USER PARTICIPATION IN THE DEVELOPMENT OF INTERORGANISATIONAL SYSTEMS AND ITS EFFECT ON THE SUCCESS OF SUCH SYSTEMS

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ABSTRACT

This study focused on customer participation as one variable impacting on the adoption of systems which link organisations with their customers. The topic draws on literature concerning user participation in system development and, secondly, on literature relating to interorganisational and strategic systems. No previous research has focused on this research topic.

Three related research questions were identified and investigated. The first question concerned antecedents which determine an organisation's decision on whether or not to involve customers in the design and building of the system. The second question concerned the way in which customers participate in system development. The third question related to the effect of customer participation during development on adoption of the system.

A multiple case approach was adopted for the empirical component of the study. Data was collected on 9 systems in New Zealand. Data analysis included within case analysis for each individual case and cross case analysis.

It was found that customer participation during system design occurs in a minority of cases only and is associated with systems which are developed in response to customer initiatives or for competitive reasons. The effect of participation on subsequent adoption is indirect: participation can affect the ability of a system to fulfil a customer need and this need induces a customer to adopt the system.

The study found that customer participation must be considered in relation to other adoption factors. A major outcome of the study is a model explaining and predicting adoption according to five adoption factors. If a system involves a customer in high acquisition costs, fast adoption is unlikely. The marketing effort by the sponsoring organisation and the technological awareness of the customer are strongly correlated with adoption.

ACKNOWLEDGEMENTS

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Lastly, but by no means least, I must thank my two children, Roger and Rowena, for having put up with a mother who, instead of baking cakes, has given a lot of attention to her thesis during the past year!

TABLE OF CONTENTS

LIST OF TABLES and FIGURES

CHAPTER ONE - Introduction

During the 1980s, use of interorganisational systems has become increasingly widespread. Interorganisational systems (IOS) attract attention because they are highly visible systems which often create a significant impact on participating organisations. Systems like American Hospital Supplies' ASAP, McKesson's Economost and American Airlines' Sabre are well-known examples of IOS.

These systems capture the interest of researchers and practitioners alike. Practitioners are interested in the uses and benefits of IOS and in ways of enhancing the success of these systems. In the early 1980s researchers were primarily interested in describing successful IOS and in developing frameworks for identifying IOS opportunities. During the last few years research interest has focused on understanding IOS and the factors which contribute to their success. The subject of this thesis falls within this area of IS research: it investigates one factor (participation during development) and its impact on the success of IOS.

This chapter firstly outlines the research problem. Secondly, the research methodology is briefly described. Next, the importance of the research is discussed. Then, the main limitations and assumptions are outlined. Lastly, an overview of subsequent chapters is presented.

1 Research problem

It is often considered axiomatic that intended users should be involved in the system development process in order for the completed system to be successfully adopted by its intended users. However, in IOS those potential users are outside the organisation which develops the system and this fact may affect the readiness of sponsoring organisations to seek participation of intended users in development. By not involving potential users during development, sponsoring organisations may inhibit the subsequent success of their system. These are the issues investigated in this thesis.

Reich and Benbasat (1990) and Runge (1985) reported on empirical studies focusing on systems linking organisations with customers. They found that customers participating in the development of systems enhanced subsequent adoption of those systems. They also found that customers are involved in a minority of system development projects only. This thesis set out to understand why customers are involved in a minority of cases only and to investigate to what extent customer participation contributes to the success of a system.

Since it is important to clarify major terms from the outset, the following subsections place the constructs for this thesis in context. Systems linking organisations with customers are a subset of interorganisational systems; customer participation is a kind of user participation; adoption is an aspect of system success.

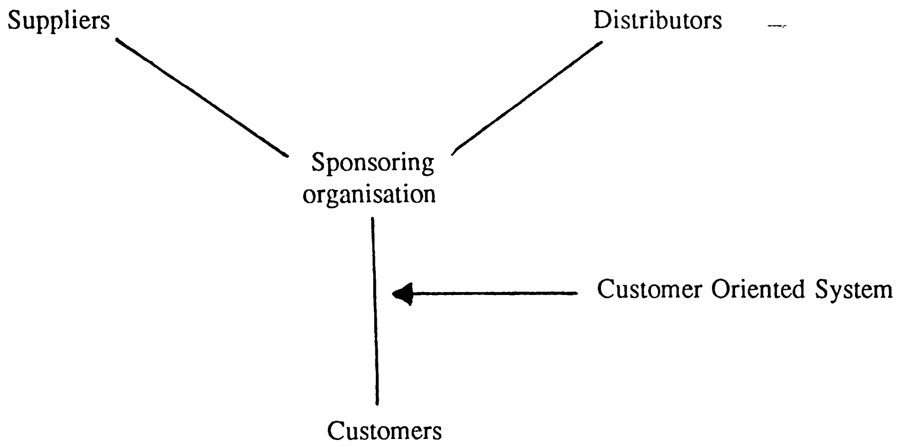
1.1 Interorganisational systems

Interorganisational systems (IOS) can be defined as systems that are shared by two or more companies (Cash and Konsynski, 1985). Information systems that cross company boundaries were first envisaged by Kaufmann (1966). Now, advances in computer and communication technologies, globalisation of businesses and an awareness of the strategic importance of interorganisational links have made the regular use of IOS a reality (Suomi, 1992).

An IOS may link an organisation with its suppliers, its distributors and/or its customers. It can be difficult to determine whether a particular system is oriented towards suppliers, distributors or customers. One system linking two organisations may be supplier-oriented for the one firm and customer-oriented for the other firm linked to the system. This is due to the fact that outbound logistics for one firm are at the same time inbound logistics for another (Clemons and McFarlan, 1986).

However, by focusing on one organisation only it is possible to clearly distinguish between systems which link that organisation with suppliers, with distributors and with customers (see Figure 1.1).

Figure 1.1 IOS linking with suppliers, distributors and customers



This research focuses on one particular type of interorganisational system: Customer Oriented Systems. Customer Oriented Systems (COS) may be defined as computer-based, interorganisational, strategic information systems that link an organisation and its customers (Reich and Benbasat, 1990; Runge, 1985). Examples of COS are:

- order entry systems which allow customers to place orders electronically without intervention of a telephone sales person or a sales representative (eg American Hospital Supplies' ASAP system);

- cash management systems which allow customers to complete bank transactions electronically without having to walk into a bank (eg Merrill Lynch's Cash Management Account system);

- reservation systems which allow customers (or intermediaries) to book seats electronically (eg United Airlines' Apollo system).

1.2 User participation

User participation in development is defined as "the behaviour and activities that the target users or their representatives perform in the system development process" (Barki and Hartwick, 1989, p52).

In all participation literature it is implicitly assumed that the target users are employees of the organisation that develops the information system. The target user of interorganisational systems, however, is not an employee of the organisation developing the system: the intended user of an IOS is *outside* the organisation.

Since this research focuses on Customer Oriented Systems, the target users of the systems under study are customers. User participation in this context becomes "customer participation" which, by adapting the Barki and Hartwick (1989) definition, may be defined as the behaviour and activities that customers or their representatives perform in the COS development process.

1.3 Success of the system

IS practitioners are particularly interested in the organisational impact of their information systems. Organisations building interorganisational systems aim to achieve strategic or operational objectives. In the case of COS the more customers adopt and use the system, the more likelihood that those objectives are met and the greater the benefits to the sponsoring organisation (Figure 1.2).

Figure 1.2 - Relationship between various measures of COS success

COS adoption $\longrightarrow$ COS penetration $\longrightarrow$ Impact of COS on sponsoring organisation

The primary measure of success of interorganisational systems is therefore its adoption and use by intended users (Reich and Benbasat, 1990; Runge, 1985). System adoption is an objective and relatively easy to quantify measure of success (DeLone and McLean, 1992) for the researcher as well as for the sponsoring organisation monitoring its own performance.

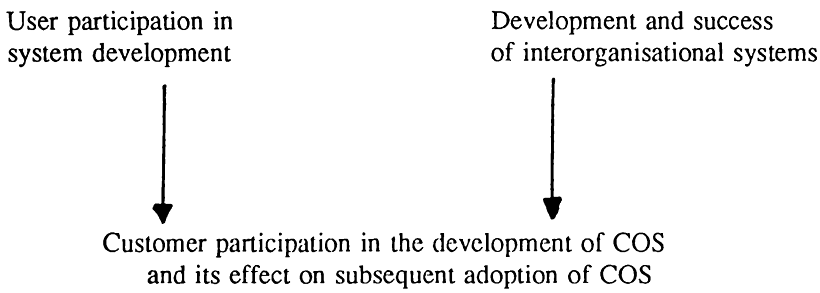
The ultimate measure of success for a COS is the organisational impact of the system. The organisational impact refers to the spin-off effects from COS adoption. These effects manifest over time in the form of changes in market share, cost efficiency, sales volume, customer satisfaction and image in the industry (Clemons and Kimbrough, 1986; DeLone and McLean, 1992; Johnston and Vitale, 1988).

In order to enable comparison with previous work, this research uses the adoption construct as the main measure of COS success.

2 Methodology

The topic of this research, customer participation in COS development, combines two existing areas of IS research: user participation in system development and the development of interorganisational systems.

Figure 1.3 - Combining 2 areas of IS research



User participation literature focuses on the development of information systems whose ultimate users are members of the organisation. However, in COS users are customers of the organisation who are, by nature, *outside* the organisation. Interorganisational systems literature addresses development of, uses of and potential benefits from IOS. The IOS literature therefore describes the context for the development of customer oriented systems. Combining the two research areas enables an investigation of customer participation as a factor potentially contributing to the adoption and success of COS.

A case research approach was adopted to collect and analyse empirical data. Multiple case research was selected as the appropriate research design for this study (Yin, 1989a and b). Data was collected on 9 COS in New Zealand. Data analysis was carried out in two phases (Eisenhardt, 1989; Miles and Huberman, 1984): firstly, cases were considered individually and single case write-ups were produced; secondly, cross case analysis addressed the specific research issues.

3 Importance of the research

The topic of this study is important for 3 reasons. The topic concerns interorganisational systems, addresses adoption factors and, specifically, investigates customer participation.

3.1 Importance of research on IOS

IOS are an increasingly prevalent type of IS. Improvements in technology have enabled organisations to extend IS beyond the boundaries of single organisations. The interorganisational nature of these systems has meant that these IS affect not only internal operation of the sponsoring firm, but also operations of organisations that the systems link into. Success of IOS is not solely dependent on the building of effective systems and appropriate maintenance of systems, but also on the acceptance and use of the system by the users outside the sponsoring organisation.

The prevalence and the interorganisational nature of IOS makes these systems a worthy and interesting topic of research.

3.2 Importance of research on COS adoption factors

Success of IOS in terms of organisational impact for the sponsoring organisational depends on adoption of the systems by customers. In order to ensure that organisational benefits are obtained, some organisations insist on use of IOS by customers; several Electronic Data Interchange (EDI) applications, eg in the automobile industry, fall into this category. Other IOS are offered to customers for voluntary adoption.

In cases of voluntary adoption, knowledge and understanding of factors which impact on adoption are very important. Once aware of factors which inhibit or facilitate adoption and once aware of their relative importance and of interrelationships, it is possible to devise strategies to maximise the likelihood of fast and widespread adoption of the COS.

3.3 Importance of research on customer participation in COS development

User participation in development is often heralded as being an essential or, at least, a facilitating factor for the adoption and acceptance of a system by its intended users. Customer participation in the development of COS can be expected to be similarly important for the subsequent adoption of the COS by customers. It is important to investigate if customer participation indeed is likely to have a significant positive effect on adoption of COS. It is also important to know if there are contingencies which make customer participation particularly appropriate or necessary for successful development of COS.

4 Major limitations and assumptions

This study potentially contains regional bias and its findings may therefore be relevant in the New Zealand context only. The study does not specifically address impact of the technological differences between systems.

4.1 Regional bias

Previous relevant literature and published findings are all based on research conducted in North America and the UK; the *theoretical* basis for this study is therefore firmly grounded in North American and Western European experience. The *empirical* component of this research focuses on New Zealand cases. The New Zealand context is one which is hardly referred to in general IS publications; very little research has specifically considered New Zealand IS experience. Because the New Zealand context is a relatively unknown quantity, it is not known to what extent North American/UK research findings are relevant to New Zealand. Similarly, it is unclear whether New Zealand empirical findings contain a regional bias which would limit their generalisability.

The findings of this study are New Zealand based. The study may contain cultural bias and therefore does not claim generalisability of findings beyond the New Zealand context. Further and comparative research is needed to determine relevance of findings in other contexts.

4.2 Technological effects

This study focuses on COS and ignores the differences in technologies used to implement the COS concept. Specific COS technologies include mainframe-to-mainframe EDI, PC-to-mainframe EDI, PC/modem access to databases maintained by the sponsoring organisation and portable data entry unit access to an organisation's mainframe. The different technologies in themselves may impact on participation and on adoption of the systems, but these technological effects have not been specifically addressed in this study.

The assumption is made that variations in technology do not significantly affect the desirability for participation in the development process or the adoption of systems by their intended users. Wherever possible technological effects were considered as part of other variables: eg "complexity of the system" as a variable affecting participation and "cost to the customer" as a factor impacting on adoption.

5 Overview of chapters

The next chapter reviews the literature on user participation in system development (Chapter Two). Next, literature on IOS and SIS is reviewed in order to describe the COS environment (Chapter Three). Chapter Four presents the research problem and associated research questions in detail. Chapters Five and Six outline the methodology used to investigate the research questions. The three research questions are addressed in 3 consecutive Cross Case Analysis Chapters (Chapters Seven, Eight and Nine). Chapter Ten concludes with conclusions and recommendations for further research. Individual case summaries are included in Appendices 2 to 10.

CHAPTER TWO - User participation in system development

This study draws on literature from two existing areas of IS research. The first of these areas concerns the body of literature on user participation in system development - exclusively focused on participation of users *within* an organisation in the development of *internal* systems. The second research area concerns literature on interorganisational and strategic systems. The literature on each of these areas will be reviewed separately (in this chapter and in Chapter Three respectively) and will, where appropriate, be combined when discussing the research problem in detail (in Chapter Four).

This chapter first defines user participation and presents a framework which is used to describe user participation research findings. Next, research findings concerning the user participation-system success link are reviewed. Then, the empirical literature on user participation is analysed and further research opportunities are identified.

1 Introduction

A significant body of IS research is concerned with the involvement and participation of users in the system development process and the effect of participation on system success. For many years it was considered axiomatic that user participation has a significant positive influence on the eventual success of the system. User participation is a *necessary* component of participative design methods; some form of user participation is considered *desirable* in most traditional system development methods in order to ensure that user requirements are met, to gain user commitment and to avoid user resistance.

Empirical studies are not able to show consistently that there is a causal relationship between user participation and system success; research provides mixed results (Ives and Olson, 1984). It has been known for some time that there are information systems development projects where users participate but which are not successful; there are also projects which are successful but where users do not participate (Edstrom, 1977; DeBrabander and Edstrom, 1977). It seems that user participation is neither sufficient nor necessary to guarantee system success. The link between user participation and system success is considerably more complicated than the direct, bivariate relationship traditionally assumed. The existing body of user participation literature is by no means useless, but in order to see its value it needs to be properly organised and synthesised. This chapter sets out to do just that.

2 Definitions

Before discussing user participation findings the terms "user" and "user participation" must be defined.

2.1 Defining user

Very few authors define what they mean when using the term "user". Land and Hirschheim (1983) identify several types of user. Firstly, there is the individual or group that sponsors the system and wants the system developed. This user group considers the development project as a means and opportunity to save costs, to improve information flow or to enhance operations in yet another way. Secondly, there is the user group which can be identified as management, who may use the system's output, who monitor system results and who are ultimately responsible for the system and the organisation at large. Thirdly, there are the individuals or groups who interact with the systems as part of their job. This group is directly affected by the system as they use the system day-to-day. Adoption and use of the system by this group is intended to bring about the positive effects and benefits envisaged by the sponsor of the system.

Beath (1987, p415) explains that in both theory and practice the multitude of users is usually condensed to a virtual user: "he or she is high enough in the organisation to influence the flow of resources and is also a knowledgeable participant in the business function to be supported". This research will employ the term "user" in the virtual sense.

2.2 Defining user participation

Until recently the terms user participation and user involvement were often used interchangeably when describing interaction between users and developers during the system development process. Barki and Hartwick (1989, p52) propose that a clear distinction should be made between user participation on the one hand and user involvement on the other. They define *user participation* as "a set of operations and activities performed by users" during system development. They reserve the term *user involvement* for a "subjective psychological state" which influences user perceptions of the system and thus affects system success.

