THE USE OF INFORMATION TECHNOLOGY FOR COMPETITIVE
ADVANTAGE IN CANADA

by

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ABSTRACT

This thesis reports the findings from an empirical study of eleven information systems built by Canadian companies and installed in their customers' premises. It examines the factors which enable or inhibit the success of these strategic information systems. Specifically, it investigated factors which enable a company to:

1. Create a customer-oriented strategic system (COSS) before its competitors.
2. Achieve a high level of adoption of the COSS by the customers.
3. Achieve competitive advantage from the COSS.

Also examined were the effects that the COSS had on the company which originated it.

The findings are as follows:

1. Factors which were associated with "first-movers" are:
   a. A corporate sense of urgency.
   b. Management support (the chief executive or a champion).
   c. A competent, proactive IS department.

2. Factors which are associated with high early adoption are:
   a. A well-identified need recognized by the customer.
   b. A low price charged for the use of the COSS by customers.
   c. A COSS that matches the desired company-customer relationship.

3. Factors that are associated with low early adoption are:
   a. Absence of a recognized need by the customer.
   b. A high price charged for the use of the COSS.
   c. A sales team with low competence at selling the COSS.
4. Factors associated with high late adoption and high competitive advantage:
   a. Many enhancements made to the COSS over the years.

5. Factors associated with low late adoption and low competitive advantage:
   a. A system that is perceived to be of poor quality.
   b. A lack of continuity of the champion.
   c. A system that has had few enhancements.

6. The main effects that a COSS had on the originating companies were:
   a. The IS operations staff needed to change their service levels, procedures and attitudes.
   b. The product sales people who had to sell the COSS needed to upgrade their skills to become comfortable selling an information technology system.

In summary, the findings showed that the competitive advantage which accrues from an information system can take many years to become reality. It is imperative that companies wishing to create such systems take the time to develop a customer-oriented strategy, to develop a good quality system and to prepare for several years of enhancements.
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CHAPTER 1. INTRODUCTION

1.1. OBJECTIVES

In 1982, when periodicals such as Business Week reported on American Airline’s Sabre system and The Wall Street Journal described Merrill Lynch’s Cash Management System, it became obvious to industry observers that companies had found a new weapon to use against their rivals. Information systems were emerging from a supporting role to make major contributions to the future of many companies. Since then, academics and practitioners have been highly interested in the potential of this new phenomenon, the strategic use of information systems. Many questions, both theoretical and practical, were asked:

- How does one find opportunities for strategic systems?
- What kind of companies/industries can be affected by the use of strategic systems?
- What can strategic systems contribute?

The overall objective of this research project was to address some of these questions by examining a set of systems which had been developed in Canadian companies. More specifically, the project set out to develop ideas about the factors which might make such systems "successful" in the business sense in other words, systems that would strengthen the competitive position of the companies which built them.
1.2. BACKGROUND

1.2.1. Linking Information System Plans to Business Plans

Since the early 1970's, practitioners and academics have been interested in creating planning methodologies which link the Information System (IS) plans to the strategic plans of the business. IBM pioneered this practice with its Business Systems Planning methodology. This approach was significantly different from previous attempts because it focused on identification of corporate needs rather than the needs of a particular manager or function.

In the next few years, several information system planning methods were developed by major consultants (e.g., Nolan & Norton, James Martin, and Bob Holland), and academics (Rockart, 1979). There was considerable emphasis on linking an organization's strategy set to its IS strategy set (King, 1978).

1.2.2. Emergence of Strategic Systems

In the early 1980's, two important and independent developments took place. First, examples of information systems which shaped, rather than supported strategic business plans emerged in the popular literature (e.g., the Merrill Lynch cash management system and the American Hospital Supply on-line order entry system). Second, Porter (1980) published his theories concerning the competitive strategies which an organization can adopt to counter the competitive forces in its particular industry. Subsequently, based on Porter's models, IS academics
began to describe the **strategic potential** of IS and the probable effects information and information technology would have on the competitive stance of an organization (Parsons, 1983; McFarlan, 1984).

Two things were clear. First, these strategic systems could not have been identified with traditional IS planning methods. The planners, who were examining the internal operations of the company to find automation opportunities, were not looking in the right place. These new strategic systems would most likely be found by examining the **linkages between an organization, its stakeholders, and its environment**.

Second, Porter’s frameworks provided a concise, understandable way of analyzing the influences of information technology. By using his framework, it became obvious, in retrospect, that the only strategic value most of the current systems had was improving cost-effectiveness. While an attention to cost is always wise, Porter made it quite clear that support of other competitive strategies, such as differentiation, required other types of IS support.

**1.2.3. Development of Frameworks**

During the next few years, much activity was undertaken by academics and practitioners to understand this new phenomena. The first results of this work were a several frameworks designed to help a company **identify opportunities** for the new type of system:

1. Porter (1980) proposed a model of the five competitive forces (buyers,
suppliers, industry rivals, new entrants, and substitute products) influencing an organization. He claimed that, by examining each competitive force, ideas for information systems which would strengthen the company's competitive position could be found.

2. Porter (1985) introduced the concept of the "value chain", which included activities such as inbound and outbound logistics, operations, marketing/sales, and servicing. To gain competitive advantage a company could identify how information technology would assist it in performing these activities at a lower cost or in a way that leads to better differentiation (e.g. better service).

3. Wiseman (1985) proposed a search technique using a matrix consisting of three "targets" (Customers, Competitors and Suppliers) by five "strategic thrusts" (Differentiation, Cost, Innovation, Growth and Alliance). By examining all positions on this grid, opportunities for strategic information systems would be discovered. He suggested a further two questions to tie the results to policy formulation: should the resulting opportunities be used in an offensive or defensive way, and will the system be used internally or provided to the targets.

4. Ives and Learmonth (1984) developed the Customer Resource Life Cycle framework to identify areas where a company could use information technology to provide better service to its customers.

5. Synott (1987) proposed an "Information Weapon" model outlining alternative strategies (leader, follower), foci (external, internal) and levels (productivity, information and innovation) for companies wishing to gain competitive advantage.
1.3. **DEFINITION OF A CUSTOMER-ORIENTED STRATEGIC SYSTEM (COSS)**

The frameworks addressed only one piece of the puzzle of the strategic system phenomenon - namely, how to identify areas of opportunity for these systems. Little else was known about the next steps in the process how to develop such a system, how to implement and support it, and how to measure its success. These were the questions which the current research set out to investigate. First, the unit of analysis had to be defined.

For the purposes of this project, Wiseman's (1984) definition of a strategic information system was adopted. He defined a strategic system as:

"... a computerized information system used to support an organization’s strategy, its strategy for gaining advantage over its competitors."

This simple definition captured the entire essence of the word "strategic", without limiting it to a certain time frame (e.g. was the competitive advantage sustainable over several years), or a certain method (e.g. was the result to lower costs, raise revenue or ward off competition). It also met the need of the project for a definition which could encompass successful and unsuccessful systems and systems which were built with different motivations.

Although there are many types of systems which can improve a company's competitive position, the project has investigated one specific category of strategic information systems - those which link a company to its customers. This
particular type of system was chosen based on a study (King, 1986) which found that customer service systems had been implemented by 70% of the respondents to his survey. These findings indicated that customer-oriented systems were important to companies and also were prevalent enough that a sample of them would exist in Canada. To distinguish these systems in name from other types of strategic systems, we called them **Customer-Oriented Strategic Systems (COSS)**.

The idea of "linkage to customers" was operationalized by selecting systems which the customer operated from his/her own premises. The definition required that the customer explicitly accept the system at the site and learn how to operate it.

The project labelled such systems "strategic", because of the researcher's strong belief that a profit-oriented company's motivation for building a system to strengthen linkages with customers is always undertaken for the purposes of gaining some type of competitive advantage. This belief was subsequently borne out in the systems that were studied.

The selection criteria for the sample were:

1. The system was developed by a profit-oriented company to support a particular product or line of products. It was marketed to current and potential customers of the product. The customers had a choice about buying the product and they had a choice about accepting the system. Accepting the system was not mandatory after they decided to buy the
product.

2. Customers who accepted the system would operate it from their own premises. The company supplying the COSS would provide systems support and maintenance.

3. The system had to have been installed for at least one year prior to the beginning of the research project. This condition was included to enable the project to discuss the effects of the system.

4. The system should have been a "first-mover" in the relevant industry and market (first-mover is defined in Chapter 4).

1.4. THESIS OUTLINE

The thesis is organized as follows:

1. Chapter 2 contains a review of the empirical work which has been done on the subject of strategic information systems. Particular attention is paid to the doctoral thesis of Runge (1985), who pioneered a systematic approach to studying this topic.

2. Chapter 3 describes the theoretical frameworks used in the research.

3. Chapter 4 describes the research design, including the research questions and methodology. Also discussed are the measurement issues which were addressed in the research.

4. Chapter 5 briefly describes each system that was investigated.

5. Chapter 6 discusses the findings specific to each research question.

6. Chapter 7 draws general conclusions and outlines areas for future research.
CHAPTER 2. PREVIOUS EMPIRICAL RESEARCH

2.1. DESCRIPTIONS

Many examples of information technology (IT) used for competitive advantage have been described in periodicals (e.g. The New York Times, The Wall Street Journal, Business Week, Computerworld and Information Systems News - for exact references, see Wiseman, 1985). Some of the most widely referenced COSSs from this source are:

1. American Airlines and United Airlines computerized reservation systems, Sabre and Apollo, respectively. This linkage between the airlines and the travel agents has earned the companies very large market shares and threatened the existence of their competitors.

2. The various systems developed by Banc One, including a 1970 installation of automated teller machine equipment. These systems have assisted Banc One in its change from being a small, local bank in 1967 to ranking in the top 10 U.S. banks by 1984.

3. CosMcK, a system developed by McKesson Corporation, which helps retailers stock, rotate and display merchandise based on system-generated marketing reports. The former president, Thomas Drohan, emphasized the strategic nature of IT by saying:

"Perhaps the single greatest advantage that the McKesson distribution companies enjoy has been - and will continue to be - in computer technology..."
Although the periodical articles do not present a complete picture of the processes by which these companies conceived and implemented strategic systems, several authors (Ives and Learmonth, 1984; Wiseman, 1985; Synott, 1987) have compiled more comprehensive descriptions of the companies and their systems to explain and support their frameworks. In addition, several important systems have been described in detail in case write-ups. The Harvard Business School has published cases involving U.S. companies (e.g., American Hospital Supply, Otis Elevators, Pacific Pride, American Airlines) and The University of Western Ontario has done the same for Canadian companies (e.g. D.H. Howden).

To date the focus has been on describing how, rather than systematically investigating why, information systems led to competitive advantage. While these efforts have been valuable in identifying the type of competitive systems and detailing their possible effects, academics have called for "a research agenda to develop and test explanatory models of IT and competitive advantage" (Treacy, 1985).

2.2. SURVEYS

2.2.1. Vitale et al., 1986

In one of the few empirical studies on this topic, Vitale, Ives and Beath (1986) surveyed 24 senior IS managers to test the relationship between two organizational factors (environmental turbulence, knowledge about information assets and opportunities) and a company's satisfaction with their process of identifying
strategic uses of IT. They found a very high correlation between both of the factors and the dependent variable, and concluded that companies should use an "adaptive" or "opportunistic" model rather than the less flexible "top-down" model of strategic IS planning. They also suggested that companies build an appropriate structure conducive to the identification of strategic applications instead of relying on a planning process to create new ideas for competitive uses of IT. These findings were tested in the current research by investigating the structure and planning processes used by the sample companies.

2.2.2. King et al., 1986

In a mail survey of 51 IS executives, King et al. (1986) investigated the use of strategic information systems using a number of frameworks. He found, using the five competitive forces model (Porter, 1980), that customer linkages were the most important area of strategic applications for 57% of the respondents. The next most important area was Product/Service Differentiation, which was ranked highest by 14% of the respondents. The following were the most important facilitators (using statistical rank) of a company's effort to create strategic systems:

- Technical support within the firm
- Existing IT leadership position
- Pressure from Competition

Similarly, the factors reported to be the strongest inhibitors were:

- Importance of other priorities
- Difficulty in assessing tangible contribution
- Lack of appropriate planning
- Lack of top management support

He also proposed a theoretical separation between the use of information technology, and the use of information, as means by which companies can use information resources for strategic purposes.

In this research project, data was gathered which tested King’s findings on organizational facilitators and inhibitors. No attempt was made to differentiate between the use of information and information technology. Results are discussed in Chapter 6.

2.3. FIELD STUDIES

2.3.1. Runge, 1985

In his doctoral dissertation, Runge (1985) made the first attempt to systematically analyze strategic systems. He studied 35 systems in depth to determine:
- How companies recognize the opportunity to use telecommunications for competitive advantage, and
- What structures or processes enabled companies to exploit the opportunities.

Runge used a multiple case study approach and gathered data using structured interviews. His sample consisted entirely of systems which used telecommunications to link a company to its customers.
Runge did not use his empirical data directly to answer his first research question. Instead, he used descriptions of the systems to test the robustness of the customer resource life cycle (Ives and Learmonth, 1984). His findings led him to make minor modifications to the life cycle model and add a new dimension labelled as the "degree of impact". This was the degree to which the system created switching costs on the part of the customer. Therefore, the first result of his empirical study was another prescriptive framework designed to identify ideas for competitive systems. We infer from his actions that he could not find any significant similarities between the methods used to recognize opportunities for competitive systems (or, alternatively, that he could not discern any "methods" at all). King et al. (1986), similarly could not identify any common methods.

To answer the second research question, Runge held an average of five in-depth interviews regarding each system. His questions were based on a taxonomical framework which had been developed by Clemons et al. (1984) and modified and extended by Runge. This framework consisted of four categories of "enabling factors" for telecommunication based information systems (TBIS): Application Opportunities, General Policies, Operational and Design Constraints, and Network Design Variables. Runge's model is represented in Figure 1.

In all, Runge's taxonomy identified about 35 variables to be investigated in the research. The dependent variable examined was the rate of adoption of the TBIS by the customers. It was measured by asking the interviewees to classify the rate of customer acceptance of the TBIS as slow, moderate or rapid.
Runge used two criteria to determine the key enabling factors:

1. those factors which were **consistently mentioned as contributing towards the successful implementation of the systems studied**, and/or
2. those factors which **correlated significantly with adoption rate**, using Spearman Correlation Coefficients (SCC).