According to these definitions most IS research using the term user involvement is in fact research on user participation. In order to avoid confusion in this dissertation all reference to user activities in the information system development process is termed user participation (in keeping with the Barki and Hartwick definition).

User participation is not a clearcut, homogeneous concept: in practice it takes many forms and can occur at many levels. Describing user participation in terms of activities engaged in by users does not provide a complete and accurate picture of that participation. Several dimensions of user participation have been identified. User participation may be characterised according to different types, varying degrees and different content of participation.

<u>Type of participation</u>. The type of participation refers to the proportion of users actively participating in system development. Ives and Olson (1984) distinguish between indirect participation (where users or their representatives are consulted only) and direct participation (where users actively take part in the development process).

<u>Degree of participation</u>. The *degree of participation* refers to the extent to which users become involved in system development. User input may, on the one hand, be completely ignored or may, at the other extreme, be paramount in the design process. Ives and Olson (1984) give examples of increasing degrees of user involvement from no involvement (users are unwilling or are not invited to participate) through to involvement by strong control (users pay for or are ultimately responsible for system development).

<u>Content of participation</u>. The *content of participation* refers to the scope of the system being developed (Hirschheim, 1983). Users may be asked to help in the development

of the technical system, but social and job considerations may be ignored. Participative system design encourages user participation to include the latter and thus calls for a greater content of participation than traditional approaches to system development.

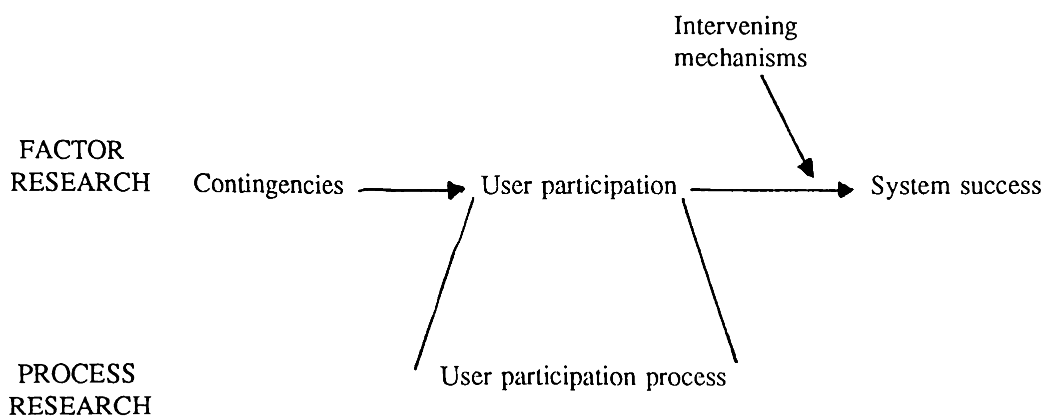
A full description of user participation in a development project includes the activities the users were involved in and gives an indication of the type, degree and content of this participation.

3 A descriptive model of user participation

Reported research on user participation presents a fragmented picture of the need for and value of user participation in system development. Research efforts focus either on one factor or on a set of related factors influencing user participation or discuss the dynamics of the participation process. Both factor research and process research provide valid insights but neither on its own is able to completely explain a concept. Findings from factor and process models complement each other and, when presented together, are able to describe a concept more fully than either can on its own (Newman and Robey, 1992).

Based on Newman and Robey (1992) Figure 2.1 depicts the traditional participation-success link and adds factor and process research components.

Figure 2.1 - User participation and its effect on system success



The model recognises the potential of participation contingencies, acknowledges the dynamics of the user participation process and accepts that intervening variables may moderate the participation effect on system success. These various components of the model are briefly described below.

Contingencies. Contingencies refer to the context of system development which enables or facilitates user participation or which, alternatively, may prohibit or inhibit participation. These conditions may determine whether or not user participation is desirable or necessary.

User Participation Process. A project may incorporate user participation during development, but the quality and effectiveness of such participation is not guaranteed. User participation may be considered as a interaction process between analysts and users. The dynamics of the user-analyst relationship affect the extent and effectiveness of the user participation process.

Intervening mechanisms. The outcome of system development with user participation may not necessarily lead to system success. Intervening variables may moderate the effect of user participation.

Figure 2.1 is used here as a framework to synthesize existing research findings and to indicate the value of separate findings in their ability to contribute to a full description of user participation in system development. Referring both to theoretical literature and to empirical research findings contingencies, the user participation process and intervening variables are now discussed in turn.

4 Contingencies for user participation in system development

In an effort to explain mixed results in the early user participation literature some researchers have adopted a contingency approach to participation in development. The research literature identifies a number of factors which make user participation in development particularly appropriate or which facilitate user participation in development. These contingencies are related to the organisation, the project environment, the development stages and the user.

4.1 Organisational variables

Time for development. Involving users in the analysis, design and implementation of IS may cause delays in the development process. By involving more people, who may have different viewpoints, it becomes more difficult (and hence will be more time-consuming) to reach consensus (Locke and Schweiger, 1979; Mansbridge, 1973). Thus, if there is a time constraint on development, there is likely to be no or less user participation.

Both Hirschheim (1985) and Tait and Vessey (1988) found that time constraints lead to a substantial decrease in the participation of users in the development process and may preclude participation. Users and designers agree that applications developed in a traditional manner with limiting user participation are more likely to be completed on time (Mahmood,1987).

Financial resources available. User participation increases the demand for financial resources as more people are assigned to the project and as it takes more time to implement the system (Locke and Schweiger, 1979).

When there are insufficient resources the degree of user participation in system development may be decreased to meet the budget (Tait and Vessey, 1988). When there is no constraint on resources and when top management is financially committed to system development user participation in development is facilitated (Doll, 1987).

Top management commitment. Top management commitment to system development is a prerequisite for the provision of funding and adequate resources in terms of manpower (Hirschheim, 1985). Commitment need not involve top management participation in the project; top management commitment translates into support for IS and development projects (Jarvenpaa and Ives, 1991). Support from top management encourages and enables the participation of users in the development process (Doll, 1987; Ginzberg, 1981a; Hirschheim, 1985; Jarvenpaa and Ives, 1991).

4.2 Project-related factors

Structuredness of task. One reason for involving users in the development process is to ensure that the requirements of users are captured and that the completed system reflects user needs. If user needs are known and standard then there is less need for user participation during development.

Schonberger (1980) proposed that structured tasks at the operational control level require no or minimal user participation whilst unstructured, strategic planning tasks need considerable user participation. Later researchers consistently find that systems which are highly structured and well-defined do not require user participation to enhance system quality (Ives and Olson, 1984) or to improve the technical content of the system (Hirschheim, 1983).

Project complexity. Complex projects may require user participation. It is appropriate to involve users in the development of complex systems (Beath, 87).

Tait and Vessey (1988) found that managers react to systems that are technically complex by involving users in the development process. Mann and Watson (1984) indicate that the degree of task interdependence is an antecedent for user participation in system development. Beath (1987) suggests that cross-functional projects benefit from user participation.

Size can be considered to be an indicator of complexity of the project. User participation is generally used in the development of large systems; participative design is considered impractical to use for small systems (Hirschheim, 1985).

Initiator of project. User participation in development is particularly appropriate if the idea of the system originates from non-user sources. Involving users from an early stage will enhance user commitment to the system.

Alter (1978) found that systems which are not initiated by users themselves tend to incur higher resistance and are more likely to fail. However, in his sample all low initiation systems which involved high user participation during development turned out to be successful applications. It appears therefore that user participation may compensate for lack of user initiation. These findings were confirmed by Kim and Lee (86).

Expected change brought about by system. New systems may bring about changes to jobs, interpersonal relationships and to organisational structure (Anderson, 1985). If such changes have not been prepared for the new system may encounter resistance among users. User participation will help gain general support for the development effort, will make users feel more committed to the system and may thus avoid resistance to the system (Markus, 1983). Development projects which are likely to lead to significant change benefit from user participation, even if the task to be automated is relatively structured and straight-forward.

4.3 Development stages

The development process consists of a number of stages and user participation may be more important in some stages than in others. Researchers identify different numbers of stages and name stages differently, but all describe essentially the same process: IS development from initial problem statement through system analysis to system design and implementation.

Early stages. During the early stages of development the problem is defined and requirements are identified. User participation in these early stages facilitates project definition and planning (Ginzberg, 1981a), ensures that users form realistic expectations about the system (Ginzberg, 1981b) and facilitates the identification of complete and accurate user requirements. Participation of users requires time and effort, but McKeen (1983) found that development projects which spend a considerable amount of time on the early analysis stages of a project turn out to be more successful than those where limited time is given to analysis. Hence, the extra time required for effective user participation is likely to pay off in terms of a more successful system.

Empirical research findings show that user participation, if it does take place, is prevalent in the early development stages (Edstrom, 1977, Franz and Robey, 1986; McKeen, 1983). The same studies also show that system success is positively related to user participation in the early stages of development.

Physical design and coding stages. Users are hardly involved in the physical design and coding phases. Users do not usually possess the technical and programming expertise to contribute to these phases in the development process (eg McKeen, 1983).

Later stages. Users may again participate when the development process reaches the testing and installation phases. Empirical studies show that participation in implementation is positively related to system success (eg Baronas and Louis, 1988; Kappelman and McLean, 1991). It has been suggested that participation in the implementation stages is less important than participation in the early phases of development (Ginzberg, 1981b; McKeen, 1983).

4.4 Factors related to the user

Willingness to participate. It may be desirable for users to participate in a project but there is no guarantee that users want to do so. The primary motivation for users to participate is that their participation is more likely to lead to a system that is designed according to user needs and wants (Locke and Schweiger, 1979). User willingness to participate increases if the proposed system and its output is perceived to be important by the user (Anderson, 1985). Non-participation of users, even though given the opportunity to participate, may indicate user resistance to the system developed (Markus, 1981).

Ability to participate. Users may not immediately be capable of contributing to system development in a meaningful way. Users are not likely to be able to contribute unless they understand the technology, the tasks involved and the environment within the system will operate (Anderson, 1985). Designers often feel users do not have the knowledge to adequately contribute to the development process (Land and Hirschheim, 1983; Newman, 1984; White and Leifer, 1986). However, effective communication between system specialists can overcome the knowledge gap: it can allow for learning, can enhance user knowledge and can enable meaningful user participation (eg Alavi and Henderson, 1981; Boland, 1978; Newman and Noble, 1990).

Users may not be able to participate because they are geographically removed from the project or because their own jobs take priority (Beath, 1987).

User characteristics and attitudes. Cognitive differences between users and specialists may deter user participation (Beath, 1987; Land and Hirschheim, 1983; Zmud, 1979). Tait and Vessey (1988) found the relationship between user attitudes and user participation to be positive but insignificant.

5 The process of user participation in system development

Users may participate in development but there is no guarantee that such participation is effective in contributing to the final outcome of the project. User participation in system development is a process that takes place over time and involves interaction between users and developers. Users contribute to the process to ensure the system will conform to their needs; system specialists contribute to the process to take account of technological limitations and opportunities.

Effectiveness of user participation is affected by the user-analyst relationship. The different backgrounds and perspectives of users and specialists potentially lead to conflict during user-designer interaction (Robey and Farrow, 1982; Robey et al, 1989). The degree and effectiveness of user participation in the development process depends on the relative ability of users and designers to exert influence, their relative power positions and the ability and willingness of each party to communicate (eg Markus and Bjorn-Anderson, 1987; Newman and Noble, 1990; Robey et al, 1989).

User participation can only be effective if users can exert influence during the development process (Robey and Farrow, 1982). Users may participate in the development process, but their input may be ignored, thus limiting their degree of participation. conversely, users may be able to force the system specialists to accept their input, thus enhancing their degree of participation (Ives and Olson, 1984).

The extent to which users are able to exert influence is related to their power position relative to that of the system designers. In many cases actual or perceived power implicitly lies with system specialists (Markus, 1983; Markus and Bjorn-Anderson, 1987). Descriptive studies show that designers are aware of and use their position - at times to the detriment of the final outcome of the project (Grover et al, 1988; Newman, 1984).

Effective communication can ensure mutual understanding and thus can affect agreement between user and analyst (Edstrom, 1977). Effective communication can be influenced by the relative position in the organisation of the two parties, by the extent to which either party's involvement is mandatory and by the semantic gap between the users and specialists (DeBrabander and Edstrom, 1977; DeBrabander and Thiers, 1984).

Because system development is a process the user-specialist relationship is not likely to remain stable over time: the relative ability to exert influence changes as time progresses (Markus, 1983; Newman and Noble, 1990; Robey et al, 1989). Newman and Robey (1992) show that user-analyst relationships indicate the trajectory of a project; they suggest that critical encounters may change the nature of relative user-specialist influence and thus may change the trajectory of a project.

The development of systems involving user-specialist interaction is a process characterised by likely conflict and by fluctuations in relative influence of either party. Because of the dynamic nature of the process there is no guarantee that user participation is effective. The outcome of the development venture is thus affected by the quality and nature of user-specialist interaction during development.

6 Variables moderating the participation-success link

Users may have participated in development and the process of participation may have been effective, but the outcome of this participation need not necessarily be a successful system. Recent empirical studies have investigated the effect of intervening variables on the relationship between participation and system success. The intervening mechanisms that have been identified are user cognitive and motivational factors.

<u>Perceived control</u>. Baronas and Louis (1988) propose that the process of implementing a new system represents a threat to users' sense of control over their work and work situation. By giving the users a sense of control during implementation users are able to accept the new system and will rate it in a more positive way than users who perceived a loss of control. They conclude from their study that user participation during development may have less impact on subsequent user satisfaction with the new system than efforts which enhance or restore perceived control.

Desired level of participation. A user's desired level of participation as compared to his/her actual level of participation may affect user satisfaction (Doll and Torkzadeh, 1989). Most user participation research assumes that users participate and are involved to the degree that they wish. However, this is not necessarily so and this may have detrimental effect on user information satisfaction. Testing discrepancy theory Doll and Torkzadeh (1989) found that users who are substantially more or less involved than they desire, are less satisfied with the outcome of system development. King and Lee (1991) conclude that the actual amount of participation in IS development may well contribute less towards user information satisfaction than ensuring that users' *desired* participation is closely matched with the *actual* amount of participation.

Perceived importance and relevance. Barki and Hartwick (1989) introduced into IS research the notion of user involvement as a need-based psychological state of users. User attitude toward the development process and its product (the IS) is generated by the extent to which the system is both "important and personally relevant" to the user (Barki and Hartwick, 1989).

Swanson (1974) already showed that "a priori involvement" (ie participation) increased user appreciation (ie involvement) of the system. Similarly, Kappelman and McLean (1991) found that user participation enhances user involvement and that user involvement intervenes in the participation-success relationship.

7 The user participation-success relationship

The previous sections discussed contingencies, process dynamics and intervening mechanism impacting on the user participation-success relationship; this section focuses on the relationship between user participation and system success. It has long been advocated that user participation during system development enhances system success. The standard model of user participation shows a direct causal relationship between user involvement and system success. Since being first introduced by Swanson (1974) it has formed the basis of most user participation research.

Empirical research has repeatedly tested the participation-success link, but studies have reported mixed results. Ives and Olson (1984) reviewed 22 empirical studies carried out between 1959 and 1981. They show that there are positive, negative and inconclusive findings concerning the relationship between user participation and success. Only 8 studies (36% of their sample) supported a positive participation-success link.

Updating the Ives and Olson review, Table 2.2 identifies 19 empirical studies carried out between 1982 and 1992 and shows the conclusion drawn by the authors concerning the participation-success relationship.

Table 2.2 - Empirical research findings (1982-1992) concerning the user participation-system success link

Positive result	Inconclusive result	Negative result
Allingham and O'Connor (1992) Baroudi et al (1986) DeBrabander and Thiers (1984) Doll and Torkzadeh (1989) Franz and Robey (1986) Kappelman and McLean (1991) Kim and Lee (1986)	Baronas and Louis (1988) Beath (1987) Franz and Robey (1984) Hirschheim (1985) Jarvenpaa and Ives (1991) Markus (1983) Newman and Noble (1990) Newman and Robey (1992) Robey et al (1989)	King and Lee (1991) Tait and Vessey (1988) Robey and Farrow (1982)
7	9	3

Of these studies 7 (37%) found a positive relationship between participation and success, 3 returned a negative result and 9 studies had inconclusive findings. Comparing the two review results, it is clear that, in spite of 10 more years of research, the 1982-1992 findings are still just as inconclusive as those of 1959-1981 studies.

A different approach for comparing research results was taken by Pettingell et al (1988). They report on a meta-analytical study of research findings concerning the influence of user participation on system success. They combine research findings and statistically test the strength of the relationship between user participation and system success. The Pettingell et al (1988) study indicates that the combined findings show a positive and significant participation-success link. In spite of conflicting individual research findings the relationship between participation and system success can not be dismissed as unimportant or irrelevant.

The literature on user participation regularly proclaims the importance of and need for user participation in development; empirical research continues to provide inconsistent results when testing the participation-success link.

8 Discussion

This section reflects on empirical research findings and highlights its limitations and weaknesses. These limitations concern the operationalisation of variables, the possible misinterpretation of existing findings, the appropriateness of research methods used and the types of system studied.

8.1 Operationalisation of constructs

Mixed results in user participation empirical studies may be the result of inconsistent operationalisation of constructs (Ives and Olson, 1984).

Participation is consistently measured as user activities during various phases of system development. Most researchers also attempt to measure the degree of user participation by gauging actual influence of the user during the development process. Actual instruments used are different for nearly every study. Only 2 studies used the same instrument: King and Lee (1991) used the instrument developed by Doll and Torkzadeh (1989).

System success is ideally measured in economic terms by return on investment: a system is successful if its return on investment compares favourably with alternative investment opportunities. However, economic justification and evaluation is difficult as intangible costs and especially benefits of IS are, firstly, hard to identify and, secondly, difficult to express in financial terms. Instead of evaluating system success in economic terms, the IS community relies on surrogates for success.

User information satisfaction is the most widely used surrogate for system success in the empirical user participation literature at large. It is recognised that satisfied users alone do not necessarily indicate that a system is successful (Melone, 1990): it is possible to have unsuccessful systems with satisfied users and, similarly, to have an effective system with unsatisfied users. However, user information satisfaction is accepted as the main indicator of success, particularly when system use is mandatory.

System use is an appropriate measure of system success when system use of discretionary or voluntary (DeLone and McLean, 1992). Other success measures employed in empirical studies on user participation include progressive use of IT (Jarvenpaa and Ives, 1991), and resolution of conflict (Robey and Farrow, 1982; Robey et al, 1989). Instruments used in the various studies all differ.

The diversity in measurements and in instruments prevents research findings from being cumulative. Further research should be aimed at clarifying constructs and at the building of validated research instruments (Ives and Olson, 1984). Only then can studies be replicated and can a cumulative body of findings be built up.

8.2 Validity of existing findings

Baroudi and Orlikowski (1989) suggest that existing findings in the user participation literature may have been misinterpreted due to low statistical power. Research has not shown a demonstrable link between participation and system success, but that does not necessarily mean that there is no causal effect. It may be that the statistical tests used in qualitative studies on participation were not powerful enough to detect the effects. Future user participation research may be directed at determining whether inconclusive findings in previous studies are correct (Baroudi and Orlikowski, 1989).

8.3 Selection of research approaches

Surveys are the most frequently used research strategy amongst the studies investigated. Use of surveys enables the collection of a large amount of structured data to test hypotheses, but is not appropriate for exploring context and uncovering further contingencies. Divergence of findings suggests there may be a need to identify contextual factors which impact on user participation (eg Doll and Torkzadeh, 1989; Franz and Robey, 1986; Ives and Olson, 1984). Opportunities for further research include the increased use of case research and qualitative methods to investigate participation issues. Such research enables researchers to capture the "rich picture" and may lead to greater understanding of the contingencies, the process and the intervening mechanisms associated with the user participation and system success relationship.

8.4 User participation and types of system

Most studies discuss user participation in the context of a traditional data processing environment: data is collected on user participation in the development of transaction processing and management information systems. Very few studies concentrate on other types of systems.

Previous studies have called for further research into user participation in the development of particular types of system and in a variety of environments (Doll and Torkzadeh, 1989; King and Lee, 1991; Ives and Olson, 1984). Different environments create different contexts for user participation. Studies focusing on a specific type of system as the unit of analysis allow us to build prescriptive models for particular applications.

8.5 Participation in the development of interorganisational systems

This study looks at participation in the specific context of interorganisational systems (IOS). A theoretical paper (Johnston and Vitale, 1988) and two empirical studies (Reich and Benbasat, 1990; Runge, 1985) have mentioned the importance of participation of intended users in the development of interorganisational systems. All three studies focused on IOS and the participation issue receives only peripheral attention. No previous study has specifically focused on user participation in the context of IOS.

Interorganisational systems are a specific type of system: they are systems that extend beyond the boundaries of one organisation. User participation in the development of IOS differs from that in the development of systems which are internal to the organisation. In IOS intended users are outside the organisation which is developing the system and this may have implications for the ability and willingness of users to participate. Also, the development of an IOS is likely to have a strategic impact and, for reasons of confidentiality, the sponsoring organisation may want to limit or avoid participation by users external to the organisation (Reich and Huff, 1991).

Focusing on the participation of users in the development of IOS, this study responds to calls for participation research in the context of a specific type of system. By extending the participation concept to systems where intended users are outside the organisation, this study adds a new dimension to user partipation research.

9 Chapter summary

This chapter has reviewed the literature on user participation in system development. The major research findings are outlined below.

Contingencies of participation. Empirical research has shown that the contingencies which impact on user participation include organisational variables (time constraint, financial constraint, top management commitment), project-related factors (structuredness of task, complexity of task, expected change for the user, project initiator) and user-related factors (willingness and ability to participate).

Describing and classifying participation. Participation itself can be described in terms of the participation activities at various stages of development. Participation can be classified according to type, degree and content of participation.

Participation/success relationship. Empirical research investigating this relationship has provided mixed results. The relationship can not be considered confirmed.

Methodological issues. Operationalisation of contingency variables is usually not made explicit. Definition and operationalisation of the dependent variable "success" varies among empirical studies.

This thesis explores the role of user participation in the development of Customer Oriented Systems. Participation in an interorganisational context has not before been investigated and no existing literature on this research topic is available.

Existing research literature on user participation (in the context of internal systems) has been reviewed in this chapter. The research literature concerning interorganisational and strategic information systems is reviewed in the next chapter (Chapter Three).

CHAPTER THREE - Interorganisational and Strategic Information Systems

This chapter discusses the second area of literature which impacts on the research topic. A review of the literature on interorganisational and strategic information systems describes the context of the issue under study.

The chapter starts with some definitions. Then, a framework is presented which identifies 4 stages in the development process of interorganisational systems. Research findings related to each of the four stages are reviewed and suggestions for further research are presented.

1 Introduction

Interorganisational Systems (IOS) and Strategic Information Systems (SIS) are topical areas of IS research. Literature in both areas is fairly recent. SIS literature is found mainly since the early 1980s when articles began to appear linking the use of IS to business strategy describing successful cases and presenting frameworks to help identify SIS opportunities. The concept of IOS has been around since the late 1960s (Kaufmann, 1966) but only in the 1980s has the concept of interorganisational systems been discussed at any length in the literature (Barrett and Konsynski, 1982; Cash and Konsynski, 1985; Suomi, 1992). Most strategic information systems are also interorganisational systems and many interorganisational systems are also strategic systems (Johnston and Vitale, 1988). The terms are often used interchangeably and much of the literature on these interorganisational and strategic systems (IOS/SIS) overlaps.

Researchers are now interested in the risks associated with IOS development and the temporary nature of the competitive benefits attributed to their implementation. Development does not necessarily lead to highly successful systems which enhance the firm's competitive position. It is not yet clearly understood how and why some systems become successful applications whilst others fail. Much of the evidence is circumstantial and based on descriptive case studies. Research has begun to try and find underlying factors which may contribute to the relative success of IOS/SIS. The purpose of this chapter is to assess the state of this research.

2 Definitions

Before presenting the research framework some conceptual issues must be addressed. The terms interorganisational system and strategic information system must be defined.

The concept "interorganisational systems" is relatively straightforward; IOS are information systems that cross company boundaries and link two or more organisations (Cash and Konsynski, 1985). The concept "strategic information systems" is a more complicated term. There is not only confusion over the meaning of the term *strategic use of IT* but also over the distinction between *strategic* and *competitive* IS applications. These concepts will be briefly addressed in turn.

There are two distinct meanings of the strategic use of information systems (IS) (Wilkes, 1991). Firstly, IS may be *used to support strategic decision making*. Examples include computer-based strategic planning methods and executive information systems, where information systems are used during the strategic decision making process (Doyle, 1991). Secondly, IS may be *used to support or shape an organisation's competitive strategy* (Wiseman, 1985). Famous examples include airline reservation systems and many applications of electronic data interchange (EDI). IS may be used as a tool to support and implement strategy; IS may also be used to drive and formulate strategy (Chan, Huff and Barclay, 1990; Wilkes, 1991). This chapter adopts the second and more common definition of SIS: "IS used to support and shape an organisation's competitive strategy".

There is confusion in the literature surrounding the terms *strategic IS* and *competitive IS*. Some authors use the terms strategic use of IS and competitive use of IS interchangeably (Rackoff, Wiseman and Ulrich, 1985; Wiseman, 1985); other authors distinguish between the two (Huff and Beattie, 1985; Bakos and Treacy, 1986). Overlap between various strategic uses of IS may explain the confusion: the boundaries between strategic versus competitive uses of IS are sometimes blurred.

Strategy may be internally oriented (aimed at improving internal operations), may be competitive (aimed at outmanoeuvreing other industry players) or may have a portfolio orientation (from the perspective of an outsider considering whether to and how to compete in an industry) (Bakos and Treacy, 1986). The competitive use of IT is thus only one application of the strategic use of IS. Empirical studies have found that most SIS applications contribute at the internal strategy and competitive strategy level while only few SIS applications contribute at the business portfolio level (King and Sabherwal, 1992; Sabherwal and King, 1991).

Often an internally oriented strategy has a competitive impact and many internally oriented systems evolve into competitive strategic systems. Several researchers have commented on the overlap between the internal strategic and the competitive strategic use of IS (Bakos and Treacy, 1986; Rockart and Scott Morton, 1984). Improving the efficiency and effectiveness of a firm may *at the same time* create competitive opportunities. For example, efficient transaction processing systems may reduce costs and hence make the firm more competitive. Internally oriented SIS may enable a firm to provide an improved product or service and therefore may make the firm more competitive. It may be difficult to clearly distinguish between an internal strategic application of IS and a competitive strategic use of IS.

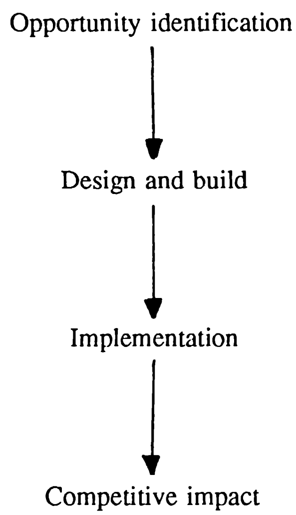
An examination of 14 well-known SIS cases showed that the vast majority of SIS are initially developed in response to internal efficiency needs (Neo, 1988). Once operational, the transaction processing systems were adapted for strategic purposes. Hence a system, built for internal strategic purposes, may become a competitive strategic system. The apparent overlap between internal strategic and competitive strategic use of systems can be easily explained: SIS often play both an internally strategic and a competitive strategic role.

3 A research model

The process of developing an IOS/SIS can be broken down into a number of stages (Reich and Benbasat, 1990). The reasons for breaking down the development process into separate stages is two-fold. Firstly, each individual stage may be completed but this does not guarantee that the organisation is able to successfully complete the subsequent stage. Secondly, at each stage different factors either enable or inhibit successful completion.

Reich and Benbasat (1990) propose a five-stage model distinguishing between Idea Generation, Development, Early Adoption, Longer Term Penetration and Competitive Advantage. The research model here proposed combines the Early Adoption and Longer Term Penetration stages into one stage - thus distinguishing four clearly identifiable stages. The present model also changes the names of each stage in order to make each label as descriptive and non-ambiguous as possible. The four stages are shown in Figure 3.1 and are briefly described below.

Figure 3.1 - An IOS development model



Opportunity identification. No system can be developed without the original idea for its development having germinated. An opportunity must be identified and evaluated.

Design and build. Once opportunities are identified firms may wish to exploit such opportunities. Even with equal access to knowledge and technology, not all firms exploit opportunities: there are factors facilitating or inhibiting the development of SIS.

Implementation. After development the SIS must be implemented and adopted by the intended users. Since these users are often outside the sponsoring organisation such adoption may be voluntary.

Competitive impact. Not all firms are able to derive a competitive edge from their SIS, even when developed and successfully adopted.

The IOS/SIS development process, as depicted in the model, needs to be well-understood for such systems to prosper. Factors must be identified which enable firms to successfully complete each stage in the development process. Knowledge of such factors could help a firm ascertain its potential to develop and implement a system successfully. Factors inhibiting a firm's success at any stage must be made explicit, so that expectations for the system's outcome are not inflated. Recognising limitations and constraints, firms may be able to affect change and to create conditions more favourable to the successful development of the system.

The existing research is now considered within the above framework and opportunities for further research are identified.

4 Identification of opportunities

The development process starts with the identification of an opportunity for an interorganisational, strategic system. Organisations can proactively search for opportunities using one of the many frameworks designed for this purpose. Apart form searching for opportunities, opportunities may simply present themselves to an organisation; a number of facilitating factors have been identified. Once an opportunity is identified it is not always prudent to go ahead: risks of development must be evaluated before progressing to designing and building the system.

Opportunity identification frameworks, factors facilitating development and risks associated with opportunities are now discussed in turn.

4.1 Frameworks aiding identification of opportunities

A significant proportion of the literature is devoted to the identification and description of opportunities for IOS/SIS use. Such articles are intended to help practitioners interested in using IS to enhance business opportunities.

Economic theory suggests that competitive opportunities may be derived from bargaining power and comparative efficiency (Bakos and Treacy, 1986). Bargaining power relates to the ease with which an organisation can resolve bargaining situations to its advantage; comparative efficiency refers to the ability of a firm to offer a product at a lower price than a perceived equivalent.

Transaction cost economics suggests an additional avenue of exploiting competitive opportunities: the cost involved in the flow of goods and services between firms (Clemons, 1986; Clemons and Row, 1991). Reduction of transaction costs can lead to direct savings (eg by lowering the cost of searching for suppliers or of placing orders) and to indirect savings (eg by reducing inventories).

IS can be used to exploit these sources of competitive advantage. IOS/SIS research offers a number of frameworks explaining the competitive use of IS. These models are based either on the competitive strategy model or on the value added chain model.

4.1.1 Competitive strategy based models

Porter (1979, 1980) introduced the idea that competition is rooted in an industry's underlying economic structure. Five competitive forces combine to present the competitive environment for an organisation in every industry: potential new entrants to the industry, suppliers, customers, substitute products or services and, lastly, other firms within the industry. Only by being aware of and understanding these forces can an organisation compete effectively and formulate appropriate strategies. Porter (1980) suggested that organisations may adopt one of three competitive strategies: be a low-cost producer, produce a unique, differentiated product or aim to fill the needs of a niche market.

McFarlan et al (1983), Parsons (1983) and McFarlan (1984) were among the first to link the use of IT with Porter's model. They discuss the use of IT to combat Porter's five competitive forces and to enhance Porter's 3 competitive strategies. The describe and give examples of ways in which firms can exploit IT to produce low-cost goods and services, to reduce lead-time, to customise products, to enhance levels of customer service and to identify specialised markets.

Benjamin et al (1984) present a "strategic opportunities matrix" to help managers find potential IT applications. Firms may explore opportunities to produce new products or use new processes or may choose to improve traditional products and processes; firms can concentrate on improving internal operations or may use IT to improve their position in the competitive marketplace.

The "strategic thrust model" (Wiseman and McMillan, 1984; Rackoff et al, 1985; Wiseman, 1985) is also based on the competitive forces concept. The model describe ways of finding strategic applications for one of three targets (supplier, customer and competitors) using one of five strategic thrusts (differentiation, cost, innovation, growth and alliance). Strategic thrusts connect business strategy and IT as IT may be used to support or shape any of the five strategic thrusts.

Ives and Learmonth (1984) concentrate on just one of Porter's 5 competitive forces. They analyse a firm's links with customers and put forward the Customer Resources Life Cycle model. Organisations can put themselves in a "preferred supplier" position with customers by aiding the customer with the ordering and management of stock. They break down the stock ordering and management process and give examples of ways in which IT can support each segment in the process. Offering enhanced service and/or cost saving it is possible to link customers into one's business as customers will experience switching costs if switching to another supplier.

4.1.2 Value-added chain based models

The value added chain model recognises that a company's activities may be divided into a number of technologically and economically distinct activities. At each of these stages value should be added to the product or service so that the value added is greater than the cost of performing the activities at each stage.