He found five factors that qualified as key enablers:

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**Application Opportunities**
- Competitive Environment
- Customer Interactions
- Characteristics of Customers
- Product/Service Characteristics

**General Policy**
- Risk
- Planning
- Organisational Authority
- Control
- Network Design Policies

**Operational and Design Constraints**
- Availability of Technology
- Regulation
- Industry Practices
- Organisational Capability

**Network Design Variables**
- Capability
- Adaptability
- Flexibility
- Quality of Service

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**Figure 1. A Taxonomy of Potential TBIS Enabling Factors (Runge, 1985)**
1. The presence of a **product champion** (83% of sample, no significant correlation).

2. A high level of **customer involvement** in the development process (% not reported, SCC = .712, significant at the 1% level).

3. An **existing system** to base the TBIS on (77% of sample, SCC = .330, significant at the 10% level).

4. A high degree of attention to **marketing** the TBIS (78% of sample, no significant correlation).

5. The **circumvention of existing IS planning** and project selection procedures (80% of sample, SCC not reported). The TBIS had been built earlier than it would have been if the normal IS priority-setting procedures had been followed.
CHAPTER 3. THEORY AND FRAMEWORKS

Runge's project provided a solid methodological foundation upon which to base research on customer-oriented strategic systems. It was decided to replicate his work by identifying examples of the use of IT for competitive advantage in Canadian companies and to investigate whether his findings were applicable in Canada. Before proceeding, however, several changes were made to clarify and enhance the research framework.

3.1. OVERALL COSS SUCCESS

One concern was to ensure that the framework used was based on a theoretical foundation and could be shown to be exhaustive. Towards this end, a model was created (Figure 2) which represented an existing industry in which one or more COSSs had been introduced. It was reasoned that, if the diagram could be shown to contain all the relevant types of data about a COSS, then any factors influencing COSS success should be attributes of the entities depicted in the diagram.

To use the American Hospital Supply COSS as an example, the Company would be American Hospital Supply (AHS) and the Customer would be an individual hospital or a hospital buying group. The Company has a line of medical Products for sale to potential Customers. The Company and the Customer have a relationship defined by the type and quantity of AHS products which were/are sold to the hospital. Aggregated information about Companies, Customers and
Products represents an Industry.

When a company creates a COSS to support the sale of its products and/or services, a new relationship is added, emanating from the sale (or acceptance, if the customer does not pay for the COSS) of the COSS to the customer.

This way of looking at the environment of a COSS demonstrates that two events are important in discussing COSSs. The first is the production of the COSS, the second is the sale of the COSS. What this diagram cannot show is the effect that these two events have on the rest of the entities (e.g. the change in the product-based relationship between the company and the customer, the changes at the industry level). This research project investigated the factors that influence these changes as well as the factors that enabled the first two
events - the production of the COSS and the sale of it.

By visualizing the information in the COSS environment as a set of entities, the data gathering typology could be structured with a known degree of completeness. The project, therefore, was structured to gather information about the five entities (Company, Customer, Industry, Product and COSS). This approach, rather than Runge's strategic network design taxonomy, seemed to produce a good fit with the five competitive forces identified by Porter (1980), and the "supplier, customer, competitor" dimension proposed by Wiseman (1985). Runge's questions fit well within this framework as he had investigated aspects of all of the major entities.

Using Runge's question set as a guide, the COSS entity and the Company entity were broken into sub-entities. The COSS became three separate sub-entities - the COSS Development Project (the successful completion of which results in the COSS), the Functions and Features of the COSS, and the Support and Marketing programmes designed to boost the success of the COSS. The Company entity was divided into a Corporate Level (containing data about the company as a whole) and an IS Function (containing information such as the structure, status, and existing technological infrastructure of the IS function in the company). The general model which resulted from our taxonomical changes is depicted in Figure 3.

In this general model, COSS "success" is the overall dependent variable, defined in three ways:
A timely development of the COSS,
- A successful adoption by the customers (Runge's dependent variable), and
- An increase in the competitive position of the company.

At this level of analysis, attributes of all of the entities (Company, Customer, Industry, Product, COSS), have the potential to impact the success of the COSS.

Runge's taxonomy (Figure 1) did not distinguish between the first two measures
of success - the development of the COSS and its adoption by the customers. This may explain why several of his factors satisfied only one of the criteria for inclusion. For example, factors such as the presence of a product champion, and the avoidance of IS planning guidelines, were well represented in his dataset but had no significant correlation with adoption rate, the dependent variable. On the other hand, the level of customer involvement in the COSS development correlated very highly with the adoption rate. These findings make intuitive sense because the first two factors would be influential during the creation of the COSS and the customer involvement would be influential in persuading customers to adopt the COSS. Runge, however, did not distinguish between strategic systems which had been first-movers or followers and so he could not test for correlations between entry position and any of his factors.

This realization led to a separation of Runge's model into two parts - reflecting the hypothesis that the success of a COSS has many facets and that each one might be influenced by different factors. The first model related to the development of the COSS, the second related to the adoption of the COSS by customers.

3.2. THE COSS DEVELOPMENT PROJECT

Several methods were used to develop a model containing factors which potentially influence the speed with which a company develops a COSS.

Three of Runge's findings (a product champion, avoidance of IS planning and an
existing system to build upon) represented factors which would influence a company's ability to "readily respond to the opportunities seen" (Runge, p 26). The factors from his taxonomy which related to these findings (e.g. organizational capability, planning, adaptability) formed the basis of the model. They were placed as factors under the Corporate and IS Function entities.

In addition to Runge's findings, the literature on new product development and innovation added to our understanding of the COSS development process. Because a COSS has customers as its target, it can be thought of as a product, moving through the new product development phases of opportunity identification, design, test, introduction and life-cycle management (Urban et al., 1987). Although one might argue that these are generic steps which might relate to any IS project, there are differences which distinguish a COSS from an internal system and qualify it for special theoretical treatment. The major difference stems from the fact that the fate of the COSS will be decided by the market - consisting of customers, competitors, products and other environmental forces. The COSS will be competing with other COSSs. One might expect, therefore, that a COSS development project would take on the characteristics of a new product development effort, such as use of leading-edge technology, creativity, secrecy, speed and high need for team productivity. Therefore, factors which described the COSS Development Project and the IS Function were added to the model.

A COSS can be conceptualized as an innovation, both from the point of view of the company developing it and from the point of view of the customer. There is a rich body of literature which has investigated the factors enabling companies to
develop innovations. Factors such as structure (Burns and Stalker, 1981, Kanter, 1982), size (Kanter, 1982), and competition (Drucker, 1985), have been shown to correlate with innovative behavior. These findings were incorporated into the model under the Corporate Level, IS Function and Industry entities.

Factors from the Vitale et al. (1986) study on planning and technology awareness were added to the Corporate Level entity. The resulting model is shown in Figure 4. In this model, the dependent variable is the time or order of COSS introduction into the market. It distinguishes between first-movers and followers. A detailed description and justification of the independent variables is included in Appendix A.

3.3. ADOPTION OF THE COSS BY CUSTOMERS

As Kimberley (1986) stated, "how an innovation fares in the marketplace is a function of numerous factors - its performance, how effectively it is marketed, and its comparative advantage, to name just a few." To create a model which contained such factors, several sources were used.

The first factors to be added were Runge's two remaining enabling factors - a marketing programme and customer involvement in the COSS design. They were added under the Support and Marketing and COSS Development Project entities.

As mentioned previously, a COSS viewed from the customer's perspective can be conceptualized as an innovation, defined by Rogers (1983) as "an idea, practise
or object that is perceived as new by an individual or other unit of adoption". The unit of adoption in our model is the customer's organization. No single paradigm exists to explain the factors which influence adoption at an organizational level. The earliest and best accepted model (Rogers, 1962) characterizes adoption as a two-step process: the early adopters make decisions based on the qualities of the innovation, the late adopters focus on the experiences of the early adopters. This finding was incorporated into the model

Figure 4. Potential Factors Influencing COSS Development
as two attributes of the COSS (features and adoption rate). Also included in the model were Roger's (1983) factors that relate to adoption by individuals. They are:

1. Relative Advantage - the perception of how much better the innovation is than existing methods.
2. Compatibility - how compatible the innovation is with existing values and needs.
3. Complexity - how complex the innovation is perceived to be.
4. Trialability - the degree to which the innovation can be tried before it is adopted.
5. Observability - the degree to which the benefits of the innovation are observable by others.

The first three factors have been shown to be superior predictors (Tornatzky and Klein, 1982) and they were included in the model as descriptors of the Customer. The latter two were not tested.

Rogers also outlined six generic steps that an organization goes through en route to incorporating an innovation into its operations. They are:

1. Agenda Setting - identifying a problem and seeking solutions.
2. Matching - matching the problem with the innovation to establish how well they are likely to fit.
3. Adoption/Rejection Decision
4. Redefining/Restructuring - changing the innovation to fit the organization or visa versa.
5. Clarifying - moving the innovation into the organization.
6. Routinizing - incorporating the innovation into regular activities.

The project incorporated ideas from this literature into the COSS and Customer entities in the model.

The Management Information Systems (MIS) literature on strategic systems contains several frameworks which are claimed to be useful in predicting COSS opportunities. Two of these (Ives and Learmonth, 1984; Porter, 1980) were tested for predictive power as attributes of the COSS. The resulting model is shown in Figure 5.

In this model, adoption of the COSS by the customer is the dependent variable, measured in terms of rate, penetration and usage. A detailed description and justification for the individual factors is contained in Appendix A.

3.4. COSS IMPACT ON COMPETITIVE POSITION

Although a COSS may be constructed in a timely manner and enjoy a high adoption rate, it will not necessarily improve the company's competitive position. Furthermore, a change to the current position may not be sustainable. The third model (Figure 6) portrays the factors which may affect the amount and the sustainability of the competitive advantage that a company might receive from a COSS. The factors in the model are based on several hypotheses from business policy and MIS literature, including:

- Porter's (1985) claim that technological change will lead to sustainable competitive advantage only if it lowers cost or enhances differentiation and
the technological lead is sustainable.

Keen's (1985) notion of gaining advantage through added-value features which result in high customer dependence on the COSS.

The dependent variable in this model is the competitive advantage that is gained through the customer adoption of the COSS. It is divided into gains in profitability (e.g., measurable gains in sales, decreases in costs) and gains in

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Figure 5. Potential Factors Influencing COSS Adoption
competitive strength (e.g. raised barriers to entry, increases in customer loyalty, increases in switching costs). Justification for the individual factors are contained in Appendix A.
3.5. SECOND-ORDER EFFECTS

One of the questions about a COSS that had never been investigated empirically was the extent and the nature of the changes that a COSS might bring to the company which developed it. If this system represents a new way that the company wishes to deal with its customers, then it is quite conceivable that certain functions and procedures in the company will be affected. The project did not specify any hypotheses about the nature of the changes to be expected. Rather, it used the hierarchical framework (called the "7-S framework" by its authors) developed by Athos and Pascale (1981). They claim that changes can occur on many levels in a company, and use the following descriptors to describe the levels:

- **Superordinate goals** - the mission and long-term goals
- **Strategy** - the strategies put in place to support the goals
- **Structure** - the formal organizational structure
- **Style** - the culture of the organization
- **Staffing** - the level of staff
- **Systems** - the operational or control systems
- **Skills** - the skills required to do various jobs

The project investigated whether the COSS affected one or more of these areas in the originating companies.
CHAPTER 4. RESEARCH DESIGN

4.1. RESEARCH QUESTIONS

The project's research questions are as follows:

1. The Innovation Question - What factors enable a company to be a "first-mover" in creating a COSS?
2. The Adoption Question - What factors influence the adoption rate of a COSS by its customers?
3. The Competition Question - What factors affect the size and sustainability of the competitive advantage achieved by a company?
4. The Second-Order Effect Question - In what ways does a COSS typically affect the originating company?

4.2. RESEARCH METHODOLOGY

There seemed to be two ways to structure a project to investigate the research questions. The first was a case approach, largely descriptive and exploratory in nature. The data for analysis would be a combination of the perceptions of the subjects and the interpretation of these perceptions by the researcher. The second was a field study approach, with a large sample and an emphasis on quantitative results. In this approach, data for analysis would consist only of the perceptions of the respondents.

Bonoma (1985) opined that case research methods were "useful when a
phenomenon is broad and complex, where the existing body of knowledge is insufficient to permit the posing of causal questions and when a phenomenon cannot be studied outside the context in which it occurs." The first and last qualifications are true for the COSS phenomenon, the second one depended on the current inventory of empirical literature. As previously discussed, little empirical work has been done to discover the processes by which strategic systems are built or the factors which influence their success. Runge's research used a multiple case approach to study the factors which influenced adoption rate. King (1986) used a mail survey technique to classify strategic systems and to investigate the facilitators and inhibitors of COSS development. This research project creates new frameworks based on Runge's study and other literature on adoption, competitive forces and innovation. With the exception of Runge's five factors, the contents of the frameworks have not been tested. Measurement theory has not been developed for the major constructs in the framework, making it difficult to use survey techniques with any assurance that the results have validity.

The stage of development of the research into the COSS phenomena (using the Bonoma(1985) continuum of "drift", "design", "prediction" and "disconfirmation"), seemed to be somewhere just beyond the drift stage. As he states, "drift becomes design with the development of a tentative explanation of the divergent observations." In the design stage, "cases might be collected... to provide a sufficient (not statistically so) body of observations with which to "flesh out" the model and permit the development of some generalizations to account for the divergences in observation." Since the project's models were very tentative and
potentially incomplete, it was decided to employ a case research strategy to firm up their shape and contents.

Choosing the case approach meant that the study could be treated as essentially a replication of the Runge project. There were only a few decisions to make in its execution. The participation of companies with COSSs had to be solicited, the Runge interview guide had to be altered and the interviews conducted. The plan was to interview two types of people about each system - the IS manager and the executive who was responsible for the system. They would be asked the same questions, thus improving the validity of the findings. However, in any comparative analysis, the values for many of the factors would ultimately be interpreted and determined by the researcher.