Researchers have utilised value chain analysis to put forward approaches to identify competitive IT opportunities (Rockart and Scott Morton, 1984; Porter and Millar, 1985; Johnston and Carrico, 1988). The use of IT can affect the way individual activities are performed and can enhance linkages between activities either within or between firms. Hence the use of the value-added chain model can be useful to identify where an firm can deploy IT to support business strategy.

Each part of the value chain can be examined separately to identify IT applications. Ives and Vitale (1988) offer a detailed model to consider new ways of using IT in maintenance and after-sales service.

4.1.3 Relative usefulness of models for identifying SIS opportunities

Frameworks to identify SIS opportunities proliferate; more than 15 separate models have been identified (Earl, 1989). Some researchers have questioned the relative usefulness of these models (Ciborra, 1991; Doyle, 1991; Galliers, 1990).

Organisations who wish to use a framework for identifying IS opportunities face the difficulty of selecting an appropriate framework. In a study to compare the relative usefulness of 2 main frameworks Bergeron et al (1991) compared Porter's value chain model (Porter and Millar, 1985) and the Wiseman strategic thrust model (Rackoff et al, 1985). It was found that both models were relevant and helped identify strategic opportunities. The study concluded that value chain models tend to be more applicable to organisations in stable environments aiming to improve internal processes. The strategic thrust model seems more relevant for organisations that seek an improved competitive position.

Survey evidence in the United Kingdom suggests that many organisations do not use models to identify IS applications (Galliers, 1990). Wilson (1989) found that organisations may understand the concept of adopting a strategic view, but that, in practice, the deliberate process of strategy formulation is rare. Identification of SIS opportunities is therefore not dependent on the use of SIS models.

Careful reading of case studies of successful SIS also suggests that organisations do not rely on models and high level planning to identify applications (Ciborra, 1991). The more frequently cited SIS successes of the 1980s (American Hospital Supply's ASAP; McKesson's Economost; American Airlines' Sabre; French PTT's Minitel) evolved from bottom-up, prototyping, trial-and-error approaches; none of these were developed with a top-down, big-plan approach.

4.2 Factors encouraging development

The initial idea for an IOS/SIS opportunity is not necessarily the result of considered planning and decisionmaking. Opportunities may evolve or present themselves to an organisation; they may simply need to be recognised as such. Careful reading of case studies of successful IOS/SIS reveals that often the organisational president or other top executive may initiate the project, having the vision to see its strategic potential (eg Johnston and Carrico, 1988; Lindsey et al, 1990; Neo, 1988; Wightman, 1990).

Internal need. Neo's analysis (1988) of 14 well-known IOS/SIS suggests that most organisations develop SIS initially in response to an internal need. Processes and products with a high information content are automated to enhance internal efficiency (Lindsey et al, 1990). Businesses with high transaction volumes develop systems to improve internal operations (Johnston and Carrico, 1988). Such systems may provide the opportunity to be employed strategically.

Competitive pressure. A competitive industrial environment is conducive to the development of IOS/SIS (King and Sabherwal, 1992). Organisations that are first to develop and introduce an SIS often have a competitive orientation and show a strong desire to be number one (Reich and Benbasat, 1990). In other cases IOS/SIS are developed in response to increased competition in the industry (Johnston and Carrico, 1988; King et al, 1989). Increased competitive pressure may arise from a growing number of competitors (increased foreign competition or entry of competitors from another industry) or from a successful initiative by a competitor.

Information intensity. Development of IOS/SIS is often related to the relative information intensity of products and processes. Products that have a large information content and processes which involve a high degree of information processing provide opportunities for exploiting IT (Huff and Beattie, 1985). In some industries IS are critical for the functioning and survival of firms (finance, publishing, distribution); in other industries IT plays a cost-effective but distinctly supporting role (manufacturing). In information intensive industries IT budgets are high and IS have a high profile - factors already identified as application specific factors facilitating the IOS/SIS development process. Development of such applications is therefore often associated with information intensive industries (Johnston and Carrico, 1988).

Opportunities and threats facing an industry. Opportunities or threats can act as a catalyst for IOS/SIS development (Johnston and Carrico, 1988; Neo, 1988). Technological advances may present an opportunity to enhance existing systems or to develop a new IOS/SIS application. Government intervention through, for instance, deregulation of an industry may increase competitive pressure and encourage SIS development.

4.3 Assessing risk associated with opportunities

Several researchers have pointed out a number of potential risks and unexpected effects of the use of IOS/SIS (eg Clemons and Kleindorfer, 1992; McFarlan, 1981; Vitale, 1986).

McFarlan (1981) suggest taking a portfolio approach to the evaluation of opportunities. He proposes that organisations weigh up risks and benefits associated with the development and implementation of an application in order to decide whether or not to go ahead with design and building of that application.

Vitale (1986) presents a framework to help consider whether to capitalise on an identified opportunity for a potentially important information system. His 2x2 matrix plots current impact of IS on the firm versus the future importance of IS to the industry. Such an approach highlights the importance of not merely considering an opportunity in terms of benefits to the organisation in the short-term, but also considering the opportunity and its potential impact on the industry in the longer term.

Clemons and Kleindorfer (1992) suggest that organisation may want to rethink their plans for developing interorganisational systems if they truly understand the impact of such systems on themselves and their partners. They present a preliminary model which helps show the manner in which enhanced business value, created by the system, is shared among participants of the system. The value to be obtained may not be of the type or magnitude as first envisaged by organisations.

5 Design and build the system

Having identified a potential application a firm moves to the second stage in the development process: designing and building the system. Increasingly research interest has turned to identifying conditions which facilitate this development stage.

Application sponsor. Many IS projects require an enthusiastic, high level sponsor who champions the system by encouraging its development and offering strong support throughout the development process. Runge (1985) identified a significant positive correlation between a product sponsor and IOS/SIS development. Other empirical studies have also found that a product sponsor is often associated with SIS development (Lindsey et al, 1990; Reich and Benbasat, 1990; Wightman, 1990). A centralised environment is conducive to the effective sponsorship of systems by a high-level executive (King and Sabherwal, 1992).

Top management support. Top management as a whole must support SIS development. An IOS/SIS is often a large project and its development constitutes a major commitment in terms of time, people and financial resources. Successful projects are accorded high priority in the organisation (Neo, 1988; Reich and Benbasat, 1990). A lack of top management support is a major inhibitor in the development of IOS/SIS (King et al, 1989) even if the IS function itself is willing and enthusiastic (Johnston and Carrico, 1988).

Resources. Management has to be willing to invest substantial resources in order to develop an interorganisational and strategic system as most require an abundance of resources (Reich and Benbasat, 1990). A strong financial position of the firm has therefore been identified as a major enabling factor for the development of IOS/SIS; whilst budgeting constraints act as an inhibitor (King et al, 1989).

The decision to invest in IOS/SIS invariably carries with it some risk. It may not be possible to assign reliable quantitative values to all risks and benefits and thus it may be difficult for an organisation to evaluate whether an IT investment is worthwhile. Yet, there may also be risks attached to not investing (Clemons, 1991). Case studies show that an organisation may have to invest in a major project in order to keep up with competitors (Copeland and McKenney, 1988) or to remain in business (Lindsey et al, 1990).

Build on existing system. It is preferable for organisations to have prior experience with IS. Many successful IOS/SIS evolve from transaction processing systems already operational in the organisation (Copeland and McKenney, 1988; Johnston and Carrico, 1987). Existing systems may become an SIS through integration of separate internal systems (Benjamin and Scott Morton, 1988) or by extending the systems beyond company boundaries (Cash and Konsynski, 1985).

IS experience. If not using an existing system organisations may use the experience gained in one system to build a new, improved IOS/SIS (Reich and Benbasat, 1990). King et al (1989) found a strong internal, technical ability to be a major enabler for SIS development. High levels of competence amongst IS staff (Reich and Benbasat,

1990) and large existing processing capacity (Copeland and McKenney, 1987) enable an organisation to design and build an IOS/SIS.

Existing IS capacity. Organisations must have the capacity to develop a system. A large existing processing capacity enables an organisation to design and build an IOS/SIS (Copeland and McKenney, 1987).

6 Implementation of IOS/SIS

Few IOS/SIS studies distinguish between, on the one hand, the designing and building of an application and, on the other hand, the implementation of that application. Such a distinction must be made because successful building of a system does not guarantee successful implementation (Reich and Benbasat, 1990). The success of IOS/SIS depends on acceptance by and adoption of the system by its intended users. There are factors which impact on and determine the relative success of the implementation/adoption stage. Only two IS studies were found to refer specifically to factors impacting on the implementation or adoption of IOS/SIS (Reich and Benbasat, 1990; Runge, 1985).

Fulfilling a user need. The system may have been built to satisfy known needs: intended users may have expressed dissatisfaction with an existing system or they may have expressed the desire for a new service. Reich and Benbasat (1990) in a study of Customer Oriented Systems found that systems built in reaction to needs expressed by customers were adopted more quickly than systems built in the absence of an expressed need.

User participation in development. Applications which rely on voluntary adoption must take into account the views of the intended user (Krcmar and Lucas, 1991). Such views can be learnt and accommodated by involving users in the design process. User participation is positively correlated with rapid adoption of IOS/SIS (Runge, 1985); system development which does not involve user participation has mixed adoption rates (Reich and Benbasat, 1990).

Financial cost to user. Organisations may choose to pass on all or some of the cost of the IOS/SIS to the intended user. Empirical evidence suggests that passing on a high cost of the system to the user leads to slow adoption, whilst low or nominal cost is associated with fast adoption of IOS/SIS (Reich and Benbasat, 1990).

Marketing of the system. Since IOS/SIS often involve users outside the organisation adoption may depend on the relative effectiveness of marketing the system. Empirical evidence suggests that superior marketing programs have an enabling effect on system adoption (Runge, 1985). Disappointing marketing efforts, on the other hand, are associated with slow adoption of IOS/SIS (Reich and Benbasat, 1990). This could be attributed to poor support for and lack of training of the sales staff.

7 Competitive impact of the system

If the system has been implemented successfully, the IOS/SIS may enable a firm to gain a competitive advantage. A firm has a competitive advantage if it is able to obtain returns on investment (in a given industry) that are better than normal (Clemons and Kimbrough, 1986). However, there are few reported instances of sustained competitive advantage based on IOS/SIS. Any competitive edge may be eroded as competitors copy the system. Often the use of IT becomes a strategic necessity within the industry. The literature has discussed these three possible outcomes.

IS research focusing on firms obtaining a competitive advantage is mostly theoretical and explains how a competitive edge may be temporarily gained, how the industrial cost structure of the industry may be changed and how, potentially, a competitive advantage may be sustained.

7.1 Temporary competitive edge

Successful development and adoption of an IOS/SIS may lead to the firm gaining a competitive edge over its competitors. The system can enable the firm to provide its product or service at a lower cost than competitors; it may allow the firm to differentiate its product or service from a competing product; it can enable a firm to provide a new product or service in a niche market (Porter and Millar, 1985).

Empirical studies show that such sources of competitive advantage are real and increase a firm's profitability and/or market share (eg Clemons and Row, 1988: McKesson; Copeland and McKenney, 1988: Sabre; Dos Santos and Pfeffer, 1991: ATMs).

However, a competitive edge based on IT may only be temporary (Clemons and Kimbrough, 1986). A specific use of technology is easily imitated. Technology itself is available to all and at competitive prices. Competitors can, by acquiring the technology, attempt to duplicate the innovative system.

A firm can maintain a competitive edge whilst it has the time to reap benefits from its system (Clemons, 1987). Such time is available if competitors do not react and copy the IOS/SIS immediately. Competitors may not follow the IS lead for a number of reasons. Competitors may not be aware of the source of the leader's competitive success; they may not realise the importance of the new IT application; they may not be able to imitate because of costs or lack of access to technology (Clemons and Row, 1987).

7.2 Strategic necessity

A first mover in the industry may obtain a competitive advantage with an innovative IOS. A first mover's system may have such an impact on the industry that it changes the rules of the business. It may become clear to competitors that the IOS/SIS application is a strategic necessity: something that a firm must have in order to compete (Clemons and Row, 1987; Benjamin et al, 1990). By <u>not</u> investing in and <u>not</u> imitating the system, firms may no longer be able to compete effectively (or at all).

Competitors that imitate the first mover's use of IT must do more than merely copy the application. In order to overcome first mover advantages competitors have to leapfrog the capabilities of the original system or entice users away from the original system by offering greater incentives (Johnston and Carrico, 1988).

When an IOS becomes a strategic necessity and competitors copy the first mover system in an effort to regain their competitive position, the cost structure of the industry changes (Clemons and Row, 1987). As the industry stabilises and all competitors use the application, the cost of industry participation has increased and entry barriers have been raised - but no single firm is able to gain or maintain a competitive advantage based on the system.

IT applications classed as strategic necessities are not always easy to obtain as acquisition costs may be high, implementation may be difficult and development time may be lengthy (Clemons and Row, 1987). Such constraints may lead to the development of cooperative systems (eg joint ATM networks in the banking industry) or to industry concentration through mergers, acquisitions and firms leaving the industry (eg the drug distribution or airline industry).

7.3 Sustained competitive advantage

A competitive advantage is sustainable only if competitors can not easily copy the first mover. Firms that want to sustain their competitive advantage rely on a capability gap. A difference in capability between a firm and its competitors may be based on firm-specific strengths (Coyne, 1986), on the ability to create barriers to entry (Porter, 1980) or on the continued up-dating and improvement of the strategic tool enabling the competitive edge (Grindley, 1991).

Firm-specific strengths. Pyburn (1991) concluded that a sustainable advantage based on IT only occurs when IT is "woven into the very fibre of the firm". Exploiting IT to support activities, skills and routines that are unique to the organisation (Olaison, 1990) and thus exploiting the information component of IT (King et al, 1989) may enable firms to sustain a competitive advantage.

Creating barriers to imitation. IOS/SIS applications rely on switching costs as defense against competitor. When adoption of the system has been rapid and switching costs are substantial, a first mover is likely to reap lasting benefits from the system (Clemons, 1986). However, with increasing transparency of systems, the development of open systems and standardisation of user interfaces switching cost barriers can not always be relied upon to be a permanent defense against competitor imitation (Clemons and Kleindorfer, 1992).

Exploiting continuing opportunities. Firms that have gained a competitive edge with a SIS may be able to sustain that advantage by remaining one step ahead of their competitors. By continually enhancing and improving the system, organisations can avoid being leapfrogged by the competition. Empirical evidence supports the notion that continued exploitation of IOS/SIS underlies a sustainable competitive advantage (Copeland and McKenney, 1988; Reich and Benbasat, 1990).

8 Discussion

In the previous sections factors influencing stages of the IOS/SIS development process have been presented. It is appropriate at this stage to reflect on these findings and point out limitations. Many empirical research findings are the result of exploratory and descriptive studies. The factors identified can therefore not be accorded prescriptive qualities. The limitations of existing studies relate to methodology and concern problems with measurement of variables and the generalisability of findings.

8.1 Research methods used

Researchers have employed a number of methods in an attempt to identify factors which facilitate the designing and building of interorganisational and strategic systems. Most research is case study based and authors generalise from a single case in a single industry (eg the TELCOT system in the cotton industry - Lindsey et al, 1990) or look for commonalities in a number of cases in a single industry (eg reservations systems in the airline industry - Copeland and McKenney, 1987) or a number of cases in several industries (eg Customer Oriented Systems - Reich and Benbasat, 1990). Other studies survey IS professionals to elicit practitioners' perceptions of factors impacting on the SIS development process (eg Johnston and Carrico, 1988).

The empirical studies provide evidence of a number of factors which are associated with successful design and building of these systems. Survey methods can now be used to test these factors in a large sample of firms and across industries.

8.2 Measurement issues

Measurement issues include issues relating to both independent and dependent variables. Firstly, only simple measures have been used to operationalise the factors influencing each stage in the development process. Secondly, very few studies operationalise the success of each of the four stages.

Independent variables. Factors impacting on the various stages of the IOS/SIS development process have not been operationalised (Reich and Benbasat, 1990). Empirical studies report the presence of certain factors, but have not attempted to quantify variables and have not examined relationships between variables.

Dependent variables. The first stage in the development process has been successfully completed when an IOS/SIS opportunity has been identified. The second stage (designing and building the application) is complete when an IOS/SIS has been designed and built. The third and fourth stages (implementing the system and gaining of competitive advantage) are more difficult to operationalise.

Implementation refers to the adoption of the application by intended users. Adoption is often voluntary as intended users of IOS/SIS tend to be outside the sponsoring organisation. Adoption can be measured by system use; the relative success of SIS adoption may be measured by comparing numbers of actual users with the total population of intended users (Runge, 1985; Reich and Benbasat, 1990).

Competitiveness derived from an IOS/SIS is hard to quantify. A firm has a competitive advantage if it is able to obtain returns on investment (in a given industry) that are better than normal (Clemons and Kimbrough, 1986). It is hard to attribute a definite proportion (or amount) of profitability and competitive strength to a particular IS. Researchers rely on self-reported perceptions, qualitative measures and some quantitative figures to ascertain the extent of competitive advantage. Ordinal ranking may be used to separate successful and unsuccessful competitive applications (Reich and Benbasat, 1990).

8.3 Generalisability of findings

Most empirical research identifying factors influencing the IOS/SIS development process focus on successful systems and/or on first movers. This focus affects the generalisability of findings.

Studies usually report that several systems which have been developed successfully have certain factors in common (eg Neo, 1988). However, such knowledge is not sufficient for us to be able to conclude that without the presence of these factors IOS/SIS can not be successful. Only by including both successful and unsuccessful systems in the sample is it possible to find factors that distinguish between the two.

A similar problem with generalisability arises with studies reporting on first movers (eg Reich and Benbasat, 1990). A sample of first movers may distinguish between factors enabling and inhibiting the development process. However, it is not possible to deduce what factors impact on the development process for firms that follow and imitate an IOS/SIS built by a competitor. Further research should study first movers as well as followers.

8.4 Completeness of findings

As most studies are descriptive and not easily generalisable research findings are potentially incomplete. There may be additional factors, not yet identified, impacting on the development process. In addition, some factors may be more important than others in certain industries or for certain types of application. Sample selection and data collection methods should allow for the capture of further contextual information.

9 Chapter summary

This chapter has reviewed IS theoretical and empirical literature relating to the IOS/SIS development process. Four separate stages in the development process were identified. Major findings which are particularly relevant for the present research topic are summarised below.

Factors impacting on adoption of systems. Once the IOS/SIS has been built it is presented to the intended users outside the organisation. Only two previous empirical studies have investigated factors which affect adoption of Customer Oriented Systems (Reich and Benbasat, 1990; Runge, 1985). These studies suggest that adoption is enhanced by the system fulfilling customer need, by the system having been developed with the aid of customers, by a low cost (to the customer) of the system and by a superior marketing effort on the part of the sponsoring organisation.

Reich and Benbasat (1990) and Runge (1985) each mention participation of customers, but present aggregate findings only and do not consider relative importance of and interrelationships among the adoption varables.

Methodological issues. The shortcomings of the empirical research to date were highlighted. A major limitation of IOS/SIS literature concerns the absence of clear operationalisation of independent and dependent variables.

In this chapter and the previous chapter, the literature which is relevant to this study's research topic has been reviewed. The next chapter (Chapter Four) combines the two areas of research and details the research problem with its associated research questions.

CHAPTER FOUR - The research problem

In the previous two chapters the literature in relevant areas of research was reviewed. This chapter details the research problem and associated research questions drawing on the literature previously discussed. The research problem is briefly outlined and the relationship between the specific research questions is made explicit. Each of the research questions is examined in detail.

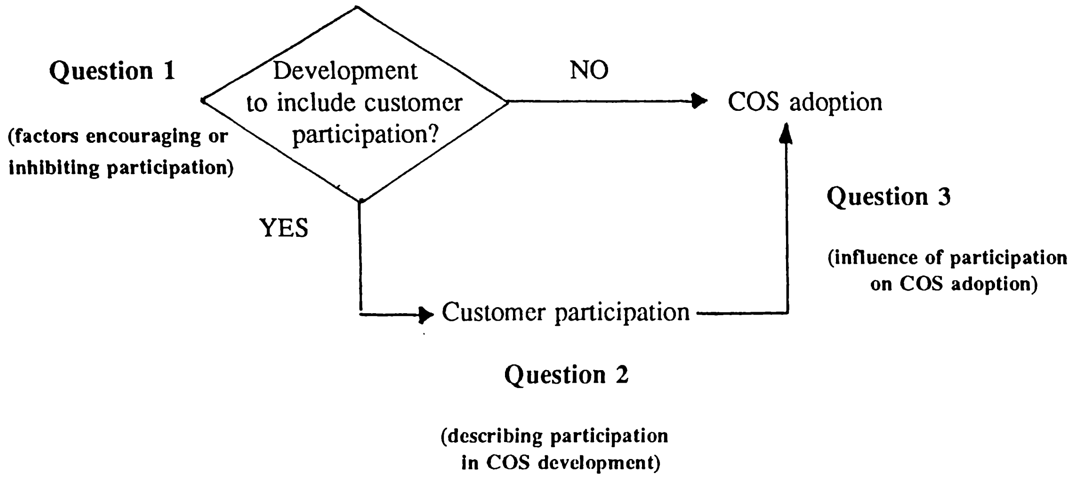
1 Research problem

Two studies on Customer Oriented Systems (COS) both reported that the involvement of customers in the development of systems enhances the adoption rate of such systems (Reich and Benbasat, 1990; Runge, 1985). COS development that does not involve customer participation has mixed adoption rates. Customer participation in the development of COS appears to be positively correlated with successful adoption and yet only a minority of firms involve customers in the development process.

Both Runge (1985) and Reich and Benbasat (1990) suggest that customer participation in COS development is a factor affecting COS adoption; both empirical studies report aggregate findings concerning a number of adoption factors. Both are interesting studies, but their findings' impact is limited in that neither of the studies discusses any of the factors in detail and neither study considers relative importance of adoption factors or discusses interrelationships among factors. This study addresses these limitations by investigating customer participation during development and by considering the relative importance of customer participation as one of several adoption factors.

This study aims to answer three research questions relating to customer participation and its effect on COS adoption. The first research questions aims to find out what factors contribute to the decision to involve or not involve customer in the COS development process. The second research question investigates how customers participate in the development process. The third research question tests if customer participation has a positive effect on system adoption and addresses its impact on adoption in relation to other adoption factors. The relationship between these three questions is shown in Figure 4.1; the research questions are discussed in detail in the following sections.

Figure 4.1 - Customer participation in the development of COS and its effect on the adoption of such systems



2 Factors determining customer participation in COS development

Just as users may or may not participate in general system development (eg Ives and Olson, 1984), customers may or may not participate in COS development. Reich and Benbasat (1990) found in a study of 11 COS that 3 of the systems were developed *with* customer participation while 8 were developed *without* customer participation. Organisations implicitly or explicitly decide whether or not to obtain customer input in the early stages of COS development. This decision is the subject of the study's first research question:

<u>Question 1</u> - *What factors contribute to or inhibit the participation of customers in the COS development process?*

A number of factors impact on a sponsoring organisation's decision regarding customer participation during development. Such factors may be derived from literature on user participation in development and from literature on strategic information systems (SIS) and inter-organisational systems (IOS). Literature on user participation distinguishes between the circumstances which make user participation desirable or possible and, on the other hand, the circumstances which make user participation unlikely or unnecessary. Literature on SIS and IOS describes the actual circumstances in the COS environment. Thus, user participation literature describes *potential factors* impacting on participation, whilst IOS literature describes the *context* of the COS development environment.

Potential participation contingencies for participation of customers in the developmetn of Customer Oriented Systems are derived from both bodies of literature and are here presented together with the major references. The factors can be categorised as organisational factors (which can be controlled by the organisation), project-related variables (which are project-specific and can not be controlled) and customer-related variables (which are customer-dependent and can not be controlled by the organisation).

Organisational factors

Time constraint. Projects which have to be completed quickly tend to discourage or preclude user participation in development (Hirschheim, 1985; Tait and Vessey, 1988). Projects which require a longer time to develop or which are developed without a time constraint, tend to encourage user participation (Hirschheim, 1985).

Financial constraint. When there are plenty of resources, user participation is facilitated (Doll, 1987). Constraint on resources discourages user participation in development (Tait and Vessey, 1988).

Top management commitment. Commitment of top management ensures resource provision and encourages user participation (Ginzberg, 1981; Doll, 1987). Lack of top management commitment inhibits user participation (Ginzberg, 1981).

Project related factors

Structuredness of task. Tasks which are relatively structured or which are at the operational control level in an organisation do not require user participation in development (Schonberger, 1980). Unstructured tasks do require user participation (Hirschheim, 1983; Ives and Olson, 1984; Tait and Vessey, 1988).

Complexity of task Tasks which are technically complex require user participation (Tait and Vessey, 1988); projects which are cross-functional benefit from user participation (Beath, 1987); large projects benefit from user participation (Hirschheim, 1985).

Initiator of project. If the idea for the system does not originate from users, user participation is desirable (Alter, 1978; Kim and Lee, 1986).

Expected change. A system which is likely to bring about significant change for the user, benefits from user participation (Markus, 1983; Anderson, 1985).

Confidentiality. This issue is not discussed in the user participation literature and may be peculiar to the development of interorganisational systems.

Strategic considerations may inhibit or preclude customer participation during the COS development process. Organisations seeking to obtain a strategic advantage over competitors with a COS may be concerned about security leaks (Reich and Huff, 1991). In order to preserve and ensure confidentiality organisations may not wish to involve customers in the COS development process.

Customer related factors

Willingness to participate. Potential users are motivated to participation in development if the system and output are perceived to be important to the user (Anderson, 1985; Locke and Schweiger, 1979).

Ability to participate. Intended users may not be able to participation if they are geographically distant from the project or when their own jobs take priority (Beath, 1987). Users are unlikely to be able to participate in a meaningful way if they don't understand the technology (Anderson, 1985).

Table 4.2 summarises the variables and the values which are associated with participation or non-participation of users in the system development process. The two columns showing values for each variable, indicate what value for every variable is associated with a *positive* impact on participation and what value is associated with a *negative* impact on participation.

Table 4.2 - Values of factors which potentially affect participation of customers during COS development

Factors		Value encouraging participation (+ive impact on participation)	Value inhibiting participation (-ive impact on participation
Organisational	Time constraint	no	yes
	Financial resources	no	yes
	Top management commitment	high	low
Project-related	Structuredness of task	low	high
	Complexity of task	high	low
	Initiator of project	non-user	user
	Expected change	high	low
	Confidentiality	no	yes
User-related	Willingness to participate	high	low
	Ability to participate	high	low

During data analysis it may become clear that the user participation factors do *not* clearly distinguish between COS development with and without customer participation and that therefore the factors may *not* be appropriate in the COS context. If that is the case, then this study must use the available data to investigate what factors *do* categorise COS development projects according to participation or non-participation.

3 Actual customer participation in COS development

Customers may participate in COS development in a number of ways. The second research question aims at describing customer participation in COS development:

Question 2 - *In what ways do customers participate in COS development?*

Customer participation in development can be described according to a number of dimensions:

Activities performed (Barki and Hartwick, 1989). The user participation literature defines user participation in terms of activities performed by users during system development. A description of customer participation in COS development must therefore detail the activities engaged in by customers in the various stages of the development process. Authors disagree on the specific number of stages in the development process; there is also no consensus on the appropriate name for each stage. In general, though, authors describe the same process with similar activities and responsibilities (Olson and Ives, 1981; Franz and Robey, 1986). MIS literature agrees that the development process ranges from initial problem definition through to installation of the completed system. Ives and Olson (1984) distinguish four stages:

- definition: justification of project and design of high level specifications;
- system design: logical design of the system;
- system building: physical development of the system;
- installation: making operational of the completed system.

Baroudi et al (1986) and Franz and Robey (1986) have built validated, accepted research instruments for measuring specific activities describing participation at each of these stages.

Type of participation (Ives and Olson, 1984). Participation varies from indirect participation (where users are consulted only) to direct participation (where users actively take part in development). Mumford (1979) distinguishes three types of participation:

- consultative: users are consulted but do not make decisions;
- representative: representatives of users are part of the design team;
- consensus: all users are involved in the design process.

It is possible to categorise a system development project according to one of these types of participation. In the case of COS it is likely that COS with a small, well-defined set of customers may enable consensus participation in development; COS with large numbers of casual customers lend themselves to consultative or representative participation.

Degree of participation (Ives and Olson, 1984). Users may have varying amounts of influence over system design. Ives and Olson (1984) list:

- symbolic involvement: users participate but are ignored;
- involvement by advice: users give advice which is solicited through interviews or questionnaires;
- involvement by weak control: users have "sign-off" responsibility at each stage;
- involvement by doing: users are part of the design team or act as intermediary between the user group and the design team;
- involvement by strong control: users are fully responsible for development.

Each development project may be characterised by one of these degrees of participation. In terms of COS, customer participation will not involve strong control as responsibility for the system lies with the sponsoring organisation. The degree of customer participation in COS development is likely to range from symbolic involvement through to involvement by weak control.

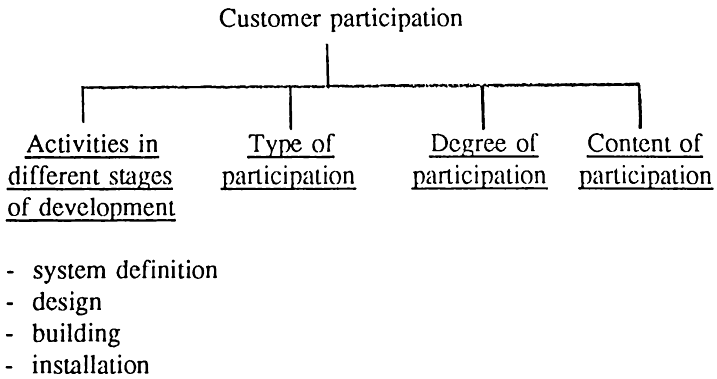
Content of participation (Hirschheim, 1983). User participation may involve different aspects of design. Hirschheim (1983) distinguishes:

- technical design: users participate in technical design of the system;
- social design: users participation includes social and job considerations.

Participation in development projects will either focus on technical design or will encompass social design as well. Customer participation in COS development is likely to cover technical system design. Organisations may seek to enhance acceptability of COS by including social and job considerations as part of the brief for customer participation in the COS development process.

Figure 4.3 summarises the dimensions which will be used to describe customer participation in COS development.

Figure 4.3 - Dimensions to describe customer participation in COS development



4 The effect of customer participation on subsequent COS adoption

A COS may be developed with or without customer participation. Two studies on COS concluded that user participation in the development process has an enabling effect on COS adoption (Reich and Benbasat, 1990; Runge, 1985); studies on user participation in system development in general have provided mixed results when linking participation with system success (eg Ives and Olson, 1984). The participation-success relationship can not be considered confirmed and must be tested in any study on user participation in COS development. This research will investigate whether customer participation during development has a significant impact on subsequent adoption. The third research question addresses this issue:

<u>Question 3</u> - *What influence does customer participation have on COS adoption?*

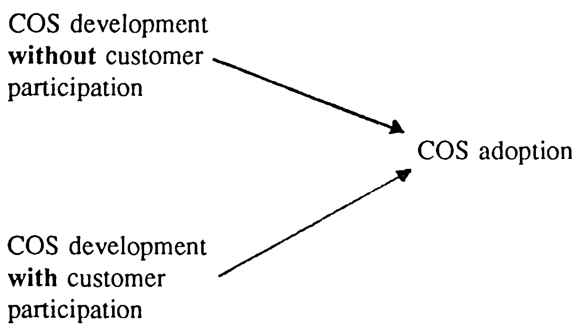
Empirical studies have identified that customer participation is one of several factors influencing COS adoption. Therefore there are two separate components to this research question: the question, firstly, investigates the impact of participation on adoption and, secondly, addresses the relative importance of participation among the set of adoption factors.

4.1 The participation-COS adoption link

Previous research has reported that participation of customers during COS development enhances subsequent adoption of COS (Reich and Benbasat, 1990; Runge, 1985). Both studies used adoption rate for operationalisation of the adoption construct. In order to enable comparison with these studies, this research will also use speed of adoption as the measure of the dependent variable.

This study investigates whether adoption of COS developed with customer participation is faster than adoption of COS developed without customer participation. Figure 4.4 depicts the relationship to be tested.

Figure 4.4 - The link between participation in development and COS adoption



It is expected that COS developed *with* customer participation are adopted more quickly than COS developed *without* customer participation (Reich and Benbasat, 1990; Runge, 1985).

4.2 Factors influencing COS adoption

Customer participation in COS development is only one of several factors influencing COS adoption. The SIS/IOS literature includes two empirical studies that focus particularly on COS (Reich and Benbasat, 1990; Runge, 1985). Both of these studies identify factors influencing COS adoption:

Customer participation in COS development. Customer participation in development enhances COS adoption; if customers are not involved fast adoption is not guaranteed.