4.2.1. Sample

The population of COSSs in Canada is unknown and discovering it was beyond the resources of the project. It was decided to use a convenience sample generated from colleagues. The criteria for including a COSS in the study was:

1. The company had to be profit-oriented.
2. The COSS had to be operated at the customer's place of business, either through a remote terminal or a personal computer with a modem.
3. The customer had to be able to refuse the COSS while still purchasing the product.
4. The COSS had to have been available in the marketplace for at least a year.
Once a company was referred to the project as being a candidate, the researcher approached either the line executive who had responsibility for the COSS or the IS manager. In all cases that fit the criteria for inclusion, the executives agreed to participate in a two-hour interview.

The resulting sample consisted of 11 systems located in nine Canadian companies (see Chapter 5 for the descriptions) - four banks, an oil company, an insurance company, a hardware wholesaler, a paper manufacturer and a computer manufacturer (Descriptions of the systems appear in Chapter 5). Although several of these companies were wholly owned subsidiaries of international firms, the Canadian management had acted autonomously in deciding to create a COSS.

Ten of the systems were "first-movers" in the relevant market area. The decision was made to select a preponderance of first movers in order to investigate the structures and processes which are associated with companies who were first.

4.2.2. Interview Guide Contents

Although Runge's interview guide was created using a strategic network design framework, it contained questions which pertained to most of the factors in the newly developed models. Additions and alterations were made as follows (Appendix B contains the full text of the resulting interview guide):

1. Questions were rearranged into a format patterned after the life-cycle (i.e. idea formation, development, marketing, support) of the system.

2. Additions were made to investigate the dependent variables (entry position,
adoption rate, competitive advantage, second-order effects). For example, questions were added to probe for quantitative measures of adoption rate such as actual number of customers over time, number of target customers, and usage rates by customers. Questions regarding competitive advantage (see section 6 of the interview guide in Appendix B), were added to investigate the impact of the COSS on:

a. The company's profitability (such as sales, price, costs).

b. Other measures of competitive strength (such as image, entry barriers, customer loyalty, industry-level changes).

c. Internal changes in the company (such as strategy, skills required, structure).

Limitations

Although the theoretical frameworks had been designed to be complete, the research design limited the project's ability to fully test each framework. For example, since customers were not interviewed, it was not possible to measure their perception of the complexity of the COSS, or their level of satisfaction. Another variable of interest which could not be measured was the increase or decrease in transaction cost experienced by customers. Similarly, since the written material taken from each company was limited to a description of the COSS, the following variables were not operationalized:

- Corporate structure
- IS structure
- Market Position
4.2.3. Interviews

The interviews were held at the interviewee's place of business and lasted from 1 1/2 to 2 1/2 hours. For 8 of the 11 systems, the researcher was successful in gaining access to both the executive and the IS manager who were responsible for the COSS. The interviews were all tape recorded and the researcher took additional notes during them. Written material describing the development and the marketing of the system was obtained whenever possible. After the interview, the researcher made notes on the major points made by the interviewee.

4.2.4. Data Analysis

There were several steps taken in the analysis of the raw data.

- **Assimilation- organizing and condensing the data**

  Worksheets were made up, entitled Company, Customer, Industry, Product, COSS and Results. The interview questions which pertained to each of these topics were transferred onto the sheets. A copy of each of the worksheets was created for each COSS. The researcher then, using the interview notes and the tape recordings, filled out the worksheets for each system. If different answers to the same question were given by different interviewees, the researcher used her knowledge of their position and their proximity to the COSS to decide on a single answer.

- **Interpretation - summarizing the data onto high level frameworks**

  The researcher made up 3 high level frameworks - one page each for
COSS development, adoption and competitive advantage. Using the entities as headings, she summarized, from the worksheets, the information which the interviewees had particularly noted concerning the three dependent variables. This was done to prepare a concise overview of each system which stressed the most important facilitators and enablers of each outcome.

Ranking - ordering the systems based on dependent variable values

The researcher then ranked the eleven strategic information systems on each of five dependent variables (See section 4.3.2 for a discussion of the measurement of each).

a. Entry Position - was the COSS a first-mover or a follower?
b. Adoption Rate for the first year - was the COSS adopted slowly, moderately or quickly by customers?
c. Adoption measured four or five years later - what is the penetration (in percentage) that the system has achieved compared with targets?
d. Competitive Advantage measured quantitatively - what gains has the company made in increasing sales, adding customers, raising product prices, or lowering costs as a result of the COSS?
e. Competitive Advantage measured qualitatively - what has the COSS contributed to the company in terms such as raising entry barriers, raising switching costs, improving image and supporting strategy?

Comparison - Determining which independent variables showed support for the hypotheses.

Using a computer-based spreadsheet package, the researcher then coded results from each independent variable in the model (each one became a
row in the spreadsheet) for each COSS (each one became a column in the spreadsheet). Five subsets of the spreadsheet were created, each containing the variables which were expected to affect one of the dependent variables. The COSSs were ordered by their ranking on the dependent variable. This allowed a visual interpretation of the results and highlighted trends and commonalities.

To analyze the data, the systems were categorized into two or three groups for each dependent variable (i.e. first/late entrants, slow/moderate/fast early adoption rate, high/low penetration percentage, winners/hopefuls/losers on competitive advantage measures). To test the reliability of the researcher's groupings, a professor also ranked and grouped the COSSs on all five dependent variables, using the procedures described above. Although there was some variation in the rankings, no systems changed from one group to another in this procedure.

4.3. MEASUREMENT ISSUES

4.3.1. Reliability

Reliability is a concern in any empirical work. If one cannot show that the data being manipulated has some stability, then any findings drawn from the data are cast into doubt. In this research project, the data was largely taken from long (1 1/2 to 3 hours) interviews in which participants in a process (the development and management of a COSS) were asked post-hoc questions about it. This data
collection method posed problems such as:

- Did the interviewees remember accurately (i.e. factually and completely)?
- Did they shade the truth to make themselves look better?
- Were their answers influenced by the outcome (i.e. the success of the system)?
- Did the interviewer record the answers correctly?
- Was the coding of the answers done impartially?
- Were conflicting answers given by various respondents resolved correctly?

These problems were alleviated in several ways:

- By gathering archival and anecdotal information about the COSS.
- By using the interviewer’s information systems experience in the interview.
- By using multiple ways of asking the same question.
- By interviewing multiple people in the company. To aid in resolving conflicting answers, a history of each person’s involvement with the COSS was taken.
- By recording the interviews.
- By having a colleague code a sample of the data.

Each of these techniques for increasing the reliability of the data is discussed in the following paragraphs.

Before the interviews, the researcher discussed the system with other participants in the IS industry - to get objective, albeit second-hand, opinions about the development and the outcome of the COSS. This information allowed the researcher to create the impression that she had other sources of data and that answers which were less than truthful could be challenged in the interview. This
implicit threat was actually carried out in several interviews when it seemed that the interviewee was placing too favourable a light on the data. Another source of a-priori information was the archival data printed about the system in the newspapers, annual reports and in the company's marketing literature. This information allowed the interviewer to spot unusual features or objectives and to question the interviewee about them.

The interviewer has many years of experience as a practitioner and consultant in the information systems field. This experience gave her a body of empirical data to take into the interview against which to test the interview data for significant deviation. This background personalized the interviews with the information systems managers and gave the interviewer the credibility needed to probe beneath surface realities.

The interview guide (see Appendix B) was designed to ask for information in several ways. Each construct (i.e. customer involvement in design), was introduced by first asking an open question about the topic. Based on the answer, another set of questions was asked to probe for quantification or further explanation of the answer. Then a final question was asked to assess the factor's importance to the success of the COSS. In this way, the interviewee was led into a subject, first by general discussion and then by closed questions. He/she was given the opportunity to re-evaluate a hasty first answer as more detail emerged. This method of questioning was developed based on Bouchard's (1976) "funnelling" concept.
In all cases, the interviewer attempted to speak to multiple people about a particular COSS. The objective was to question policy makers in both the product-related functional area and the information systems area. In three cases, this attempt failed and the only interviewee was the information systems manager who was in charge of the development of the system. In the other cases, from 2 to 6 people were interviewed about each COSS. One of the positive results of multiple interviews was that questions which one person felt unsure about answering were addressed by other interviewees, giving the researcher a more complete set of data. Another, more problematic result of multiple interviews, was that conflicting answers were given to a few of the questions. In this case, the interviewer either clarified the conflict in the interview or applied information about each individual’s proximity to the system to make the judgement about the final answer.

Before the interview commenced, each interviewee was asked if the interview could be recorded. Confidentiality of the individual COSS data was promised, although the name of the company and the COSS was to be published. All interviewees agreed to have the proceedings recorded. This gave the interviewer the freedom to listen and respond to what the interviewee was saying and to write only the essentials of the comments on the interview guide. The recordings proved invaluable during the data analysis to clarify points in the notes and to examine the way an answer was structured.

In order to check on the objectivity of the researcher’s coding of the responses, a professor was given the interview notes and was asked to check her
interpretation of the data. This procedure resulted in a few changes in how the data was coded but did not alter the data content.

4.3.2. Construct Validity

Measuring the "First Mover" Construct

The first research question investigated the factors which enabled companies to be "first-movers" in developing a COSS. First-mover was previously defined as being first to introduce a COSS in the relevant market area. Therefore, if a company's market was Quebec, it had to be the first industry competitor to introduce the particular COSS in Quebec. Whether or not it had been introduced in the U.S. or in Western Canada was judged to be irrelevant.

During the pre-study activities, it became obvious that being "first" is a relative term. Several interpretations are possible, all based on the systems' life-cycle. For example, one could choose the company which was first to start development, first to pilot test, or first to install the COSS. In many industries, these distinctions were unimportant since there was a period of several months or several years in which the COSS was the only one available in a given market area. In the financial industry, however, every competitor will have a version of a mainline COSS within the space of 2 years and so the distinction between first-mover and follower is more difficult. In the case of the banks, a period of 2 to 4 months was allowed within which the participants were considered to be "first". For example, both the Bank of Montreal and the Royal Bank were considered to be first movers since their respective cash management systems
were delivered within two months of each other and the Bank of Montreal offering was the first in Canada.

Choosing the date of commencement of development is not appropriate since companies often have several projects in development which may or may not ever be released. The date of the announcement of the COSS (which often coincides with the industry's annual conference) can be a good date to choose if specific details of the system (e.g. functions, cost, pilot results) are available. Without these details, one can surmise that the announcement has been made as a marketing ploy or as motivation for the company's developers. In the absence of these details, the pilot test date or the first installation date can be used.

In the interview, several questions were asked to probe the first-mover construct. They include:

1. Did you copy this system from another competitor or another industry?
2. Were you first into the market with this kind of system?
3. How and when did the competitors react?

These questions provided enough data to determine whether or not the system was a first-mover.

Measuring "Adoption Rate"

Runge's study used a single question to probe for adoption rate. This study tried to understand the complete adoption construct by using questions such as:

1. What was the target number of customers for the COSS?
2. How may signed up during the first year, second year etc?
3. Would you say this was slow, moderate or fast adoption?
4. How many customers do you have now?
5. What factors influenced this adoption rate?
6. What is your current target?

The result of this line of questioning was a set of data which was difficult to force into a single dependent variable construct such as adoption rate. To solve this problem, the project created two dependent variables, the first called adoption rate in the first year which was based on the rate of adoption as perceived by the interviewee. This variable was chosen so that the findings of the study would be comparable to those of Runge. The second was the adoption at the end of 4-5 years. This was measured by calculating the percentage of the target population that had accepted the COSS (i.e. the penetration). The researcher felt that eventual penetration was a more meaningful measure of the adoption success of the COSS. The companies were then ranked on both dependent variables and the researcher examined the data to see if the enabling factors were the same for both.

Measuring "Competitive Advantage"

In MIS literature, little success has been achieved in the attempt to define the bottom line effects of an information system. It seemed, however, that because strategic systems are built expressly to contribute towards the competitive strength of a product line, and because factors other than adoption rate might prove important in this endeavor, another attempt should be made.

Such a measure would enable the research project to test for factors which
separated companies receiving a significant competitive advantage from those receiving little. Accordingly, this project attempted to measure the competitive advantage construct.

Underlying any notion of success in a business context is always the idea of contribution to the bottom line. This contribution, however, is often indirect (e.g. the system locks the customers into the company and they are less likely to switch suppliers) and hard to measure. The perception of the respondents may be the most important measurement rather than numbers in a ledger.

The interview was structured to gather a comprehensive set of data about the effects of the system. The respondent was first asked an open question about the benefits that the COSS had brought to the company. This question was followed by a set of closed questions designed to quantify any stated benefit and to identify benefits in areas not mentioned. The interview was concluded with a yes/no question about the success of the COSS and an open-ended question asking the respondent to comment on the reasons for this level of success.

Before the interviews commenced, the researcher had expected to code the competitive advantage construct as a composite of actual results to date plus anticipated future results as measured against objectives set for the system. After the first interviews, ideas about comparing objectives to results were discarded. Two classes of objectives were mentioned by interviewees:
- Written objectives in the business plan.
- Unstated objectives in the originator's mind.
Although these two sets of objectives could have been the same, they often were not because:
- The business plan objectives were created to gain approval and were structured to conform to the company’s cost/benefit measurement methods.
- The originator’s objectives were often strategic in nature and not quantitatively specified or they were confidential (e.g. downsizing the sales force, manipulating the customer’s behaviour).

Because many of the interviewees alluded to the presence of unwritten objectives, measuring competitive advantage against the written objectives would not operationalize the benefits that the company was anticipating. Gaining reliable access to the unwritten objectives after the fact seemed highly problematic.

Therefore, the competitive advantage construct became a composite of actual quantifiable results plus anticipated future results. The future results had to be based on identified qualitative changes which had the potential to be realized quantitatively (e.g. when the customers renewed their contract or when the industry structure changed). Quantifiable results mentioned by the interviewees included:
- New customers
- Increases in sales.
- Reductions in costs.
- Increases in product price.

Qualitative results mentioned included:
- Increases in image in the industry.
- Increases in customer satisfaction.
- Higher entry barriers.
- Higher switching costs.
- Lower customer bargaining power.
- Broader customer contact.

According to Porter (1985), "there are two basic types of competitive advantage that a firm can possess: low cost or differentiation". He discusses how being a low cost producer can result in sustained above-average performance because it produces high margins. Similarly, differentiation which justifies a premium price can produce above-average margins. Using Porter's ideas, we can partition the benefits mentioned by the respondents into either a differentiation or a low-cost outcome. Although the qualitative benefits may not have resulted in higher margins, they differentiate the product and have the potential to support a premium price.

The project data, therefore, contained two sets of benefits identified by respondents: one containing items that could be traced to increases in current profitability and one with items that had the future potential to produce higher profitability. Although companies are interested in sustainable competitive advantage, the research project had no way of assessing the sustainability of current increases in profitability. Likewise, it had no way to assess the probability or the size of the competitive advantage which might be realized from the potential sources. Therefore, the competitive advantage that a COSS produced for a company had to include all items from either list. Because the items in both lists were not independent and therefore, were not
additive, procedures which involved weighting and rating the items were not appropriate. The resolution of this quandary lay in having the researcher, and independent colleagues, rank the COSSs based on the raw data.

In summary, this attempt, like others which preceded it, provided only an ordinal way to assess the "success" of an information system.
CHAPTER 5. A DESCRIPTION OF THE SYSTEMS

In this section, each of the systems involved in the research will be briefly described. Because an assurance was given to the respondents that the competitive results of individual systems would not be divulged, no data on adoption rates or benefits are provided. This section is included to give the reader an idea of the type of systems and companies which formed the sample.

Most of the companies in this sample are very large. In this study, however, our concern has not been with overall size, but with the company's competitive position with respect to a specific product. For example, at Imperial Oil, we investigated its sales of petroleum products to commercial truckers. At Canadian Imperial Bank of Commerce, we investigated its securities management offering. In only one case, IBM Canada, did the COSS support the entire product line. The smallest company in the sample was D.H. Howden, with annual sales of approximately $120 million.

In 1981, the Bank of Montreal, a national bank with $85 billion in assets, became the first Canadian bank to produce a terminal-based cash management system. It was designed to assist the treasurers of Canada's largest corporations who had deposit accounts with the Bank. This system enabled them to make decisions about allocation of funds based on more current information and to see the results of their decisions immediately. It was called DIRECT LINE BANKING, (DLB) and was an extension of the central MECH system which controlled all updates to the online database of current accounts. In fact, customers who used the Direct Line Banking system were given a terminal
which could execute the same transactions that the tellers used in the retail branches. Because of the Bank’s need for data security, the DLB terminal had an attachment (called the "blue box"), which performed the necessary security routines.

Two months later, the Royal Bank of Canada, North America’s sixth largest bank, announced their cash management system, called CASH COMMAND. It was built at the same time as the Bank of Montreal’s system and directly competed for the same type of customers. The system used existing databases (day-old copies of the master databases) and new user-oriented transaction software. The system has been enhanced continually over the years and is now offered on an IBM-PC. Customers receive up-to-date information on bank accounts maintained anywhere in Canada, and can move money between various current accounts and short-term investments.

In 1972, D.H. Howden, a medium-sized Ontario-based hardware wholesaler, introduced a very simple system to the dependent and independent hardware and lumberyard retailers. It was called MSI, and consisted of a hand-held MSI terminal and modem at the retail location and a receiver and data collection programmes at Howden headquarters. When the retailer wished to place an order, he/she would enter a header code and the stock numbers and quantities. When the order was complete, the handset would be placed in the modem and the order would be transmitted to Howden. No information was received back by the retailer. This system replaced the former order-entry method of long distance phone calls and supported Howden’s strategy of expanding nationally while
maintaining only one warehouse, in London, Ontario.

In 1983, Howden offered their dealers a system called DISPLAYPHONE, named after the type of terminal on which it ran. This system allowed dealers to enter into 2-way communication with Howden, to update their orders or to send unstructured messages. Within an hour of placing an order using the MSI system, a dealer could check its status and substitute items for those which were out-of-stock. A later enhancement of the system allowed them to reserve stock in their name. It was Howden’s belief that dealers could replace up to half of the average of 10% out-of-stock items by substitution and this would increase the sales of both the dealer and of Howden. This system was very innovative and won Howden one of the four industry awards given annually to North American hardware wholesalers.

In 1984, Laurentien General Insurance Company Inc., the leading general insurer in Quebec, offered independent insurance brokers a system called INFO 2000. This was a system which automated the back office of the broker, with modules which kept information on clients, policies, premiums and the general ledger. It supported all insurance policies, including those that were written by Laurentian. Several similar personal computer based systems were announced by competitors in the next few months, but the Info 2000 system is still the only one based on a Local Area Network architecture. The system has been updated continually since 1984. Laurentian’s latest enhancement to INFO 2000 will automate the product-related functions (such as premium calculation, risk assessment, and policy issue).
National Bank, a large, Quebec-based bank, bought and modified a commercial software package in 1985 which would allow retailers to obtain instant credit authorization and capture the drafts from their Mastercard transactions. Several months later, the system was upgraded to handle VISA transactions since retailers did not want two terminals on their premises. The benefits of this system for the retailers included earlier payment and less paperwork.

In 1982, Imperial Oil Ltd. announced the CARDLOCK system, which allowed commercial truckers to use a credit card to obtain fuel from unattended sites in Western Canada, Ontario and the Maritimes. Although the hardware was new, the central software which processed the data sent from the sites had been in place for a number of years. This software processed the transactions and issued invoices to the trucking companies.

In 1985, IBM Canada announced IBM INFO, an electronic messaging system designed to replace all non face-to-face communication with customers. All IBM Canada employees had been using electronic mail for several years and IBM INFO was designed to give their customers the same benefits that they had experienced internally, namely an avoidance of the frustration of telephone-tag and mail delays. This system was the culmination of a long process of connecting IBM with its customers - begun in the mid 1970's to support the 4300 line of computers with a communication offering called Direct Support Facility. Customers of all sizes, from MVS users with PROFS software, to personal computer dealers with a modem and a communications package, could now send messages to any IBM employee. The IBM INFO software is being
evolved from this very general beginning into a set of structured application-like offerings supporting customer-initiated functions such as placing orders, tracking invoices and solving system problems.

One of the COSSs which Canadian Imperial Bank of Commerce offers to its clients is called COMMSTAR. It grew out of CIBC's move to automate the internal operation of their securities management service. This service is a combination of activities such as safekeeping of stock certificates, delivering and receiving them from traders and crediting/debiting the accounts of the clients when the securities are bought and sold. The system on the client's premises enables them to order the trades and to track the results of the trades on a daily basis. It notifies them about failed transactions, thus saving them considerable annoyance and expense.

In 1985, the Bank of Montreal had started work with a commercial software vendor to customize and install the vendor's offering of an internal system to automate the creation of documentary letters of credit. These letters constitute a promise by the bank to provide a line of credit for a particular shipment of imported goods. This was a complex software system which integrated large amounts of text and data. After this was installed, they began work on IMPAC, which consisted of the customer interface and the reporting modules designed to allow customers to electronically initiate and receive documentary letters of credit. The first customer for IMPAC received the system in the fourth quarter of 1986. This system significantly shortened the time it took the importer to receive a letter of credit.
In 1985, Abitibi Price, the world's largest supplier of newsprint, announced a COSS called ABITROL. This system, which runs on a PC installed in a newspaper's production facilities, performed the function of newsprint inventory management. A subsequent release of the system tracked the use of the newsprint through the various presses and reported on paper utilization by press and by manufacturer. The system supports all makes of newsprint and it has been sold to newspaper publishers who do not currently buy newsprint from Abitibi Price.
CHAPTER 6. FINDINGS

6.1. INTRODUCTION

In the following four sections, results for each of the research questions will be presented. Individual factors which were found, either by statistical or qualitative methods, to be significant in each model will be presented. Then the model as a whole will be evaluated to determine if there is evidence that it is useful in describing the COSS phenomenon. Each of the factors which Runge (1985) found to be important will be discussed under the appropriate model (Innovation or Adoption).

Four spreadsheets of source data are presented in Appendix C. Each shows the factors relating to a specific dependent variable, which are:

1. COSS entry position.
2. Adoption rate after 1 year.
3. Adoption penetration after 4 or 5 years.
4. Overall competitive advantage - both quantitative and qualitative.

In each spreadsheet, the companies are ordered with respect to their ranking on the dependent variable in question. Because we wished to preserve their anonymity, systems have been identified with a letter rather than a name. These letters are not consistent across the spreadsheets (i.e. COSS "B" on spreadsheet 1 is not the same system as COSS "B" on spreadsheet 4).
6.2. THE INNOVATION QUESTION

The research project set out to find the factors which enabled companies to be first-movers in building and implementing a COSS. This was a criterion for inclusion into the study sample and ten of the eleven systems met this criterion (the researcher discovered that the eleventh system was a follower during the interview). Of the ten systems which were first entrants, many have similar characteristics. The data to support these findings is presented on the first spreadsheet in Appendix C.

6.2.1. Industry

When asked to rank the strength of various competitive factors in their industry, most (80%) of the interviewees reported that the rivalry among existing competitors was very high. This rivalry took two forms: a direct product-oriented rivalry and a COSS-inspired rivalry. Many interviewees reported being motivated by perceptions that rivals were developing COSSs at the same time as they were. They also reported perceiving a strong threat from new entrants (70%), especially in the financial industry (whose members constituted 55% of the sample), where deregulation had spawned new competitors.

As might be expected, many of the interviewees mentioned customer bargaining power to be one of the strongest motivators for building a COSS (60% reported high bargaining power, 30% reported moderate). In several instances, a small number of large customers represented a significant portion of the revenue. Many of the COSSs were built in the hope that electronic linkages would increase the
quality of relationships, raise switching costs and/or reduce the price sensitivity of these large customers. Any of these outcomes would constitute a lowering of the bargaining power of the customer.

6.2.2. Corporate Level

Several of the companies (60%) reported that a specific person was the unequivocal champion of the COSS, playing a very important role in acceptance within the company and in its actual development. This finding is consistent with Runge's study. In one company, the champion, who happened to be the Comptroller, developed a strategic vision of increasing sales through improved customer ordering mechanisms. He convinced the company President and Sales Manager to support the idea, bargained with vendors over hardware prices, and travelled across Canada educating customers and installing the system. His presence in customer sites was visible proof to his company and to the customers that this COSS was an important part of their future together.

Another factor reported by 50% of respondents to be very important in developing the COSS was the support of the Chief Executive Officer. In one financial institution, the Vice-Chairman ran a full-page advertisement in a national newspaper announcing the COSS while it was still in very early stages of development. He then took the unprecedented step of holding monthly meetings with the Vice President of Information Systems to discuss the system's progress. The functional Vice President also was motivated by this "support". He reported a conversation in which the Vice-Chairman warned "If they (the competitors)
When discussing their corporate style, 90% of the companies mentioned a strong drive to be number one, either in all parts of their business or in the specific product line affected by the COSS. They had developed clearly articulated strategies for success and everyone in the company had a role to play in their execution.

6.2.3. IS Function

Building systems to link to customers is a normal way of doing business for many of the companies in the sample, as 80% of them reported previous COSS experience.

Runge's study found that 75% of the systems in his sample had been in existence before plans were made to link the company and its customers. The percentages were not as high in the Canadian sample, with 40% of the COSSs being totally new, and 60% being built on top of internal systems or internal databases.

In most organizations (70%), the IS function was very proactive, continually seeking innovative ways to support their organizations through technology. They had developed high levels of competence and were well equipped to participate in the design and delivery of the COSS. In one company, the IS manager and his senior technologist travelled twice yearly to the United States to search for new
approaches in his industry. They were not perceived as a threat to the American companies and could learn first-hand about the successes and failures in a more sophisticated market. Although this level of proactive IS behavior is not unusual today, the actions described here took place in the late 1970s. The IS management team then produced a strategic IS plan, based on their conceptualization of the company’s future direction and information processing requirements. This plan was prepared almost two years before the company produced its first strategic business plan.

One of Runge's strongest findings was the avoidance of IS planning guidelines in 80% of his sample. In other words, 80% of the systems in his sample did not follow the rules (often a payback guideline or a return on investment hurdle rate) which determine which systems are to be developed. In the Canadian sample, the same trend was observed, albeit at a lower level. Although only 60% of the companies reported avoiding IS Planning guidelines, a further 20% reported that the planning guidelines were structured to support strategic systems which are difficult to justify quantitatively. A further 10% reported no planning guidelines in place. Only one company followed a rigid set of guidelines, and an interviewee observed "we are a very conservative company, no exceptions to the guidelines are permitted". The reason that companies circumvented the rules was to save time in the development process. With competitors and customers putting pressure on them, spending time in the IS backlog queue was unthinkable. As one Vice President remarked, "The normal planning process would have taken us 9 months to get a preliminary project proposal. We said 'You've got 9 months to turn the system on.'" The IS executive acknowledged that his planning
process had been avoided, saying "This was the only system ever developed in under one year". At another company, they described the system as "the fastest rollout the vendors had ever done world-wide".

6.2.4. COSS Project

Most (80%) of the systems took on a very high profile within the company while they were being developed. They were accorded high priority, and an abundance of resources. A few project teams used tactics designed to speed up the development effort. In one company, the project work area was guarded and separated from the rest of the IS employees. The team was split into four groups (design, coding, testing, documentation) who worked as much as possible in parallel with each other. The first release was ready in four months. At another company the line manager, who was identified as the product champion, built a complete prototype of the system in order to bypass the specifications phase of the systems development life cycle. Previously, the manager had not been closely involved with a systems development effort and was not considered to be a technological leader.

One might suspect that the high-pressure environment surrounding a COSS would result in short-cuts being taken in the testing phase of development. In the sample, the reverse was true. A total of 70% reported comprehensive pilot tests, and one company in a very competitive situation followed the pilot with a complete rewrite. One explanation of this finding might be that the companies saw the pilot as an important marketing technique (i.e. as the beginning of the
adoption process) rather than as the final stage of the development life cycle.

6.2.5. Summary

A pictorial representation of the factors which were common among the first movers in the sample is presented in Figure 7.