Fulfilling expressed customer need. Systems built in response to expressed user needs tend to be adopted quickly; systems built in the absence of identified needs tend to be adopted slowly.

Cost of COS to customer. Systems which involve the customer in high acquisition or operation cost are associated with slow adoption. No, low or nominal cost of the system is associated with fast adoption.

Marketing of COS. Poor marketing of COS tends to lead to slow adoption; superior marketing efforts are associated with high adoption.

Figure 4.5 summarises the factors influencing COS adoption. Three of these factors are related to and can be controlled by the sponsoring organisation (customer participation in development, marketing of the system, price of the system) and the other factor relates to the customer (expressed customer need).

Figure 4.5 - Factors influencing COS adoption

COS Adoption

Sponsoring organisation	Customer related
- customer participation - marketing of COS - cost of COS to customer	- expressed customer need

Previous research has identified several factors influencing COS adoption but has not considered the relative importance of various factors. This study, though focused on the customer participation factor, also addresses the significance of this factor among the set of factors known to impact on the adoption of systems that link organisations with their customers.

4.3 Beyond adoption

This research focuses on customer participation and its impact on adoption. It is however of interest to consider the importance of adoption in the context of ultimate COS success. For this reason, this study will also briefly consider what happens beyond adoption addressing COS penetration and the ultimate impact of the COS on the sponsoring organisation.

Once customer organisations adopt a COS the sponsoring organisation can reap the benefits from such adoption. Reich and Benbasat (1990) found that high penetration of the COS is a pre-requisite for a sponsoring organisation to achieve significant organisational benefits. So, a sponsoring organisation has to achieve adoption and high penetration of the COS before being able to reap the benefits of the COS.

Organisational impact of a system has been described as the ultimate measure of system success (DeLone and McLean, 1992). Organisational impacts include tangible and intangible benefits. Tangible benefits of COS are lower operational costs, increased sales, increased market share; intangible benefits include customer satisfaction and improved image in the industry.

5 Chapter summary

This research aims to understand the issue of customer participation in COS development. It seeks to do so by answering three research questions.

Research Question One. The first research question aims to find out *why* organisations decide to involve or not involve customers in the development process. A taxonomy of variables impacting on the customer participation decision has been proposed. This taxonomy will be tested.

Research Question Two. The second question sets out to describe *how* customers participate in the development process. A number of dimensions which can be used to describe customer participation has been proposed. Customer participation will be categorised according to these dimensions.

Research Question Three. The third research question examines the effect of customer participation on COS adoption. It is recognised that customer participation is but one of a number of factors influencing COS adoption. COS adoption is a pre-requisite to the sponsoring organisation experiencing an organisational impact from the system.

The methodology for answering these questions is described in the next chapter.

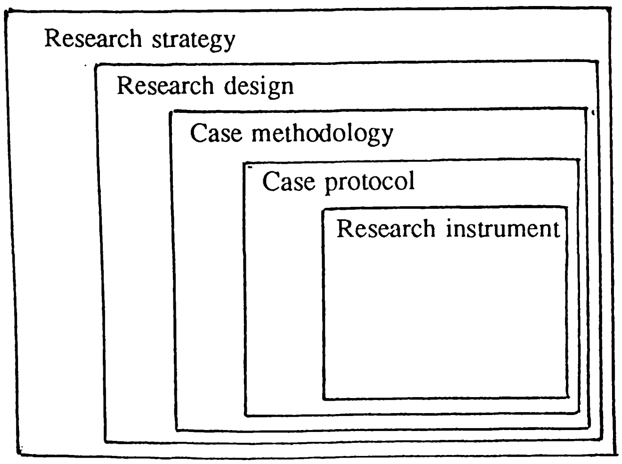
CHAPTER FIVE - Research methodology

Having identified research questions it is important to explain how the study aims to answer the questions. Before being able to collect data and address the research questions, the way of collecting and analysing data has to be decided upon, explained and justified. This process involves (eg Galliers, 1992; Sellitz et al, 1976; Yin, 1989):

- selecting the research strategy;
- creating the overall research design;
- specifying the methodology;
- determining the protocol to be used during field work;
- designing the research instrument.

The five steps are depicted in Figure 5.1; they are sequential and progressively lead from the general (selection of research strategy) to the specific (design of research instrument).

Figure 5.1 - Five methodological steps



These five steps constitute the link between, on the one hand, research questions and, on the other hand, data collection and data analysis.

The first part of this chapter explains the selection of case research as the appropriate research strategy for this study. Next, the specific case research design for this study is outlined. Thirdly, the specific steps of the case methodology are described. Then, the case protocol is presented and, lastly, details of the research instrument are provided.

1 Selection of research strategy

A research strategy is a way of investigating an empirical topic by following a set of pre-specified procedures (Yin, 1989a). There are a number of research strategies that may be employed in a research project. The major research strategies are laboratory experiments, surveys, field studies and case studies; other strategies include simulation, forecasting, action research and phenomenology (eg Benbasat, 1984; Bonoma, 1985; Galliers, 1992; Stone, 1978). Selection of a specific research strategy depends on the purpose, nature and characteristics of the research topic.

1.1 Prevalent research strategies in IS

In a recent study of IS research approaches Orlikowski and Baroudi (1991) found that nearly 50% of IS research published between 1983 and 1988 is survey research, whilst another 27% is based on laboratory experiments. Clearly, experimental and quantitative methods prevail in IS research but there are difficulties associated with these strategies. Quantitative research in IS is not necessarily carried out well (Baroudi and Orlikowski, 1989; Pervan and Klass, 1992) and use of experimental and quantitative methods in IS research has limitations (Benbasat et al, 1987; Kaplan and Duchon, 1988; Lee, 1989; Orlikowski and Baroudi, 1991).

IS research relying on experimental and quantitative strategies may only provide part of the complete picture surrounding a phenomenon (Lyytinen, 1987; Orlikowski and Baroudi, 1991). By measuring static constructs at a certain point in time and testing pre-determined hypotheses, these methods disregard context. In addition, these strategies preclude the discovery of further variables and the understanding of relationships among variables. Surveys and lab experiments have their strengths but "the stripping of context buys objectivity and testability at the cost of a deeper understanding of what is actually occurring" (Kaplan and Duchon, 1988, p572).

The prevalence of experimental and quantitative strategies does not necessarily mean that such strategies are the best and most appropriate for studying all IS topics. There is a place in IS research for use of research approaches other than the laboratory experiments and surveys which are employed most often by IS researchers.

1.2 Trade-offs among research strategies

It is generally accepted that no single research strategy is the "best overall" strategy (eg Benbasat, 1984; Bonoma, 1985; Stone, 1978).

Every strategy has its strengths and weaknesses. Stone (1978) provides a table comparing empirical research strategies across 14 dimensions. He notes that no single strategy has favourable ratings on all dimensions. The selection of a particular strategy involves a choice between trade-offs: increasing the naturalness of the setting involves a loss of control over variables; no single strategy can simultaneously maximise internal validity and external validity (Cook and Campbell, 1979). A researcher may try to pursue both data validity and generalisability by using more than one strategy within one project and aiming for replication or, at least, convergence of findings (Campbell and Fiske, 1959).

The strengths of the one strategy are weaknesses of another. Bonoma (1985) shows this graphically in his knowledge accrual triangle which plots the various research strategies according to data integrity (internal validity and reliability) and currency (external validity). High integrity is obtained by precise operationalisation of variables and high control over variables; the highest integrity is achieved through use of laboratory experiments. High currency is obtained by using natural settings and non-experimental designs and methods; the strategy offering highest currency is case research strategy.

Since each strategy has both strengths and weaknesses and since the weaknesses of the one are strengths of another strategy, it is not possible to rate one particular research strategy as the best one to use in any research project.

Yin (1989a) pointed out that research strategies are not all mutually exclusive: in some projects various strategies can be relevant and in other cases two strategies may be equally attractive. In selecting a research strategy we are therefore not necessarily trying to identify the one, best strategy (eliminating all others) but we are looking for an *appropriate* strategy.

1.3 Identifying the appropriate research strategy

As there is no "best" strategy, one selects the strategy which is most appropriate to the research at hand (Benbasat et al, 1987; Bonoma, 1985; Galliers, 1992; Hamilton and Ives, 1982). Each research project must be considered individually to determine the research approach that is most appropriate for that particular project.

Authors writing on methodological issues usually define and compare various strategies and also put forward criteria for selection of the appropriate strategy. The number of research approaches identified by various authors differ; similarly, the specific criteria for comparing research strategies and for selecting strategies vary among authors. However, there is general agreement that selection of the appropriate strategy should be guided by the purpose of the research, the nature of the research area and the specific research questions to be investigated. The research topic itself identifies the extent of existing theoretical knowledge about the topic, the degree of control required over variables and events and the need for studying the phenomenon in context.

<u>Extent of established theoretical knowledge</u>. When a lot is known about a research topic, the purpose of the research is likely to be theory testing on large populations (indicating survey research) or in new contexts (suggesting lab experiments or field studies). Research topics with a scant or uncertain theoretical knowledge base require in-depth information to be captured during data collection in order to enable description or theory building (Glaser and Strauss, 1967). Such topics benefit from case research or action research approaches (Benbasat et al, 1987; Bonoma, 1985; Yin, 1989a).

Customer participation in the development of Customer Oriented Systems has not previously been researched. The topic draws on two existing research areas, but neither research area provides an established theory base. User participation literature suggests variables which may affect user participation but shows mixed results when attempting to link user participation with systems success. Strategic information system literature provides descriptive studies of development of these systems and only two studies (Reich and Benbasat, 1990; Runge, 1985) have been identified which deal specifically with Customer Oriented Systems.

The lack of an existing well-developed body of knowledge suggests that case research is an appropriate strategy to study customer participation in the development of Customer Oriented Systems.

Degree of control over variables and events. If researchers are interested in investigating one variable by carefully controlling for all other relevant variables surrounding a phenomenon, then a laboratory experiment or simulation is appropriate. Controlled experiments can also take place in a field setting, using a field studies approach. If no control over variables is required then survey research or case research are appropriate.

The aim of this thesis is to increase understanding of the concept of customer participation in the development of Customer Oriented Systems, particularly as a factor contributing to adoption of such systems. Since not enough is as yet known about the topic, it is not clear what variables would have to be controlled for in an experiment investigating customer participation. This research topic requires a non-experimental research approach.

Requirement for studying phenomenon in context. When a research project focuses on measuring the incidence or prevalence of phenomena or when the research aims at testing predictive relationships, survey research is an appropriate strategy. On the other hand, when a research project aims at explanation or description then there is a need to capture the context within which the phenomenon operates. Context is known and controlled for in experimental research approaches; context is captured in a natural setting in case approaches.

The research questions of this thesis require an understanding of context. Aggregate findings, as are obtained when reporting survey research, do not enable an in-depth investigation as they do not show how various variables interrelate for individual organisations. Aggregate findings are descriptive, but are not always explanatory. This research wants to go beyond description and therefore requires full, individual information on the phenomenon under study.

Characteristics of the research topic and specific research questions identify case research strategy as an appropriate strategy for the investigation of customer participation in the development of Customer Oriented Systems.

1.4 Case research strengths and weaknesses

Having selected case research as an appropriate research approach for this study, it is important to highlight the strengths and weaknesses inherent in this approach.

Strengths of case research. Case research enables the capturing of "reality" and detail by studying a phenomenon in its natural context. It allows for the study of a large number of variables which need not have been previously determined. Case research is valuable in the developing and refining concepts for further study. Multiple case studies enable the researcher to relate differences in context to constants in process and outcome.

Weaknesses of case research. It is not possible to generalise case research findings statistically to a population. During case research one has no control over independent variables and this may limit the internal validity of conclusions. With non-experimental research one runs the risk of improper interpretation of an event. Also, case research may establish relationships between variables, but can not always indicate the direction of causation.

It has already been explained that every research strategy has its strengths and weaknesses and that the selection of a research strategy entails a trade-off. For the purpose of this study, the strengths of case research are considered of importance and the weaknesses are accepted as method-related limitations of this research.

1.5 Deficiencies in published IS case research

Just as there are shortcomings in survey and laboratory experiment research

(Baroudi and Orlikowski, 1989; Pervan and Klass, 1992), there are deficiencies in published IS case research. Benbasat et al (1987) have pointed out problems and have suggested ways of improving the practice of IS case research.

Statement of objective. IS case researchers usually fail to clearly explain where their studies fit into the knowledge building process. A clear statement of objectives and evidence of consideration of methodological issues can alleviate this problem.

Selection of case research design. IS case research focuses on single or multiple cases, but the rationale for selecting either is not often made clear. Reasons for selecting single vs multiple case research designs must be clearly specified.

Unit of analysis and selection of sites. In much published IS case research it is not clear why the author chooses a particular unit of analysis and/or why particular sites are selected for study. Unit of analysis and site selection must be tied to research questions.

These deficiencies, identified in previous IS case research, should be overcome or be avoided in further case-based studies. Since the present study adopts a case research strategy the recommendations of Benbasat et al (1987) must be addressed in this project.

2 Case research design

This section describes the case research design for this research. Research design provides the background for collection, measurement and analysis of data (Sellitz et al, 1976). Research should be designed so that appropriate data is collected and so that data analysis addresses the research questions (Yin, 1989b). Therefore, the objectives of the research suggest the specific research design appropriate for that study (Franz and Robey, 1987).

First, objectives and specific research questions of the study are outlined. Then, issues concerning data collection are addressed, including the rationale for multiple case design and the selection of unit of analysis. Next, data analysis matters are discussed, including the logic to be used for analysis and the criteria for interpreting findings. Lastly, a section concerning issues of validity and reliability is included.

2.1 Purpose of the study

The purpose of the study is defined by the objectives and specified in terms of the research questions.

2.1.1 Objectives

The general aim of this thesis is to enhance understanding of customer participation in the development of Customer Oriented Systems and its effect on subsequent adoption of such systems. Specifically, the objectives are contained in the research questions (described in Chapter Four) and reflect the theoretical issues to be addressed. The objectives expressed in the research questions are:

- to discover why some organisations involve customers in the development process whilst others do not (Research Question One);

- to describe the type, degree and extent of customer participation when customers do participate in the development process (Research Question Two);

- to determine whether customer participation has a noticeable effect on subsequent adoption of the system (Research Question Three).

In terms of the knowledge building process, the objectives of this thesis are exploratory, descriptive and explanatory.

<u>Exploratory</u>. Research Question One addresses contingencies for customer participation in COS development. A preliminary set of contingency variables has been derived from the user participation literature. However, is it not certain that these factors are relevant to the COS context since no previous study has investigated

participation in the development of interorganisational systems.

This part of the study is exploratory: previously identified variables may not all be appropriate in the new context and, secondly, further meaningful and relevant variables may be identified during data collection.

Descriptive. Research Question Two is descriptive: it aims to use empirical data to describe the customer participation construct according to pre-defined dimensions.

Explanatory. Research Question Three concerns the link between customer participation and adoption and, in addition, addresses the relative importance of participation among the set of previously identified adoption factors. This question tests known variables since two previous studies have identified COS adoption factors (Reich and Benbasat, 1990; Runge, 1985). However, these studies have not addressed the relative importance of the factors.

This part of the study is explanatory in that it attempts to explain variations in adoption success according to adoption factors and their interrelationships.

2.1.2 Research questions

The specific research questions indicate the information to be collected as evidence during data collection (Eisenhardt, 1989; Yin, 1989a). The research questions were described in Chapter Four.

Research Question One. This research question investigates user participation factors and their relevance in the COS context. The previously identified factors indicate that information must be gathered on:

- the time available for system development,
- the financial resources dedicated to the system,
- management commitment to the system,
- the structuredness of the task that is automated,
- the complexity and size of the project,
- the extent to which the system is likely to change customer operations,

- the origin of the idea for the system,
- the level of confidentiality deemed appropriate for the project,
- the extent to which customer consider the project important,
- the ability of customers to take part in the development project.

Research Question Two describes customer participation according to 4 dimensions. Information needs to be collected on specific customer participation activities during various stages of development. Information is also required on type, degree and content of participation.

Research Question Three investigates the link between participation and adoption of the COS as well as the relationships among adoption factors. Information must be collected on the relative success of the system in terms of adoption after development. Information must also be gathered on the factors affecting adoption:

- extent to which the system fulfils known customer needs,
- effort put into marketing of the system,
- cost of the system to the customer.