Figure 7. Findings - Factors Enabling Companies to be First-Movers in Developing a COSS

In this sample, there was considerable support for the innovation model as it
applies to the COSS development effort. **Companies were under pressure from the environment, champions arose to implement their visions, organizational operating procedures were bypassed, and development teams worked faster than ever before.** This is a very different scenario from the traditional systems development model, which is characterized by long waits in the IS queue, internal pressure, use of standard project management techniques and multiple checkpoints and signoffs.

If we compare the findings against existing theory and other empirical work, we find:

1. Two of the three factors which Runge found to be important are supported.
   a. **All but one of the companies with inflexible IS priority-setting procedures bypassed them.** An interesting difference between this 1985 UK study and our 1987 Canadian study was that several of the Canadian companies have priority-setting mechanisms which recognize, either explicitly or implicitly, that return on investment is not always an adequate or appropriate measure of the payback which can accrue from an IS system.
   b. **Most companies reported the presence of a champion.** Again, however, it seemed that a degree of maturity was present in some of the Canadian companies which was not present in the UK sample. Several companies which had implemented COSSs in other parts of their business had a technological and organizational infrastructure which supported the COSS concept. The existence of a champion was not required to implement another COSS.
c. Only weak support (50%) existed for Runge’s finding that most (77% in his sample) COSSs are built on existing systems.

2. With respect to Porter’s five forces model, most of the companies were in situations characterized by high customer bargaining power, a high level of rivalry and a threat of new entrants.

An Exception

There is one COSS worthy of extra discussion since it did not fit the pattern developed thus far. This company claimed to have developed the COSS without CEO support and without a champion ("being a champion is not the most popular thing to do. We don’t promote champions."). The firm followed the normal, rigid IS planning process, and characterized the IS function as reactive and having a low awareness of the business. In this company, being in the IS function is considered a type of "purgatory" for a rising manager, since it is physically and, seemingly, psychologically, separated from company headquarters. In addition, the COSS was developed using traditional methodologies and was undistinguishable from other application projects in the priority it was accorded.

The explanation for this anomaly lies in the corporate history and culture, as well as in the environmental factors. The company had only recently developed a sense of urgency and combativeness. This new direction had not yet been transmitted to the IS function. They were a competent, but reactive participant in the process of building a COSS. The company was the acknowledged leader in this product line and when the functional manager expressed an interest in
streamlining internal operations, he could point to significant cost savings to justify the project. While this internal efficiency project was underway, the manager conceived of adding an interface to it and linking to the customer, thereby addressing recent customer complaints. They had the technology framework in place which linked other COSSs to customers and this new one could be added without significant redesign. In addition, the headquarters group which was responsible for marketing other technology products, had developed proven techniques which could be applied in this case. Thus, they were able to enter the market first with a COSS, drawing on these internal strengths and newly-developed sense of corporate aggressiveness.

6.3. THE ADOPTION QUESTION

The second question the project attempted to answer was "given the existence of a COSS which has been developed in a timely manner, what factors influence customers' adoption rate and the eventual penetration of the COSS market?". Identifying these factors was of prime importance to a deeper understanding of the influence of strategic systems, since acceptance by customers was hypothesized to be an important factor influencing competitive advantage. In addition, rate of adoption had been Runge's sole dependent variable.

The data used to answer this question included all eleven systems since it was felt that the one system excluded from the previous analysis was developed in sufficient time for it to be competitive with the existing COSSs in the market.
In this discussion of adoption, the first section reports the findings which relate to adoption rate during the first year, the second section reports the adoption penetration measured at the end of 4-5 years. As mentioned in Section 4.3.2, the adoption rate measure was used to create findings which could be compared with Runge's. The adoption penetration variable was used to create a more meaningful representation of the long-term success of the COSS. The third section will integrate these findings and draw conclusions. The data to support these findings is presented on the second and third spreadsheets in Appendix C.

6.3.1. Adoption Rate Measured After One Year

Six of the eleven systems were reported, by the interviewees, to have had a fast adoption by customers during the first year of their introduction. Four were rated as having had slow adoption and one as moderate. Our analysis of the findings, therefore, consisted of an examination of the data to identify the variables which would clearly separate the fast-adopted systems from the slow-adopted ones.

The variable which most clearly separated the two groups was the one called "Need Expressed". This variable represented the presence (or absence) of known dissatisfaction among the customer population. Customers rarely, if ever, asked for an information system to solve their perceived problems. They did, however, complain about the lack of information quality, timeliness, and availability. Seven of the COSSs had been built in reaction to needs expressed by the customer. Six of these had experienced moderate or rapid adoption of the
system. Four systems had been built in the absence of a felt need from customers. Three of these systems experienced slow adoption.

Another distinguishing variable was the price of the COSS. Four of the fast-adopted COSSs had chosen to offer the system at a nominal cost to subscribers. In one case, the decision was made to price the system such that the adopter would be "cost neutral" to it (i.e. the cost of the system was the same as the customer's cost of doing business in the traditional manner). Three of the slowly-adopted COSSs had prices which their originators (and the customers) considered to be "high". In one case, the COSS was priced at $15,000 plus an annual maintenance fee. This price caused the decision by a customer to be placed into the capital budgeting process and resulted in very long decision times. Another COSS was priced at $2000 per month in order to recover all the development and operating costs of the system. Customers, who had previously received inferior information at no cost to them, had difficulty in identifying the savings which would justify such a purchase. They were unfamiliar (as many companies are) with the process of attaching value to more timely or more complete information.

Runge found a significant correlation between customer involvement in system design and adoption rate. In this study, only 3 COSSs had been built using customer input. All three, however, had reported rapid adoption in the first year.

One of the variables which was consistent (four out of four respondents reported
it) among the COSSs which reported low adoption was low competence of the sales people who sold the COSS. This item was added as a variable because, during the interviews, many respondents had mentioned the sales force when asked about the extent and effectiveness of the marketing programme. Most companies had created an appropriate marketing programme for the COSS (six reported marketing programmes which were superior in nature) and did not feel that the marketing effort had given them an advantage in securing adoption. Five companies, however, expressed dissatisfaction with the way the sales force had performed. All of these companies reported slow or moderate adoption rates in the first year. Most of the other companies did not mention the sales force as an important factor.

This finding is not hard to explain, but these companies had clearly not expected its occurrence. Sales people have been trained to sell a certain product line. Now they were being asked to sell an information system. They, as well as many of the customers, were unfamiliar with electronic technology. This unfamiliarity resulted in a reluctance and, in one case (in which the sales people perceived that their role was being decreased in importance), a resistance to the new assignment. Companies which did not report problems with the sales force had, for the most part, opted to sell the system using headquarters staff rather than through the existing product sales force. In summary, although this study found no correlation between Runge's marketing programme factor and adoption rate, it did find a strong negative relationship between sales force competence and adoption rate measured after one year.
A factor which was added to the study while the data was being analyzed was the degree to which the COSS matched the company-customer relationship. There were differences among the systems which prompted the researcher to create a variable measuring the degree to which the COSS conformed to the customer's desired relationship. For example, if the customer had historically maintained at least two supplier sources for each major product it purchased, then a system which supported this reality was likely to be better accepted than one which did not. Three companies in the sample recognized this fact and built COSSs which tracked the customer's inventory of all products, including those of their competitors. Four more COSSs had been built to support a single product line since the companies had recognized that the customer wanted a long-term relationship with one supplier. Of these seven COSSs, five of them reported moderate to high adoption within the first year.

6.3.2. Adoption Penetration Measured after Several Years

The sample contained six COSSs which had been available for four or more years. They had achieved market penetrations (measured against original targets) between 30% and 100%. One company signed up more than 10 times the number of customers it had targeted for. The researcher divided the six systems into "winners" (defined as COSSs which had attained 100% adoption) and "losers" (defined as COSSs which had attained between 30% and 50% of original target). All of the systems fit into one category or the other. We were interested in seeing if the variables which had separated high and low adopted systems at the one-year mark would differentiate these two groups.
Three of the variables which had differentiated the slow adopters from the fast adopters in the previous analysis, continued to discriminate between these winners and losers:

1. COSS Price
2. Need Expressed by the Customer
3. Competence of the Sales Force

As mentioned in the innovation findings, many COSSs were subjected to full-scale pilot tests. When the COSSs are sorted by adoption penetration, we find that half of the "losers" ran only short, quick-and-dirty pilots. They were very anxious to announce a system ahead of the competition and released a COSS which suffered from a paucity of features and/or technical deficiencies. The winners had run long pilots with many customers, solving problems and gauging customer response before the COSS was released. They treated the pilot as a "market test" rather than as the last stage in development. This finding supports the Rogers (1962) contention that late adopters examine the results generated by early adopters when making the adoption decision (this behaviour relates to the observability factor mentioned in Rogers, 1983). Customers who were early adopters and struggled with deficient systems sent a powerful message to those who followed.

Another variable which discriminated between winners and losers is the degree of management continuity. This factor is not mentioned in the models but was added to the study since several interviewees attributed their success, or lack of it, to the continuity of the vision and leadership of the champion. Two of the
losers in the sample expressed the view that their poor penetration was a direct result of the champion being transferred to other duties after the introduction of the system. In one instance, the company did not have a single manager in place who was present during the idea formation or the development of the COSS! Organizational memory is considered to be an important part of corporate culture. The transfer of many managers into and out of a function disrupts the building of such a memory and can dilute the function's ability to implement long-term strategies. As one manager who had been transferred away from the COSS ruefully remarked, "In 1981 and '82, I lost control of the system and we sagged in vision. A product champion must do some stringent handovers to successors."

A variable which did not strongly discriminate the winners from the losers but was mentioned by the lowest-adopted system and the highest-adopted system as being a determining influence on the adoption rate was the number of enhancements made to the COSS. One respondent remarked that, for organizational and technical reasons, they were unable to make the changes that the early adopters desired. This caused low customer satisfaction and, ultimately, contributed to a low overall penetration rate. The winner noted that its system had undergone enhancements continuously since it was introduced. In this way, they were able to turn an initially low adoption rate into a very fast one after several years of responding to customers' requests for change.
6.3.3. Summary

A pictorial representation of the factors which influenced the customer adoption of the COSSs in the sample is shown in Figure 8. Factors are of three types:

1. **Enablers.**
   These are factors which, when present, are associated with high adoption rate. In the diagram these factors are followed by a plus sign (+). For example, all systems which involved customers in the design process achieved fast adoption. COSSs with no customer involvement showed mixed results: some fast, some slow. Therefore, Customer Involvement was considered to be an enabler.

2. **Inhibitors.**
   These are the factors which, when absent, are associated with low adoption rate. In the diagram, these factors are followed by a minus (-) sign. An example is the factor called Low Sales Competence. It was mentioned by respondents as a factor which inhibited their adoption rate but no respondent mentioned its importance in enabling adoption. It was, therefore, considered to be an inhibitor.

3. **Inhibiter/Enabler**
   These are factors which seem to affect the adoption rate in either direction. For example, a high COSS price was associated with low adoption; a low COSS price was associated with high adoption. COSS Price was considered to be an inhibiter/enabler.

These findings show only partial support for the adoption models as defined by
Figure 8. Findings - Factors Enabling or Inhibiting Adoption of the COSS by the Customer

Rogers (1983). The concepts of Agenda Setting (expressed need) and Matching (COSS matches the desired relationship structure) are supported, but others could not be validated. There are two potential reasons:

- This study did not gather data from customers and could not analyze their decision processes.
- The adoption model is not as useful to explain COSS adoption since a COSS is a system which supports a product or product-line, not a product
There is partial support for Runge's factors in the sample data. Systems which were built with customer involvement were all adopted rapidly in the first year. The quality of the marketing programme (Runge's factor) was not found to differentiate between fast and slow-adopted systems, but low competence of the sales force was identified as a very significant inhibitor of adoption.

6.4. THE COMPETITIVE ADVANTAGE QUESTION

As mentioned in section 4.3 (Measurement Issues), it was not possible to measure the competitive advantage derived from any of the COSSs as objectively as the other dependent variables had been measured. All respondents answered affirmatively when asked if they considered the COSS to be a success. Their description of the results the COSS had brought to their companies, however, did enable us to separate them into three groups: the "winners", the "losers" and the "hopefuls".

Definitions

Both the winners and losers have had their COSS available for more than five years. The winners had reaped significant quantitative and qualitative benefits based on high adoption penetration. Their sales were up, their costs were down and they had attained strategic goals for their products. The losers had failed to differentiate their products or to lower their costs substantially; they had a small number of COSS customers and were now
trying to develop a more appropriate offering. The hopefuls had, for the most part, entered their COSS into the market within the last four years. They had created the potential for significant gains by raising switching costs or erecting entry barriers. Their efforts, however, had not yet been realized on the company's income statement.

The following sections will describe systems in each of these categories and summarize the findings. The source data for each of these systems is presented on the last spreadsheet in Appendix C.

6.4.1. The Winners

Winner #1

This COSS was envisaged as a service to be used by a few, very large, customers of the company. Although it was designed and built under intense competitive pressure, a full pilot test followed by complete rewrite ensured that the quality of the system was high from the beginning. Customers were slow to adopt since they were used to personalized service and had no experience with computer technology. This system delivered significant benefits in information timeliness, however, and the first customers were well rewarded for their efforts in mastering this new offering. During the next two years, the champion was transferred to another division and the system was maintained but not significantly enhanced. Its future direction was unclear but current customers continued to use it because of its quality and because of their investment in its operation.
When the champion was transferred back to the product area, several significant changes were made to the marketing and the features of the COSS. Instead of continuing to use headquarters staff to market the system, all account managers were trained in its operation and made responsible for sales. This created several thousand salespeople instead of a dozen and reduced the elitism that had crept into the product’s reputation in the company.

Delivering information electronically instead of manually had significantly reduced the company’s transaction costs and funded further development of the COSS. The product was enhanced to use the latest technological advances, thus reducing its price. Adoption rate increased and the target customer set was enlarged to include medium sized customers. These customers had never received this information before and were not averse to paying for it. Thus the price of the product was changed to include a variable component based on the amount of information delivered. These charges, multiplied by a high number of adopters, produced significant new revenue for the company. Current COSS adoption is ten to twenty times what was projected and the company’s target market for the COSS is now three orders of magnitude larger than was originally conceived.