2.2 Data collection

Research design describes the basics of data collection. At the research design stage a single or multiple case approach is selected, the research unit of analysis is identified, approach to site selection is explained, the number of cases to be studied is discussed and the dependent variable is identified. All of these are determined by the research questions and propositions (Eisenhardt, 1989; Yin, 1989a and b).

2.2.1 Selecting single or multiple case design

The purpose of this research suggests a multiple case design. Only a clear and critical single case can provide the appropriate data to describe and investigate the customer participation concept and its link with the success of Customer Oriented Systems. No such case has been identified. Instead, this study is based on *multiple case design.* Multiple case design allows for comparison of data across cases. This enables one to verify that findings are not merely the result of idiosyncrasies of the research setting (Miles and Huberman, 1984).

2.2.2 Identifying unit of analysis

The unit of analysis is specified by the research topic. The unit of analysis in this research is an *operational Customer Oriented System*: a fully implemented information system that links an organisation and one or more of its customers. The COS may or may not be successful; the COS may have been developed with or without customer participation.

The unit of analysis of this study is different to that used in previous studies: Reich and Benbasat (1990) studied only first mover systems and Runge (1985) concentrated on successful systems. In contrast, this study includes first mover and follower systems and successful as well as unsuccessful systems.

It is conceivable that one organisation has more than one Customer Oriented System; this enables the study of more than one case within one organisation.

2.2.3 Selecting sites

Site selection should not be opportunistic but must be based on the nature of the research topic (Benbasat et al, 1987). Cases are selected to fill pre-determined categories (Eisenhardt, 1989; Yin, 1989). The criteria for selecting sites for this study were as follows:

- sites must have developed and implemented a Customer Oriented System;
- the sponsoring organisations must be profit-oriented, selling a product or service to customers;
- the system must enable the firm to enhance its core business and may not be a separate venture in its own right;
- adoption of the system by customers must be voluntary: customers must not be obliged to use the system in order to obtain the product or service;
- the system must have been developed by or on behalf of the organisation for this application; the idea for the system may be copied, but the particular system itself must not have been a tried and tested system

elsewhere.

In order to avoid industry bias, cases from more than one industry were to be included. In order to avoid the inadvertent selection of an idiosyncratic case, more than one case per industry segment were included wherever possible.

2.2.4 Determining the number of cases

The number of cases to be studied in multiple case design is not pre-determined. The appropriate number of cases depends, firstly, on how much is known about the phenomenon after studying a case and, secondly, on how much new information is likely to emerge from studying further cases (Eisenhardt, 1991). The research questions and the data collected together determine at what point the researcher has collected sufficient data to enable appropriate analysis. Eisenhardt (1989) suggests that multiple case design requires the study of at least 4, but no more than 10 cases.

In order to enable cross case analysis this study needs to collect data on participation and non-participation cases and on fast and low adoption cases. Figure 5.2 depicts a 2x2 matrix indicating the dimensions according to which the various cases are classified.

Figure 5.2 - Classifying cases in order to determine which and how many cases to study

	Fast adoption	Slow adoption
Participation		
Non-participation		

Cases can only be classified in a reliable manner *after* data has been collected on a case. It is therefore not possible to determine *prior* to data collection, which are the appropriate cases to select; neither is it possible to identify exactly what is the exact number of cases to be studied. Data collection on cases has to continue until each quadrant of Figure 5.2 contains at least one (and preferably more than one) case.

2.2.5 Identifying and measuring the dependent variables

This study addresses 3 research questions and, therefore, investigates more than one dependent variable. The dependent variables in this study are "customer participation" and "adoption of COS".

Customer participation. User participation literature defines the participation construct as the activities performed by users in the development process from initial project definition through to installation of the system (Barki and Harwick, 1989). The IOS literature defines participation in development more narrowly.

Johnston and Vitale (1988, p158) state that "once the principle objectives and broad design parameters have been established ... it is critical to involve people from other organisations [during development of IOS]". Their interpretation of customer participation implies that customer participation involves more than using customers to aid with project definition.

Reich and Benbasat (1990, p336) define customer participation as "customer input during the design phase". Their definition describes customer participation as participation taking place specifically during the design phase of development.

This research adopts the IOS definition ("participation during design") to describe "high participation" of customers in COS development. The user participation literature definition ("participation during any stage of development") is used to indicate lesser degrees of participation: "moderate participation" when customers are involved during initial project definition, "low participation" when customers are involved at the testing stage only. When categorising cases in this way, cases were found to fall into one of each of the three categories.

Adoption of COS. Adoption of COS can be operationalised by two variables (Downs and Mohr, 1976): a time-based variable (initial adoption rate) and a usage-based variable (extent of adoption and use). Runge (1985) used the time-based variable "adoption rate in the first year of launch" as the measure of adoption. Reich and Benbasat (1990) measured both adoption rate and the usage-based variable "penetration".

In order to enable comparison with previous studies, this study adopts "adoption rate in the first year of launch" as the measure of adoption. Cases are categorised according to their adoption rate as having either a "fast" or "slow" adoption rate. Adoption was categorised as fast when adoption targets were achieved or surpassed; adoption was categorised as slow if adoption was well below the targets set by the sponsoring organisation.

2.2.6 Measuring independent variables

Independent variables for this study include potential factors encouraging/inhibiting customer participation during development and the factors which were previously identified as affecting COS adoption.

Factors affecting customer participation. Several factors have been identified in the user participation and the interorganisational system literature as potentially affecting participation of customers during the COS development process. Data must be collected on organisational factors (time constraint, financial constraint, management commitment), on project-related factors (structuredness of task, complexity of task, extent of change expected, system initiator, level of confidentiality required) and on customer-related factors (willingness and ability to participate).

Factors impacting on COS adoption. Interorganisational system literature contained two empirical studies which considered COS adoption factors (Reich and Benbasat, 1990; Runge, 1985). Data must be collected on customer participation in development, fulfilment of customer need, cost of the system to the customer and marketing of the system.

Very few of these variables are easy to operationalise. System initiator, for instance, is a straightforward variable which can have either "customer" or "sponsoring organisation" as its value; cases can therefore be categorised easily according to this variable. Most of the other variables, however, are complex constructs which are difficult to measure.

None of the variables have been clearly operationalised in previous studies. Data collection provided information about multiple aspects of each variable. According to the individual values for each variable, factors were then categorised as either high, moderate or low (and in some cases only as high or low).

Results and analysis of each independent variable are included in separate sections in the Cross Case Analysis chapters. Operationalisation of the variables is discussed in those sections, since measurement and categorisation of each of the independent variables was usually guided by the available data.

2.2.7 Triangulation

Through validating a finding by more than one method or source of evidence, one ensures that the finding truly measures the phenomenon and is not method- or instrument-related (Campbell and Fiske, 1959; Jick, 1979). Convergent validation of data and relationships enhances confidence in research findings and conclusions. Ideally, total agreement between several methods or sources of evidence is sought, but convergence of evidence is sufficient to validate a finding (Campbell and Fiske, 1959). Triangulation of data was built into the research design in various ways.

Multiple data collection methods. Data was collected by interviewing informants and by collecting documentation. The aim was, wherever possible, to compare interview and documentary evidence. In practice, the vast majority of data was derived from interview transcripts; documentary evidence complemented interview data, but could usually not be used to validate interview data.

Use of several informants. Efforts were made to obtain information from more than one informant for each system. By using more than one informant interview data from one informant can be compared with that of another. In every case, two or more informants were used. Reliability of information could thus be checked.

Triangulation within research instrument. The research instrument contained questions aimed to elicit the same information in more than one way. Hence the information provided by an informant was cross-checked at the time of the interview.

2.3 Data analysis

Research design not only states objectives of the study and outlines data collection rationale, but also lays the foundation for analysis of the data after it has been collected. Methods for data analysis of qualitative data is not well formulated and documented (Eisenhardt, 1989; Miles, 1979; Miles and Huberman, 1984; Yin, 1989a). Analysis of data in case research is difficult due to the qualitative nature of much of the data collected. This is one of the limitations of the case research approach.

This section first addresses the logic used in data analysis and then describes within case and across case analysis procedures.

2.3.1 Logic used in analysis

Yin (1989a) outlines three specific techniques for data analysis: explanation building, time series analysis and pattern-matching. Explanation building involves an iterative process of gradually refining an initial proposition by comparing new cases with existing data. Time series analysis involves comparison of an actual data trend over time with a theoretical data trend specified at the outset of the investigation.

Because this study investigates similarities within and differences between groups of cases (those developed *with* vs those developed *without* customer participation and, secondly, those with *fast* vs those with *slow* system adoption), the major data analysis technique used in this study is pattern-matching. Pattern-matching relies on replication logic and involves comparison of patterns between groups of cases. Within each group the pattern should be similar (literal replication) and between groups the pattern should differ (theoretical replication). Two types of comparison can take place.

One can compare an empirically based pattern with a pattern defined prior to data collection. If the empirically based patterns coincide with the predicted ones, then compelling support is offered for the initial propositions. If the patterns do *not* coincide then the initial propositions need to be revised and retested with further cases.

Alternatively, an empirically based pattern of one group of cases may be compared with the empirically based pattern of another group of cases. If the patterns of the two groups are the same, then the pattern is not a distinguishing feature of each group. If the patterns are significantly different, then the pattern does indeed describe a contingency or context identifying each group.

There is no definitive way of interpreting findings in pattern matching (Yin, 1989). Patterns must be sufficiently contrasting or sufficiently similar to be able to draw conclusions.

2.3.2 Within case analysis

Multiple case research requires 2 separate stages of data analysis: initially cases are analysed individually (within case analysis) and then cases are compared (cross case analysis). Within case analysis involves the detailed write-up of each case. It is a mostly descriptive narrative with some early analysis of individual case data. There is no recognised structured format for this analysis. The objective of within case analysis in this study was to obtain a standardised data set for each COS. Writing up the individual cases in a similar format enables and facilitates comparison of data from different COS (Miles and Huberman, 1984).

The specific data analysis techniques used in this research are adopted from Miles and Huberman (1984). A list of codes and a set of matrices were drawn up prior to starting data analysis. The list of codes was used to code raw data as soon as possible after data collection. The matrices took the coded data to increasingly higher levels of abstraction: from quotes and figures to categorisation of variables. The use of coding and the matrices enables conceptualisation and facilitates the writing up of within case analysis.

The individual case write-ups were based on data obtained from interviews and documents. Since triangulation was built into the research design at the data collection stage, it was possible to validate evidence during data analysis. Findings and conclusions were substantiated wherever possible by cross-validating results. There were very few instances of contradictory evidence. Where evidence did not correspond, evidence had to be weighted. Information which was volunteered by informants, rather than having been prompted by the interviewer, was considered "better" data (Miles and Huberman, 1984). Similarly data from the more thoughtful and reflective informants was rated more highly than data from other informants (Miiles and Huberman, 1984). The fact that data was usually supported by more than one informant increased confidence in the reliability of informant reports and speeded up the analysis process.

Individual case data was analysed and presented in a standardised format showing case evidence for each of the three research questions. The data was then in a form which allows for cross comparison with other cases.

2.3.3 Cross case analysis

Cross case analysis was undertaken to answer the three research questions.

Research Question One. The first question concerns the factors influencing the decision whether or not to involve customers in the development process. The propositions predict the circumstances which would distinguish between cases where customers *do* participate and cases where customers *do not* participate. Pattern-matching techniques were used to help test this proposition.

The various COS were separated into two groups: COS development with or without customer participation. The factors affecting the customer participation decision were compared, looking for literal replication within each group and theoretical replication between the two groups.

Research Question Two. The second question describes customer participation. Data on the COS which included customer participation was collated according to the categories and dimensions outlined in the theoretical model. The data on customer participation could thus be compared to findings concerning user participation during the development of internal systems.

Research Question Three. The third research question concerns the effect of customer participation during development on subsequent adoption of the system. Previous research suggests that systems developed *without* customer participation are less successful than those developed *with* customer participation. There are also previous research findings relating to other adoption factors. These associations may be tested by pattern-matching.

Cases were categorised according to their adoption success: there were cases which were adopted more quickly and others which were adopted more slowly. The relevance of individual adoption factors could be ascertained by comparing patterns for each group of cases.

2.4 Tests for judging quality of research design

Four tests are relevant when judging the quality of research design. These tests concern reliability, internal validity, construct validity and external validity (Cook and Campbell, 1979). For each of these tests several tactics have been identified which may be applied at various stages of case research so that the final study and its findings reflect good quality research practice (Lee, 1989; Yin, 1989a).

Reliability. Reliability refers to the need of a study to minimise errors and biases: a second investigator with the same information should be able to arrive at the same conclusions. Reliability of case research results can be enhanced by well-documenting research procedures (Benbasat et al, 1987). This is achieved by designing a case study protocol and by developing a case study data base (Yin, 1989a).

This study has tried to increase confidence in reliability by documenting procedures in as much detail as possible: by including a lengthy research methodology chapter, by designing a case study protocol to guide the fieldwork and by maintaining files with full data on each case.

Internal validity. Internal validity refers to the robustness of conclusions concerning causal relationships. Relationships must be demonstrated to be truly causal and not spurious. Case research can not verify the validity of deductions in a mathematical manner. It is however possible to make deductions from qualitative analysis relying on verbal propositions through the rules of formal logic (Lee, 1989).

In case research internal validity may be enhanced by the use of multiple cases (McClintock, 1979) and the use of specific tactics for making inferences: pattern-matching, explanation-building and time-series analysis (Yin, 1989a).

In order to enhance internal validity, this study uses a multiple case research design and employs analytical logic in the form of pattern-matching to aid in data analysis.

Construct validity. Construct validity concerns the importance of constructing correct operational measures for the concepts studied. This implies that concepts must be clearly identified and that an appropriate measure must be identified for each concept. A clear progression from concepts to constructs and to operationalisation is essential (eg Straub, 1989). Confidence in findings can be enhanced by across method or within method triangulation and aiming for convergent validation of results (Campbell and Fiske, 1959; Jick, 79).

In case research construct validity may be increased by establishing a chain of evidence from research questions through to research findings (Yin, 1989a); by using multiple sources of evidence (Yin, 1989a) and by using more than one informant for interview evidence (Seidler, 1974).

With construct validity in mind, this study tries to show as clearly as possible (in this research methodology chapter) how the link between the research questions and the fieldwork findings is established. In addition, multiple sources of evidence were used wherever possible and multiple informants were interviewed.

External validity. External validity concerns generalisability of research findings. Case research can not claim statistical generalisability but relies on analytical generalisation (Yin, 1989). Case research aims to generalise a set of results to theory; this theory can be tested by using replication logic on further cases or by survey research.

In IS it is unlikely that researchers can observe the same conditions or set of events more than once. It is therefore difficult to verify the findings of case research by attempting to replicate the case. However, using replication logic (rather than sampling logic) the findings of case research can be verified (Lee, 1989; Yin, 1989). Sampling logic tests findings by replicating original observations; replication logic tests findings by confirming or disproving theory using different original observations.

Replication logic may be used within one project (using a multiple case strategy) or between projects (carefully selecting single cases to build a cumulative record).

This study does not claim generalisability but has been concerned with explanation and theory building. The findings can subsequently be verified on further cases in order to test external validity.

3 Case research methodology

This study follows the principles of case research methodology described by Yin (1989a). The specific methodology is depicted in Figure 5.3. Each of the 8 stages in the methodology is then described.

Figure 5.3 - Eight-step case research methodology

Develop model
↓
Develop case protocol and research instrument
↓
Conduct pilot case study
↓
Select case organisations
↓
Conduct individual case studies
↓
Produce individual case reports
↓
Cross case analysis
↓
Modify model

Develop model. In any research project there is a need for clarity and focus. Research projects that come to a study with no framework at all usually run into difficulty (Miles, 1979; Eisenhardt, 1989; Yin, 1989a).

Case research aimed solely at theory building formulates a question, identifies some variables from the literature but avoids explicitly specifying relationships

(Eisenhardt, 1989). Case research aimed at theory testing develops a preliminary model from the literature, modifies the model according to pilot study findings and tests the model on subsequent cases (Bonoma, 1985). Yin (1989) advocates the development of a theoretical model which relates the study to previous theory and findings and which aims for explanation of relationships between variables.

The model for this research with research questions and associated variables was described in Chapter Four.

Develop case protocol and research instrument. Adherence to a protocol is desirable in all types of case research as it increases the reliability of the research and helps ensure that all required data is collected. In multiple case design the development of a case protocol is essential as it makes sure that the researcher collects parallel information at different sites. The research instrument details the questions to be asked from the informants. Use of a research instrument ensures that the same questions are asked at each site and ensures that comparable data is collected.

The protocol and research instrument used in this study are described later in this chapter.

Conduct pilot case study. A pilot case study provides conceptual clarification and helps to refine data collection plans.