Winner #2

This COSS was motivated by the company’s strategic decision to become a national operation. The comptroller of the company had read about using electronic links to facilitate ordering and began looking for the hardware to implement such an idea. After striking a deal with a hardware vendor for a
loan of 10 units for the pilot test, he oversaw the small amount of software
development that was necessary and began travelling with the sales manager to
demonstrate and install the units in customer sites. The system was subsidized
and the resulting monthly fee closely approximated the long distance charges that
the customer would have expended without it.

After a six month pilot, the communication problems were fixed and the system
was turned over to the product salespeople to sell. Although the sales force had
problems in selling this system, the customers adopted it rapidly due to its
simplicity and cost-effectiveness. The system displaced several internal
headquarters staff, and enabled the salespeople to shift their emphasis to
value-added services. In the five year period which followed the introduction of
the system, the productivity of the sales force increased by 50% to the number
one position in the industry. The company's national strategy was implemented
and it survived an industry shake-out which eliminated many of its higher-cost
competitors.

6.4.2. The Losers

Loser #1

This COSS was developed in a very competitive environment. Large customers in
various regions of Canada were pressing for changes in the way the product
was distributed. The company quickly responded with a system to support the
required changes. Because the system utilized an existing base of software and
data, it was built and installed rapidly. Its minimal cost coupled with high
customer need and a strong marketing program ensured rapid initial adoption.

The management’s focus switched to other endeavors and the system was only marginally enhanced during the next five years. Competitors had built rival COSSs and potential COSS customers had many choices. They made decisions based on benefits accruing from the system, with the result that adoption rate slowed considerably in this period. When the company’s management (including the regional manager who was the COSS champion) was centralized, the opportunity to support this regional initiative was lost. The company is now attempting to restructure the system, focussing on benefits to be gained for the customer and for itself which are based on information rather than on technology.

Loser #2

The rivalry in this industry was very fierce and it was well-known that several competitors were simultaneously developing a COSS. The company’s top management supported the view that technology was the key to future success and the system had both line management and IS champions.

The system was priced to cover all costs, resulting in a high monthly fee. The salespeople, as well as the customers, were not familiar with technology. Their learning curve, coupled with the system’s high cost, led to a slow early adoption rate. Managers were transferred to other parts of the business, the initial vision of the system was lost, and it languished with few enhancements. There was
always a tension between the rigid IS procedures which surrounded the system, and the need to quickly respond to customer requests for changes. Because of the slow early adoption of the system, the company was discouraged and did not address customer requests with high priority. Potential customers had other COSSs to choose from and were not attracted to one which had limited functions. A lowering of the cost and, therefore, the price of the COSS has enabled the company to protect its initial adoptees until a re-engineering of the system is completed.

6.4.3. Summary - The Winners vs. The Losers

The two winners and two losers described above provide interesting, albeit very speculative, analytical opportunities. In each category there is one information-intensive product and one commodity product.

The similarities and differences between the COSSs developed by the winner and loser in the commodity product case were:

- Both resulted in high early adoption rates.
- Both had champions backing them.
- The winner used the early gains to deliver more service with the salespeople; the loser saw the early adoption rate and thought the system could be put into maintenance mode.
- The winner always tried to understand the customer’s environment and provide information-based service; the loser focused on technology-driven solutions.
- The champion is still overseeing the winning COSS; the loser’s champion is
now overseeing other areas of the business.

- The winner had a long term strategy which the COSS supported; the loser was using the COSS to defend against imminent loss of market share.

The similarities and differences between the companies in the information-intensive industry are as follows:

- Both were sophisticated technologically.
- Both had top management support.
- The winner built the customer interface and subjected it to a complete rewrite. The loser took an existing system and extended it to the customer with little pilot testing.
- Although the product champion was transferred away in both cases, the winner's champion regained control and re-instituted the original strategy for the system.
- The winner's system had many enhancements to bring it to full-feature status; the loser's system had fewer enhancements and has only partial features now.

6.4.4. The Hopefuls

In the following few pages, a description of three of the COSS "hopefuls" has been provided. These systems were described as being successful by the interviewees but their bottom-line results have yet to be realized. If their potential becomes a reality, there is every possibility that they will become "winners". If it does not, their respective companies will need to decide whether to maintain, replace, or withdraw the COSS.
This COSS marks the culmination of a multi-year undertaking by the product manager, first to automate his internal operation and then to offer electronic links to the customer to improve the quality and timeliness of the data. It was a technologically sophisticated system and very expensive to build. No executive support was forthcoming and this system was championed at the middle manager level. Pressure had been brought to bear on the company’s leadership position by American rivals and by customers who wanted better service. Because of the company’s haste to get the system to market, it was not fully tested before its release. It was introduced by a national marketing plan and was nominally priced to attract customers.

Adoption during the first year has been limited to a few, large, customers. They received significant benefits from the system and were willing to bear with the communications problems and system bugs. The system has re-established the company’s pre-eminence in this product line and has stopped any attrition of its customers. The product manager is still involved with enhancements and is now using the system to woo customers from rivals. Getting customers to switch suppliers takes a long time, but additional customers have the potential to produce the economies of scale necessary to significantly lower the cost of the product. Since the competitive offerings do not match the system’s quality, there is every reason to believe that their new competitive weapon will deliver impressive results.
This system was built to support the company's strategy of providing value-added services to its customers. If it was successful, the strategy would have lowered the customer bargaining power and differentiated the product. Another reason for building the system was to turn a threat of legislated electronic data interchange standards into an opportunity by taking a leadership position. Customers had a policy of dealing with multiple vendors and the system was designed to track the inventory of all vendor's products. Adoption rate was slow because of the system's high price (it was priced to cover costs), the difficulty that sales people had in selling it, and the low priority that the customer placed on improvements in inventory information. Nevertheless, the system is well known in the industry and its quality and good support programme have precluded any competitor from copying it.

Two years after it was introduced, the system was enhanced to become a part of the customer's quality control and waste management operation. Pushing farther into the customer's business resulted in two benefits for the company. First, their salesmen now talked to many more people in the customer's organization, resulting in a change of relationship from "supplier" towards "efficiency consultant". Secondly, information from the system could differentiate the company's products because it reported on the usability of all vendor's products. Since the company's products were of good quality, this differentiation resulted in increased customer satisfaction with the company. The company is investing in a concerted marketing effort to improve the adoption rate of the
COSS based on the new enhancements.

No significant financial benefits have accrued to the company yet. The industry is very profitable now and it is a seller's market. It remains to be seen whether the system can break the stranglehold that price and quality have on the buyer's decision process and successfully introduce a service and loyalty component. If this can be done, and if they can improve the system's adoption penetration before the next business cycle, there is a high probability that their strategy will pay off.

Hopeful #3

This system was built in an intensely competitive environment. At least two rivals were known to be working on similar offerings. The company had a stated policy of being "a fast second" in the introduction of new ideas but the IS management team had taken a proactive stance about the strategic use of technology in the business and had pushed the company towards adopting their view of the world. The IS manager, whose high status enabled him to champion this system, formed a team imbued with a "combat zone" mentality. Traditional system development methods were ignored as they raced toward implementation. The strategic outlook was not abandoned, however, and they took steps to ensure that the technology used was appropriate to the task, although doing so delayed the project. The priority and pressure paid off as the system was delivered within a few weeks of its competitors.
Adoption rates were high since the customers could achieve significant cost savings and justify the system's high price. The competitors' systems, which were cheaper and less technologically sophisticated, were adopted by the smaller customers. The company has continued to enhance the system, making it clearly superior to its rivals and even more useful to its customers. They expect to significantly increase their adoption penetration because of these changes.

Few identifiable monetary gains have accrued as yet from the COSS. The company's largest rival (the market leader), having failed in an attempt to copy the COSS, has announced a new marketing strategy for the product. The company is well positioned to fight this initiative, since the new release of the COSS will allow it to reduce the product costs by ten percent and nullify the rival's advantage. This fight is the opening volley in a major industry battle and the COSS will play a crucial role in assisting the company in its bid for survival.

6.4.5. Summary - the Hopefuls

As one can see from the descriptions of some of the COSS "hopefuls" in the sample, they are a very diverse group. They support a range of strategic goals and a wide variety of product types. Their champions came from many levels and functions within the companies. What they all share, however, is the potential to significantly assist in shaping the future for their companies. One of the important findings in the hopefuls group is that the quantitative benefits can be very slow in appearing. Developing and implementing a COSS
is very much an act of faith - one requires a strong belief in its strategic potential. Only then can the players bring a constant source of enthusiasm and fresh ideas to the table.

6.5. SECOND-ORDER EFFECTS

There are two internal changes that the respondents repeatedly mentioned when asked to discuss ways in which the COSS development and support activities affected their companies. Both changes relate to a new set of skills and attitudes that an organizational group was asked to assume. The two organizational groups in question are the IS operations people and the product sales people.

6.5.1. The IS Operations Staff

Many of the interviewees in companies which had not connected their important customers to themselves electronically before, remarked that the IS operations group did not have the correct internal procedures or attitudes to support such a venture. Many such groups were used to solving problems based on technical, rather than political priorities. The management needed to upgrade the IS skill levels, rewrite their operating procedures and influence their attitudes to reflect the importance of having customers as users of the information system.

6.5.2. The Sales People

The other, more significant requirement that emerged was the urgent need to teach product sales people to sell an information system. In most of the cases where a company chose to use existing sales people to sell the COSS, they reported problems with the sales effort, regardless of the emphasis they had
placed on the marketing programme. These problems were potentially very
detrimental as they affected the early adoption rate.

The sales people's inability to sell the COSS stemmed from several sources:

1. Different Focus Required

The sales people who supported commodity products were very comfortable
stressing qualities such as product price, quality and availability. Their main
contacts at the customer site were in the raw materials purchasing group.
To sell the COSS required that they sell the customer on the value of
information. They had to give demonstrations to people such as the
warehouse manager or the accountant. This proved difficult.

2. Need for Education

Sales people are not, in general, technically oriented. They are
communicators, good at intuitive rather than systematic thinking. Asking
them to become familiar with a complex information system requires that
they invest time and energy to master this task. The COSSs in the
sample were often introduced into a very competitive environment and the
learning process was short-circuited. This lowered the effectiveness of the
sales people.

3. Fear of Job Loss

If the COSS performs a function (such as order taking) that is currently
being done by the sales people, they may perceive it to be a threat to
their job security. A company must use all the managerial tools it can
muster to overcome this impression and motivate the sales people. To do
otherwise is to have people with mixed loyalties responsible for the success
of the COSS.
CHAPTER 7. SUMMARY

In this final chapter of the thesis, the findings will be summarized and recommendations for companies who wish to develop COSSs will be presented. In addition, areas for future research will be suggested.

Recommendations based on small sample research, such as this project represents, are made on some underlying assumptions:
1. The sample is representative of some population of COSSs and findings can be generalized to that population.
2. Factors which were found to be associated with certain conditions in 1987 will have some stability over time.
3. Factors which were found to be associated with certain conditions actually played a causal role in enabling or inhibiting these conditions.
4. The steps taken to increase the reliability of the data were adequate.

These assumptions cannot be verified by this project and the reader must be warned that any or all of them may not be true.

While research advances slowly, the reality is that the COSS phenomenon is advancing rapidly. The researcher felt, therefore, that recommendations based on the type of qualitative observations developed in this project may serve a useful purpose for guiding others towards success in developing COSSs and achieving competitive advantage.
7.1. RECOMMENDATIONS

When discussing factors which influence the success of a customer-oriented strategic system (COSS), it is important to connect the findings of this study and take a life-cycle view of the system. Success at any one stage will strongly influence but not ensure success at the next. Failure can be overcome and turned into success. Unrelated changes in the economy, the industry, or the regulatory system can influence one's destiny.

In order to view the entire process from COSS development to realizable results, the major findings have been summarized and are presented in Figure 9. Inhibitors to success at a particular stage are shown above the mid-point; enablers are shown below it.

7.1.1. COSS Innovation

In order to be first in developing a COSS, the company and the IS management must be aware that this system development project should be handled differently from internal projects. They may already have a sense of urgency, created by intense competitive rivalry and high customer bargaining power. Top management support, consisting of either a committed CEO or a champion, is important at this stage to provide the organizational power to bypass the IS backlog queue and put together a well-resourced development project team. Companies with experienced, proactive IS personnel will have an advantage since much of the technology necessary for the project will already have been researched.
The recommendations which emerge from our analysis are as follows:

1. **Infuse the organizational management with an appreciation of the potential competitive uses for information systems and information technology.** Encourage functional managers to examine their operations for opportunities.

2. **Develop a clear strategy for the COSS.** Define the competitive advantage target and the ways in which the COSS will assist in reaching it.
Understand the changes in customer attitudes and behaviours that are desirable (e.g. changes in purchasing criteria, increase in purchasing frequency or volume, willingness to consult before purchase). Create a staged approach if complex changes are envisioned.

3. **Provide the IS people with some slack in the budget**, and encourage them to innovate with technology in advance of identified requirements. IS teams need financial and organizational support to play a proactive role within the company.

4. **Involve the customers in the design** if at all possible. This will provide early feedback on the practicality of your plan and provide reference accounts for the marketing programme.

### 7.1.2. Early Adoption Phase

After the COSS has been developed, it is released to the sales people and the potential customers. The early adoption will be influenced most heavily by the **customer recognition that this system addresses known needs**. If the system was built in response to these needs, it will be easy to find pilot testing sites and early adopters. The **COSS price** will affect the customer’s willingness to quickly adopt the COSS, especially if the price pushes the decision into the capital budgeting process or if it is perceived to outweigh the benefits. At this point, **sales people with low COSS competence** can negatively affect the adoption process, especially if competitive COSSs have been developed by rivals. If the COSS has been designed such that it meets customer needs, either by **involving customers in the design process**, or by **designing a system which matches the desired relationship structure**, it will be much easier to sell.
Recommendations for companies which are introducing COSSs into the market are as follows:

1. **Price it carefully.** Covering costs may not be important if competitive advantage is the ultimate goal. This system may have to be considered a "loss leader" such that the product itself can achieve higher margins. However, it should be priced high enough to ensure that the customer values it and expends the effort to use it.

2. **If the customer has not previously mentioned a need for which this system is a solution, prepare for a long selling cycle.** Marketing programmes should stress benefits; education and support programmes should be of superior quality.

3. **Test the system with the customers in a thorough pilot.** Use the process to discover weaknesses in the strategy as well as in the technical system.

4. **Plan the sales effort thoroughly.** Anticipate resistance from product sales people and create tactics to overcome it, such as using headquarters staff, teaming headquarters staff with field sales people for initial sales calls or installations, involving sales people in design, or implementing thorough training for all sales people.

### 7.1.3. Later Adoption Stage

After the first year, the industry has shown its initial reaction to the COSS, whether it is an eager acceptance or a stifled yawn. Both situations can be reversed by actions taken (or not taken) during the next two to five years. Companies with high powers of endurance can solidify early success or turn
around a poor response to gain quantifiable benefits.

Factors which influenced early adoption, such as COSS price, sales staff competence, and customer recognition of needs, continue to exert influence on this stage. All controllable negative elements should have been corrected. More important however, are actions taken by the company and random occurrences in the industry and economy. Companies who achieve high penetration during this stage have ensured the continuity of the system champions. Winners have moved into high gear, adding many enhancements to the system and tailoring it to fit customer requirements. Companies which are reluctant to invest in enhancements to systems which encountered slow adoption increase the probability of eventual failure.

Recommendations for companies entering the second year after the system is released are as follows:

1. Keep the faith. If there was a well-planned strategy in place when the system was developed, keep focused on it. Examine poor response rates for factors which can be corrected.

2. If early adoption has been brisk, resist the temptation to relax. Examine the system for ways of expanding further into the customer's operation. Enhance the system regularly to keep ahead of competitors.

3. Don't "reward" the champion with a transfer unless an understudy fully understands and is committed to the vision that created the initial offering.

In summary, building a COSS to support a product involves good strategy,
adequate resources, perseverance and good luck. Tangible rewards are often tied to a long-term change in customer behaviour, industry structure, or the economy. The long-term nature of the payoff must be matched by a long-term attitude on the part of all participants in the company.

7.2. AREAS FOR FURTHER RESEARCH

This research project set out to replicate a British study (Runge, 1985) in identifying factors which might influence the development, adoption and competitive advantage derived from a customer-oriented strategic system (COSS). What has been accomplished is a partial fulfillment of these goals. Factors which were associated with successful COSS development have been identified. Factors which characterize systems with both high and low adoption rates have been identified. Profiles of systems which have succeeded and failed in achieving tangible measures of competitive advantage have been prepared.

There are several important topics which have not been addressed by this study and which could form the basis for further research. They include question such as:

1. Why do some companies not build COSSs when their rivals have done so? What is the result of not building a system?
2. What are the factors which characterize late entrants?
3. What is the difference in adoption and competitive advantage between late entrants vs. first movers?
4. How do customers make adoption decisions with respect to information systems offered by their suppliers? Answering this question by talking to
customers would provide a better test of the adoption model than could be provided in this study.

This study lacks true generalizability because of the small sample size and because of the preponderance of financial institutions in it. A larger study which could be shown to be representative of some population of COSS developers would provide data which could be statistically manipulated. Such a study could test the findings of the current study.

As more companies build COSSs, and more customers adopt them, other avenues of exploration emerge, such as:

1. Do principles of transaction cost theory (Williamson, 1975) affect the model and the reality of competitive advantage?
2. How are customers reacting to the plethora of COSS offerings? How are they protecting themselves against loss of bargaining power?
3. What product spinoffs and alliances have been formed based on a successful COSS? Have they achieved success?

Using Bonoma's (1985) terms, this project attempted to move COSS research forward inside the "design" stage by fleshing out the model and developing generalizations. Measurement issues were addressed, new cases were added to the inventory, new factors were identified. We have begun to explore COSSs at a more complex level by examining companies' actions over time. Perhaps a next step would be to expand the research temporally to examine not only company actions but also reactions by rivals, legislators, and customers.
Inter-organizational systems, in general, and customer-oriented strategic systems, in particular, will become permanent members of the typology of information systems. They will transform the relationships between buyers and sellers, between competitors, and between industries. As a field of study, the circle of investigation continues to enlarge. The only inhibitors to successful investigation of the phenomena are the resources and the resourcefulness of MIS researchers.
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APPENDIX A - DESCRIPTION OF MODEL VARIABLES

This appendix contains a description and, where possible, a theoretical justification of the variables included in the models. In addition, the way in which each factor was operationalized in the research project is discussed. If specific procedures for operationalization are not mentioned, then the factor was the topic of one or more direct questions during the interview. It should be noted that several of the factors are included in the models for completeness but were not tested in the project. This is particularly true of the factors relating to the perceptions of customers. Any testing of these factors was only possible by interpreting comments made by the interviewees, who were employees of the company supplying the COSS, not customers.

1. FACTORS POTENTIALLY INFLUENCING COSS DEVELOPMENT

1. Corporate Level
   a. Proactive/Reactive Stance
      As Runge stated, "a company's implicit or explicit position regarding the organizational, management and financial risks that it is willing to assume, potentially enables, or constrains the development of specific applications." By gathering data concerning the perceived risks of the COSS, we hoped to test the Urban et al. (1987) concepts that companies in new product development make explicit choices about their stance (i.e. they choose to be proactive or reactive) and that this choice would influence their COSS entry position.
   b. Structure
      Burns and Stalker (1961) identified the importance of a company's
structure on its ability to produce innovations. Kanter (1982) supported this view and demonstrated that decentralization enables innovation. The research project did not operationalize this variable.

c. Technology Awareness

Vitale et al. (1986) suggested in their study that companies had unsatisfactory methods of identifying strategic information system because the strategists were not informed about IS technology. Because all companies in the sample had developed strategic systems, the project investigated each firm's level of technology awareness.

d. Champion

One of Runge's findings was the presence, in 80% of his systems, of a "product champion" defined as

"Any individual who made a decisive contribution to the innovation by actively and enthusiastically promoting its progress through critical stages" (Science Policy Research Unit, 1971).

The project investigated the presence of a champion and the roles that were played by him/her throughout the COSS life cycle.

e. Market Position

The size of a company was found (Kanter, 1982) to positively correlate with innovation. The project did not operationalize this variable.

f. Strategic Plan

Another of the factors which Vitale et al. (1986) found to contribute
to an unsatisfactory environment for identifying strategic information systems was the lack of an overall business strategy. The project investigated the relationship between COSS development and the presence of a strategic business plan.

2. IS Function
   a. Proactive/Reactive Stance
      Because the IS function is often a partner in conceptualizing a COSS, and takes a lead role in its development, the adoption of a proactive or reactive stance by the IS organization could potentially influence the entry position of the COSS.
   
   b. Structure
      Although the literature on IS organization generally confines itself to prescribing IS structures which enable development of internal systems, the project hypothesized that a centralized structure would enable systems which were tied to corporate strategy. This variable, however, was not operationalized.
   
   c. Business Awareness
      The project tested the relationship between a high level of business awareness in the IS function and the entry position of the COSS.
   
   d. Status
      If information technology is strategically important to the company, then the IS manager should have high status (McFarlan and McKenney, 1983). The project hypothesized that IS managers, as well as the entire IS function in the sample companies, would occupy autonomous roles (as opposed to roles which were subordinate to
another functional area, such as Finance) within the company.

e. Competence
It was hypothesized that companies with COSSs would have highly competent internal IS functions, or alternatively, that the IS group would not play a role in the COSS development effort. The test for this hypothesis was developed through indirect questions which probed for key enablers of COSS development.

f. Planning Policies
One of Runge's findings was that 80% of the systems he investigated had been developed in an environment where the IS planning guidelines were intentionally bypassed. The project tested this finding and also probed for measures of the flexibility of current IS planning methodologies and their linkage with the strategic plans of the business.

g. Existing Systems
Another of Runge's findings was that 75% of the sample systems existed, in whole or in part, in the internal systems inventory of the company before they had been extended to the customer.

h. Existing Technology
Runge suggested that "the degree to which the qualities of a company's technical infrastructure mirror the needs of the business can strongly influence the company's ability to use technology as a competitive weapon". Questions concerning the availability of the technology in advance of the COSS development project were developed to test Runge's hypothesis.
i. Other Existing COSSs

This factor was included to test whether previous experience with a COSS made it more likely that a company would be proactive in developing the next COSS. Of interest also was the question of whether companies which had many COSSs in place would find it necessary to have a product champion to implement subsequent COSSs.

3. Industry

a. Customer Bargaining Power

An element in Porter's (1980) model of competition is the bargaining power of customers. One of the possible outcomes of a COSS can be to increase customer loyalty, thereby increasing switching costs and reducing bargaining power. One of the hypotheses to be tested was that high customer bargaining power would be an enabling factor in the company's decision to develop a COSS.

b. Level of Rivalry

Another of Porter's five competitive forces is the nature of the rivalry within an industry. In some industries, an unwritten agreement exists allowing different participants to operate in their own niches with little competition from others. In other industries, each percentage point of market share is subject to fierce competition. The project operationalized the concept of rivalry by investigating the general nature of competition in the industry and also by gathering the company's perceptions of the actions of its competitors. (e.g. were competitors preparing a similar COSS).
c. Threat of Substitutes

If an industry is threatened by products which the customer perceives as substitutes, a COSS may be one of the ways a company can differentiate its product. Thus, the threat of substitutes may be a factor which enables COSS development.

d. Threat of New Entrants

McFarlan (1984) outlined how information systems can be used to raise entry barriers against new entrants. Similarly, Williamson (1981) has suggested that lowering the customer's transaction costs may encourage a move toward the use of network relationships rather than market transactions, thereby raising entry barriers. The project investigated the strength of this factor as an enabler of COSS development.

e. Constraining Regulations

The project investigated the impact of industry-specific regulations on the process of COSS development.

4. COSS Development Project

a. Risk and Size

Cash et al. (1988, Ch. 8) has shown that factors of a development project such as size, structure and technology will influence the difficulty of the project management process and, ultimately, will affect the probability that it will be completed successfully. Our research project investigated the strength of these factors by assessing financial risk, project size, and technological risk (using the Existing Technology factor). The structure component of McFarlan’s model is encompassed
in the "Existing System" factor.

b. Pilot Test

This factor was added to determine if a COSS was developed using the traditional testing concepts or whether the presence of a customer as the user would change the way this development activity was enacted.

c. Priority and Resources

These factors were added to investigate whether the profile of COSS projects was higher than that of projects developed for internal users and what effect this had on its entry position.

2. FACTORS POTENTIALLY INFLUENCING COSS ADOPTION

1. Development Project
   a. Customer Involvement

   Runge found this factor to be highly correlated with adoption rate.

   b. Pilot Test

   Because a pilot test is one of the bridging mechanisms between a development project and user adoption, it was hypothesized that its quality (i.e. a full-length pilot with several customers vs a short one with one or two customers) would impact both measures of COSS success. What might enable a timely development (i.e. a short pilot) might negatively impact the quality, and subsequently the adoption rate, of the COSS.

2. Function and Features
   a. Features
Based on Keen's (1985) evolutionary steps for gaining competitive advantage through linkages to the customer, Runge developed a hierarchy of information systems for competitive advantage which moved from internal to customer links to added-value information services. The project used the description of the COSS functions to determine if it served the customer in a primarily product-related manner or if it assisted the customer with functions that were not directly related to its use of the product (i.e. added value). This assessment enabled an investigation of the impact of different types of services on the customer adoption rate.

In addition, the breadth and depth of the product-related features were added as a variable to investigate the Rogers (1962) finding that early adopters are influenced by the qualities of the innovation.

b. Customer Resource Life Cycle Position

Each COSS was classified according to its position in the Ives and Learmonth (1984) Customer Resource Life Cycle to test whether a particular position on the life cycle influenced the adoption rate.

c. Value Chain Position

Each COSS was classified according to its position in the value chain (Porter, 1985) of the company to test whether a particular position influenced adoption rate.

d. Flexibility

Flexibility, defined as the ability of the COSS to be customized to meet the needs of an individual customer, is an asset of any system,
when viewed from a customer's perspective. Its value as an enabling factor has two theoretical bases:

1) It captures the meaning of Roger's (1983) "compatibility" factor.
2) It has the potential to raise the asset specificity (i.e. the differentiation) of the COSS (Williamson, 1981), thereby making it more resistant to threats from substitutes.

e. Performance

Clemons et al (1984), in discussing the influence that the performance of an information system has on a user, hypothesized that it was "extremely dependent on the nature of the applications being supported". The research project did not operationalize this variable.

f. Enhancements

This variable measures the number of functional releases of the system after it is introduced. It was felt that a high number of enhancements would produce a system that closely matched the customers' needs and therefore would result in high adoption. Customers would perceive a high level of compatibility (Rogers, 1983).

3. Support and Marketing

a. Customer Education and Customer Support

A company which provides superior education and support of its COSS has the potential to influence the Redefining/Restructuring process in Roger's (1983) process model and hence to influence the adoption rate.

b. Marketing Programme

The COSS marketing programme has the potential to affect the Matching stage of the Rogers model of adoption. In addition, Runge
found that a superior marketing programme characterized many of his systems although the size of the programme was not significantly correlated with adoption rate.

c. Price of the COSS

As Davis (1986) says, "positive attitudes toward the new technology are insufficient to ensure adoption. Adoption may be denied because it is difficult to justify costs, despite managers awareness of the benefits." The project operationalized the COSS price factor by asking the respondents whether they felt the price was high or low. Their answer was based on a number of factors, including the absolute cost of the system and its cost relative to other, rival COSSs.

4. Customer

As mentioned above, the factors relating to the customer were operationalized by using information gleaned from companies. Therefore, it is their perception of the customer's attitudes that were measured in this project.

a. Effort Required to Adopt

This factor is included to reflect the customer's perception of the compatibility (Rogers, 1983) of the COSS with existing values. It was operationalized by asking questions about the effect the COSS had on customers and by examining the descriptions of how each COSS is used by customers.

b. Technology Awareness

Since a COSS requires a certain level of technical proficiency from the user, this factor is another way to operationalize Rogers' (1983)
compatibility factor.

c. Perception of COSS Complexity

This factor reflects the customer's perception of the complexity of the COSS. Perception of complexity has been shown (Rogers, 1983) to negatively correlate with adoption rate. This variable was not operationalized.

d. Satisfaction of other Customers

Rogers (1962) found that adoption decisions of late adopters were made based on the experiences of early adopters. Therefore, high customer satisfaction by early adopters may be useful in predicting late adoption rates. The project did not operationalize this factor.

e. Awareness of Need

This factor reflects Rogers' concept of agenda setting. It was hypothesized that customers who had expressed a need which was subsequently met by the COSS would be more likely to adopt than would customers who had not expressed such needs. This factor was explored by investigating the company's motivation for developing the COSS. If companies mentioned customer complaints or suggestions as motivators, the systems were rated positively on this factor.

f. Satisfaction of other Customers

Rogers (1962) predicted that late adopters would make decisions based on the experiences of early adopters. The project, therefore, hypothesized that satisfaction of customers would be a factor which influenced late adoption rate. This factor was not operationalized in this study.
5. Industry
   a. Technology Trends
      If an industry has established standards for communication between
      constituents, these standards will be an important enabling factor for
      inter-organizational systems (Cash and Konsynski, 1985).
   b. Lead Time to Next COSS
      When a potential customer is comparing the relative advantage of a
      COSS over other alternative ways of solving a problem, the existence
      of rival COSSs will influence the adoption decision. It was
      hypothesized that companies with long lead times over competitors
      would enjoy higher initial adoption rates.

3. FACTORS POTENTIALLY INFLUENCING COMPETITIVE ADVANTAGE

1. Company - Product Economics and Differentiation
   Porter (1985) claimed that technological change will lead to sustainable
   competitive advantage if it lowers cost or enhances differentiation and the
   technological lead is sustainable. The Product Economics factor includes the
   effect a COSS might have on the cost of producing or distributing a
   product or on the price that a product can command.

2. COSS
   a. Features and Enhancements
      These factors test whether a COSS which provided added value
      features will provide more competitive advantage and whether a
      system which has been improved continually will outperform one that
      has not.
b. COSS Price

If a COSS has enough adopters and a high enough price, its revenues may in itself be a source of increased profitability for a company.

3. Product - Differentiation and Information Content

These factors are included to test whether the competitive advantage of a company which produces commodity products and/or products with low information intensity can be influenced by the presence of a COSS.

4. Industry

a. Regulations

This factor explores the presence of constraining regulations and their effect on competitive advantage.

b. Lead Time to next COSS

This factor investigates the idea (Porter, 1985) that first-mover advantages can provide sustained competitive advantage.

5. Customer

a. COSS Adoption Rate

The project investigated the relationship between high adoption rate by the customers and competitive advantage.

b. Effort Required to Adopt and Customer Dependence on the COSS

These factors test whether the COSS which requires a high investment (in time and/or money) from the customer and the COSS upon which the customer depends heavily, have the potential to produce more significant competitive advantage than those which do not.
APPENDIX B - INTERVIEW GUIDE

1. DEMOGRAPHIC DATA

How many people does the company employ?

What are total annual revenues?

What customers was the system designed to support?

What product was the system designed to support?

What is the relevant market in which the system resides? (i.e. what geographical area, who are customers).

How would you describe the current state of this market's growth?

Which competitive forces operate most strongly in your industry:

1. buyers
2. rivals
3. suppliers
4. new entrants
5. substitutes

What other information systems currently in use directly link your company with
2. THE SYSTEM AND ITS FEATURES

What is the common name and/or acronym for the system?

Briefly describe the current system.

What was your involvement with the system?

Was it an internal system before extending it to customers?

When was it implemented with the customers?

What has been the schedule and content of the major releases it has had?

Is it still considered to be "in development"?

How does the customer use the system in connection with the product:

1. To obtain information about the product.
2. To establish the amount of product/service needed.
3. To specify the required attributes of the product.
4. To choose a supplier for the product/service.
5. To order the product/service.
6. To authorize and pay for the product/service.
7. To acquire the product/service.
8. To test and accept the product/service.
9. To integrate the product into existing inventory.
10. To monitor access to and use of the product.
11. To upgrade the product.
12. To maintain the product.
13. To transfer or dispose of the product.
14. To account for purchases of the product/service.

Does the system offer the customer additional non-product capabilities? If so, describe them.

1. word processing
2. inventory control
3. accounting
4. messaging
5. sales history/forecasting

Were these non-product offerings:

1. Offered before the product-related parts
2. Offered as part of the original system
3. Envisioned but not offered with the original system
4. Developed and added after the system was installed in several customer
sites

Which capabilities (the product-related ones or the customer-related ones) do you feel the CUSTOMER perceives to be the most valuable?

What customer set did you target for this system?

What percentage of the targetted customers use the system?

Are you still trying to achieve a higher level of penetration?

What is the future direction for the system?

What department or individual is directing the future of the system?

3. SYSTEM DISCOVERY

How was the idea of the system generated? Was a particular individual or group given credit for the idea?

What was the original motivation for developing the system?

1. increasing revenue

2. decreasing cost

3. holding market share/profitability position
4. other

How was it envisaged that the system would support these goals?
1. hold or increase sales from existing customers
2. attract new customers
3. raise entry barriers
4. create new products
5. lower sales costs
6. lower distribution costs
7. lower service costs
8. decrease customer’s price sensitivity
9. decrease customer’s bargaining power
10. other

Rank the factors in order of importance.
1. Customer bargaining power
2. Growth potential of the market
3. Cost of servicing the product

Was the system developed in light of what other competitors were already doing or intending to do in the same area?
Was the system copied from one used in another market or industry?

Did a particular individual play a critical role in the inception or development of the system?

If the answer is yes:

1. Who was the individual
2. What department was this individual a member of?
3. Describe his/her attributes (high, medium, low):
   a. Status (informal)
   b. Level of authority (formal)
   c. Level of awareness of information technology
   d. Diversity of work experience

What specific roles did the influential individual play?

1. idea creation
2. creating the strategy for development and implementation
3. researching the idea with customers
4. technical work on the implementation
5. getting the idea accepted and funded within the company
6. guiding the implementation past "rough spots"
7. general education of other management
8. other... please specify

Do you think the system would have been implemented without the presence of this individual?

4. SYSTEM DEVELOPMENT AND INSTALLATION

Was the system already written in part or totally before the decision was made to let the customers access it?

How much change was needed in the existing technical infrastructure to offer the service.

1. none
2. slight
3. moderate
4. significant

What new technologies or capabilities were introduced:
1. new hardware (processor)
2. new telecommunication lines
3. buying new terminal types
4. new operating software
5. new programming languages
6. other...

Were potential customers involved in development at any stage?

1. Not at all
2. A little
3. A lot

What was the nature of their involvement (stage and activity):

1. requirements generation
2. checking requirements
3. prototyping
4. other....

Was the overall development of this system unique in any way?

1. Yes
2. No

In what ways was it unique?
How did you go about implementing the system with your customers?

1. pilot program
2. training
3. onsite support

Was this a different procedure than for internal systems?

How much attention was given to publicity, advertising or promotion?

1. None
2. A little
3. A lot

What types of publicity, advertising or promotion were used? (f5)

1. personal visits by salesman
2. letters
3. demonstrations

To what extent were publicity, advertising or promotion important to the success of the system?

1. Not important
2. To some extent
3. To a great extent

Did you charge the customers for the system?
1. Yes
2. No

If yes, did the charge cover the costs of the system?
1. all costs
2. hardware costs
3. development costs only
4. ongoing support costs only
5. nominal costs

At what rate has the system been accepted by your customers? (DV)
1. Not at all
2. Slowly
3. Moderately
4. Rapidly

Can you quantify this rate?
What factors do you feel contributed to this rate of adoption?

5. **IS PLANNING AND BUSINESS PLANNING**

At what level was the IS manager when the system was implemented.

To whom did he/she report?

Has that changed?

What percentage of revenue does the company spend on IS?

Is this above or below the industry norm?

1. don’t know
2. above
3. below

Is this a deliberate policy?

Describe the company’s IS prioritization process:
Do you have a flowchart or description that I could take away?

On what basis are information systems normally selected for implementation (rank the factors in order of relevance):

1. Reduce costs in production
2. Improve managerial productivity
3. Improve staff productivity
4. To develop new products/services
5. To improve delivery of products/services
6. To improve customer service

What methods do you use to scan for new IS opportunities?

1. we do not use any systematic methods
2. CSF
3. BSP
4. Porter - competitive forces
5. Porter - added value chain
6. other - please specify

Does your company prepare business plans regularly?
Does your company prepare IS plans regularly?

In what order are the plans prepared?
1. Business plan first (top down)
2. IS plan first (bottom up)
3. concurrently

To what degree is there alignment between IS and business plans?
1. none (only by chance)
2. partial (for some areas of the business)
3. total (all systems are to the business plan)

How do you achieve this alignment?

  e.g.

  1. cross training of IS/business people
  2. rotating people into IS from line business
6. RESULTS

On what basis was this system justified?

Did this system go through the normal IS planning process to get approval for development?

If not, why not?

What is your estimate of the cost of this system
e.g.
1. man hours
2. computer chargeouts

What benefits, measurable or otherwise, have resulted from the system?

Did the benefits last for:
1. Less than 6 months
2. More than 6 months but less than 2 years
3. More than two years

What has been the impact of the system on the company's ability to: (please quantify)
(none / moderate / significant)

1. hold market share
2. increase market share
3. decrease costs
4. increase sales from existing customers
5. capture new customers
6. increase customer satisfaction
7. stay competitive

Do you have a post-implementation review I could take away?

I want to discuss other types of changes this system caused... In what way did the system internally affect the company?

1. Superordinate goals
2. Strategy
3. Style (culture)
4. Structure
5. Systems (processes)
a. different things are done

b. Improved the productivity of some activities (value chain)

6. Staff (numbers, power)

7. Skills

Overall, what amount of change was necessary to implement the system:

(none / moderate / a lot )

1. structural
2. culture
3. staff levels
4. operational
5. financial

In what ways do you think the system changed the CUSTOMER?

e.g.
1. decreased / increased price sensitivity.
2. decreased / increased bargaining power.
3. changed its perception of the company (partner vs supplier).
4. changed its business processes.
5. other

In what ways did the COMPETITORS react to the system?

1. don't know
2. ignored
3. they are preparing to retaliate
4. copied it
5. leapfrogged it (copy and enhance)
6. retaliated in different ways
7. other

When did these actions take place?

In what ways did the system affect the INDUSTRY ?

1. changed the nature / level of rivalry
2. changed the structure
3. increased / decreased transaction costs
4. increased entry barriers
5. increased / decreased the market size
6. introduced new products
7. other

Does the system have a ROI comparable with your other IS investments?
1. greater
2. same
3. less
4. not calculated

What level of risk was involved in implementing this system:
1. extreme (corporate viability)
2. high (business unit viability)
3. moderate (product viability)
4. low (strengthening a strong position)
5. none

What level of risk do you now perceive to be involved in NOT implementing this system:
1. extreme (corporate viability)
2. high (business unit viability)
3. moderate (product viability)
4. low (strengthening a strong position)
5. none

Overall, were the results different from what was expected?
1. yes, we were pleasantly surprised
2. yes, unpleasantly surprised
3. no, we predicted well
4. no, we did not predict at all

Do YOU consider this system to be a success? (new DV)
1. Yes
2. Partial
3. No

In hindsight, would you do it again?

Would you do it differently?
7. SUMMARY

What do you feel are the most important enabling factors for using information systems for competitive advantage. e.g.

1. respected IS department
2. strong line management with vision
3. competitive pressure
4. strong ties with customers
5. good marketing

What do you feel are the most inhibiting factors holding your company back from more success using information technology. e.g.

1. financial constraints
2. human constraints
3. technology constraints
4. regulatory constraints
5. industry constraints
6. other....

What do you feel are the most inhibiting factors which hold any company back
from achieving full potential with competitive systems?
APPENDIX C - SOURCE DATA

This appendix contains four spreadsheets of data, each one containing data which pertains to a specific dependent variable. Each column on the spreadsheets contains data on a specific system. The systems are named A,B,C, etc. To preserve the companies anonymity, system A on the first spreadsheet is not the same system as system A on the other spreadsheets. Each row on the spreadsheets contains a factor which was hypothesized to influence the dependent variable. At the bottom (under the "Added" heading) are factors which were added after the interviews were completed. For an explanation of the factors, see Appendix A. Several of the data values in the spreadsheets are followed by an asterisk (*) or an asterisk with a minus sign (*-). These are the author’s notations indicating that the respondent placed particular emphasis on this variable as being an important enabler or inhibitor of the system’s success.

The first spreadsheet is entitled "Factors Influencing Entry Position". Since ten of the eleven systems were first entrants, there is little ordering of these systems. The one which was not a first entrant is shown at the right and was not used to create the findings.

The second spreadsheet, entitled "Factors Influencing Customer Adoption", shows the eleven systems ranked on the rate of adoption they achieved in the first year after introduction. Four reported slow, one reported moderate and six reported fast adoption. Systems in the "slow" group were contrasted against systems in the "fast" group to create the findings.
The third spreadsheet, also called "Factors Influencing Customer Adoption", contains data on six companies because only six had been available for more than four years. These six are ordered by the penetration they achieved by the end of the fourth or fifth year. They range from 30% to 100% and for the purposes of analysis, were grouped into "50% and under" vs "100%".

The last spreadsheet contains data on the competitive advantage that was attributed to each of the systems. The benefits are listed on the spreadsheet and grouped under "quantitative" or "qualitative" headings. The systems were ordered based on their reported quantitative results (i.e. the bottom-line changes experienced by the companies). When the quantitative results were comparable between two systems, the qualitative results were used to rank them. The "winners" are at the left end, the "hopefuls" are in the middle, and the "losers" are at the right end of the spreadsheet.
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<th>&quot;C&quot;</th>
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FULL (SIG.)
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BOTH

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MANY •
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LOW
HIGH •
PARTIAL

HIGH
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PROBLEMS AT FIRST
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