The site selected for the pilot case in this study was a local organisation where access had been obtained previously (Cavaye, 1992). The pilot case was used to test the procedure of data collection, to test the validity of the research instrument and to test whether the data collected enabled data analysis.

During data collection, interviews were obtained with several members of the organisation and documents were collected. It was difficult to obtain documents other than general information and promotional literature. It appeared that this research might have to rely more heavily on interview data than envisaged.

The research instrument itself was tested for clarity of the wording of individual questions and for the ability of the questions to elicit the desired information. Informants were told that the purpose of the interview was not only data collection, but also testing of the research instrument. Informants were asked to give information and also to comment on wording of questions and on the order and flow of questions. On the basis of the pilot case interviews, several questions were changed or deleted from the research instrument.

The writing-up of the pilot case showed that the data obtained was adequate to enable within case analysis. Within-case analysis of the pilot case was undertaken soon after data collection. The interview transcripts were coded by the researcher. The start list of codes had to be expanded to include codes for new variables and data not previously identified as potentially relevant. The data was then entered into data analysis matrices to facilitate within case analysis for each research question. The data available enabled a thorough analysis of the pilot case (Appendix 2).

The pilot case was included in the group of cases used in this research.

Select case organisations. Case organisations were selected according to pre-determined criteria. Potential sites were initially identified through discussions with other researchers; during case interviews, practitioners identified further cases. Site visits were made to ascertain whether cases fitted the selection criteria. Once a site was positively identified as an appropriate case, the organisation was officially approached and invited to participate in this research. All organisations thus contacted agreed to participate.

Nine cases were studied for this research. Figure 5.4 contains a short description of each system in the sample.

Figure 5.4 - Description of the companies and the systems in the case sample

Company (industry)	System (date introduced)	Description
ANZ (bank)	ANZCash (1989)	Cash management system enabling customers to access account and carry out bank transactions
ASB (bank)	Gateway (1992)	PC-based, real-time on-line cash management system in Windows environment
Baycorp (debt collection and credit reporting)	Baynet (1988)	PC-based access to mainframe at Baycorp allowing customers to carry our independent credit reporting searches on individuals and obtain company information
Community Pharmacy Ltd (pharmaceutical wholesaler)	"PDE system" (1979)	Handheld units used by pharmacies to order drugs and over-the-counter products from the wholesaler
Bendon (lingerie manufacturer)	"EDI system" (1990)	System enabling electronic receipt of purchase orders from and sending of invoices to customers
Mainfreight Transport Ltd (transport)	Freeman (1991)	PC-based system which enables preparation and uploading of consignment notes and allows freight tracking by customers
NZ Cargo (transport)	Tradelink (1993)	EDI application enabling transmission of freight documentation, customs clearance and freight tracking
OTC (office products wholesaler)	Oscar (1989)	Terminal or PC-based access to OTC mainframe to place orders, check on prices and availability, check account information
Stevens (pharmaceutical wholesaler)	Shopmaster (1991)	PC-based POS system for pharmacies with stock control and electronic ordering facilities

Cases were taken from a variety of industries. A variety of industries were used in order to avoid industry bias. Many industries in New Zealand do not have more than one or two examples of COS. In order to obtain a balanced sample of cases, not more than two COS examples were included from any one industry (even though in the New Zealand banking industry it would have been possible to find up to 10 COS: cash management systems linking banks with their customers).

Cases include first- and early-movers as well as follower systems. Where more than one case was identified in one industry, care was taken to select one first- or very early-mover and to select, as the second case, a late follower in the industry. However, it is not always easy to designate a case as a "follower" since each sponsoring organisation attempts to provide a novel system which is superior to a previous one in the industry. It is thus hard to determine whether a particular system is a "follower" or another "first".

Table 5.5 lists the cases by industry and shows to what extent industries were represented by more than one case.

Table 5.5 - Listing cases by industry

Industry	Case 1 (first- or early-mover)	Case 2
Banking	ANZ	ASB
Clothing manufacturing	Bendon	-
Credit reporting	Baycorp	-
Office products wholesaling	OTC	-
Pharmaceutical wholesaling	CPL	Stevens
Transport	Mainfreight	NZ Cargo

Details on the sponsoring organisation and the COS of every case can be found in the case summaries which are included in Appendix 2 to 10.

Conduct individual case studies. All organisations and all individuals that were contacted, agreed to participate in the study. Organisations were willing to give access and to supply information; individuals made themselves available for lengthy interviews. Fieldwork took place over a 5-month period between February and June 1993.

Data for each case includes interview and documentary evidence. Between two and four informants were interviewed for each case. Each interview lasted between 1 and 3 hours and took place at the informant's place of work. Informants were assured of confidentiality. The interviews were recorded and transcribed. As much documentation as possible was collected. Documentary information included information on the organisation and on the system and consisted of annual reports, brochures, press cuttings, promotional literature.

Produce individual case reports. Each case was written up individually to show the unique patterns of each case before comparing patterns across cases. Individual case reports indicate the case evidence for each research question. For each individual case convergent evidence was sought to validate facts and conclusions.

Coded interview transcripts together with coded documentation formed the basis for within case analysis. Each case was analysed and written up as soon as possible after all data for a case was available. Individual case reports are contained in Appendices 2 to 10.

Cross case analysis. Cross case analysis compares case data and addresses the research questions. Cross case analysis was only undertaken after all interviews were completed and after all individual case reports were written. The research questions were detailed in Chapter Four. The analysis for each question in turn is presented in Chapters Six, Seven, Eight.

Modify model. Cross case analysis provides the empirical evidence which either supports the previously developed model or indicates that the model is not appropriate for the specific case context. On the basis of the case evidence the original model is modified.

4 Case research protocol

The case protocol and the research instrument are both used during the data collection process. The main difference between the two is that, whereas the case protocol is written for the researcher, the research instrument is aimed at the respondent/informant.

The case protocol describes the rationale and procedures for data collection. In multiple case research it is particularly important that data from different sites is collected in similar ways. The case protocol is a document for the researcher and is meant to guide the data collection process.

Scheduling of first visit. Organisations were initially approached by phone or letter. Before the first visit information was collected on the organisation and the specific system investigated using newspaper clippings, articles in business magazines and local journals, Annual Reports and organisational promotion leaflets, informal contacts.

Determining who to talk to. The specific people to be interviewed were determined by the information that needed to be gathered. McClintock (1979) outlines two problems with selection of informants: selection of informants who are knowledgeable and controlling for informant bias. One can enhance selection of knowledgeable informants by selecting those in close proximity to the phenomenon studied (McClintock, 1979); one can control for bias by keeping in mind the informant's position in the organisation (Seidler, 1974) and by obtaining information from more than one informant (Seidler, 1974).

Data was collected on the current state and the success of the system. Therefore, the person initially approached, was the person at present in charge of the system investigated. Data was also required on the history of the system, particularly on the development process. If the person initially approached had not been a member of the project team which developed the system, then further meetings were arranged with the project team leader and/or other project team members. Wherever possible and relevant the project champion was also interviewed.

As data was collected on adoption of the system, it seemed appropriate to discuss adoption with customers. After all, adoption of a system is not independent of the experience of the customer. It was intended to contact several customers of each system and ask them about their reasons for adopting the system. However, on the whole, sponsoring organisations were not keen on divulging the identity of individual customers. Because of the difficulty of contacting customers, it was therefore decided to limit the number of customers to be contacted. In practice, a total of 13 customers of 5 of the systems were contacted and asked about their reasons for adopting (or not adopting) the COS. Responses from customers, regardless of the COS, were identical. Since responses of only few customers were obtained, it was decided to limit the use of customer information in data analysis. Where customer information *was* used during data analysis, it was decided to consider these responses to be representative, taking into account that the identical responses obtained from the customers that *were* contacted.

Data sources. Multiple sources of evidence were used in order to develop converging lines of enquiry. Findings are more convincing and conclusions are likely to be more reliable if based on several sources of information (eg Campbell and Fiske, 1959; Jick, 1979; Yin, 1989a).

The major data source for this study was interviews with informants. Some documentation and archival records for each case were also collected. Documentary evidence complemented the more informal information obtained from informants.

Transcribing of interviews. Interviews were recorded and later transcribed by support staff. All transcripts were checked by the researcher by listening to the recordings whilst reading the transcripts. Where necessary, corrections were made and the corrected transcripts was used for data analysis.

Coding of data. All data obtained from fieldnotes, interviews and documents was coded as soon as possible after obtaining the data. Coding categorises data and aids in subsequent retrieval of information and helps data analysis (Miles and Huberman, 1984). A list of codes was derived from the research questions, the identified variables and categories; this list was modified and added to as data collection progressed.

The list of codes was a helpful aid in ensuring that all data relating or a specific issue could be easily and quickly located for every case. This greatly facilitated data analysis.

Case study database. For each case a formal retrievable data base has been kept; data on each case has been collated in individual case files. These files contain all the original notes, documents and tape transcripts; they also contain preliminary integration of evidence like tables and comments on data. The case study data base forms the complete evidence base for this study.

5 Research instrument

The research instrument contains the specific questions to be addressed to informants. This section describes the development of the interview guide used in this study. First, the generic strategy for the design of the interview guide is described. Next, the development of specific questions is explained. Lastly, validity issues are addressed.

5.1 Generic strategy used in interview guide

In designing the interview guide the types of questions and the sequence of questions had to be decided upon.

Types of questions. There are two main types of questions which are used in questionnaires and interviews. There are structured, standardised questions which require a response according to a specified set of answers and there are open-ended questions which leave the nature of the response open. Phrasing of questions may alter somewhat from subject to subject in a way that is appropriate to the informant (Bouchard, 1976).

It is recommended that research instruments use a combination of these types of questions (eg Baker, 1991; Bouchard, 1976). The standardised questions allow for testing of known variables and enable aggregation and comparison of results. The open-ended questions allow for the capture of contextual information and for the uncovering of new variables of interest. This interview guide includes both standardised and open-ended questions in order to capitalise on the strengths of each type of question and, also, to help maintain informant motivation and interest.

Sequencing of questions. The data to be obtained from interviews can generally be divided according to subtopics of the research question. Bouchard (1976) recommends covering each of these subtopics in turn by "funnel sequencing" questions.

He suggests that each subtopic should be approached with broad and open-ended questions first. This allows for capture of contextual information without leading the subject. It enables the interviewer to gauge the level of understanding and conceptual language of the informant; subsequent questions can be re-phrased, if necessary, to fit the subject. Also, general questions allow the informant to begin thinking about the subtopic and to consider relevant facts and viewpoints before answering further questions.

After the broad questions specific questions with fixed response format are included. These questions check pre-determined variables. Such questions are usually not demanding of the informant. The questions allow the interviewer to check earlier responses: if structured responses contradict responses to open-ended questions, the interviewer can ask for clarification.

In accordance with Bouchard's recommended method this interview guide is divided into subtopics. Each subtopic starts with broad and open-ended questions and follows through with more specific questions.

5.2 Specific questions in the interview guide

The actual questions in the interview guide were suggested by the research topic. Wording of specific questions was based on research instruments used in previous studies.

Subject of the questions. The nature and the subject of the questions in the interview guide are based on the research questions and propositions. The link between research questions and questions in the interview guide is described in the Case Protocol.

The guide consists of several sections. The first 20 questions capture demographic data and obtain general information about the system; this information confirms that the unit of analysis is valid. The next 26 questions capture conditions at the start of and during system building; this information supplies data for Research Question One. The next section of the interview guide, containing 10 questions, relates to the customer participation process and concerns Research Question Two. The last section of 25 questions concerns implementation and measures the success of the system; the data captured relates to Research Question Three.

Formulation and selection of specific questions. To select and word questions the work of other researchers (including Franz and Robey, 1986; Reich and Benbasat, 1990; Runge, 1995) was referred to. It was not possible to use complete replication of these instruments as the topics of each of these empirical studies only partially overlap with the topic of this dissertation. Instead, 27 items were developed; 12 items were modified from other instruments and 42 items were taken directly from previous studies. The interview guide used during data collection is included in Appendix 1; the source of the individual questions is identified in Table 5.6.

Table 5.6 - Identifying the source of questions in interview guide

	Adopted from		Modified from			Newly developed
	Reich + Benbasat (90)	Runge (85)	Franz + Robey (86)	Reich + Benbasat (90)	Runge (85)	
Question numbers in guide	1-2, 5-7, 9, 16-20, 23-24, 32, 40, 47, 56, 59-60, 62, 68, 71-9, 81	22, 25, 29-30, 33-34, 46, 57, 61, 69-70	50	11-14, 28, 31,	15, 21, 26, 58, 80	3-4,8,10, 27,35-39,41-45, 48-49,51-55,63-67,
Subtotals	31	11	1	6	5	27
Totals	42		12			27

5.3 Validity of research instrument

It is important to demonstrate that effort has been made to ensure that the research instruments measures what it is supposed to be measuring (Cook and Campbell, 1979; Straub, 1989). Ideally, measures completely and accurately reflect constructs; in practice this may not be achievable but should at least be aimed for.

Instrument validation is evaluated according to three criteria: content validity, construct validity and reliability (Straub, 1989). Content validity requires that the instrument must use questions which adequately cover the topic under investigation. Construct validity concerns the measures used to operationalise concepts; the data gathered must reflect the phenomenon and must not be an artifact of the research instrument. Reliability measures the instrument's accuracy in its ability to capture the same response to similar questions from the same respondent.

Effort has been made to enhance the validity of this interview guide during construction and by testing the instrument on a pilot case.

5.3.1 Enhancing validity at design stage

In order to enhance the validity of the research instrument several techniques were used during construction of the interview guide.

Use of previously validated research instruments. Several previous studies have done empirical research which overlaps with the topic of this study. Wherever possible and relevant, questions from the validated research instruments of those studies have been included in this interview guide. As most questions in this research instrument have been asked in previous studies and as those research instruments were validated, confidence in both content and construct validity of the present research instrument is enhanced.

Use of open-ended questions. Many open-ended or free-response questions are included in the interview guide. The objective of this research is to understand the phenomenon under study. Open-ended questions capture context which is essential for the understanding of phenomena. The use of open-ended questions enhances construct validity (Baker, 1991).

Use of funnel-sequenced, structured questions. Structured questions with a fixed response format are part of the interview guide. These questions follow open-ended questions to add to and complete data collection for each subtopic. The structured questions also allow for cross-checking of responses between questions. As such these questions enhance the reliability of the interview guide (Bouchard, 1976; Straub, 1989).

5.3.2 Enhancing validity by pilot testing of interview guide

The interview guide was tested by conducting a pilot case.

Content validity. It is important to ascertain that the research instrument captures the information that is available on a case. This was tested by selecting, as a pilot case, a case with which the researcher was already familiar. The data obtained with the use of the research instrument could be compared to data already obtained and used for a previous study (Cavaye, 1992). Use of the research instrument in the pilot case could thus ascertain if the data elicited by the questions in the interview guide would indeed provide the information available on a system, its development process and its implementation success.

It was found that some questions needed rewording or needed to be refined in order to capture all information. The changes required became apparent during interviews. The interview with the main informant was particularly useful in this regard: he asked for clarification of questions which showed that some questions needed refining.

The reworded and refined questions provided the information available and captured even more and more detailed information than was previously obtained. Confidence in the content validity of the instrument was thus established.

<u>Construct validity</u>. The research instrument aims to collect rich data which reflects the phenomenon of each separate case. The open-ended questions captured data and identified variables which had not been previously defined and which were not specifically tested in closed questions. The fact that such extra information came to light during the interviews ascertained that construct validity of the research instrument is adequate.

<u>Reliability</u>. Reliability of the instrument could be tested by comparing responses to questions. It was found that responses by the same informant to similar questions was indeed similar. Hence, the research instrument can be considered reliable.

6 Chapter summary

This chapter has described the selection of case research as the appropriate research strategy for the topic under study. In terms of research design a multiple case approach has been selected. Data will be collected from multiple sources of evidence at multiple sites on multiple Customer Oriented Systems. Specific systems will be selected so that cases include systems which include customer participation, systems which did not involve customers during development, systems which are successful and systems which are unsuccessful. The data will be analysed first within cases and then across cases.

The chapter also described the specific case methodology used, the case protocol and the research instrument. The specific methodology follows the case research approach recommended by Yin (1989a). The case protocol, guiding the researcher through the data collection process, was presented. The research instrument details the specific questions to be addressed to interviewees and is included in Appendix 1.

With the aid of the case protocol and the interview guide, individual case studies for this research were undertaken. Details of the 9 individual cases are presented in Appendix 2 to 10. Cross case analysis addressing the 3 research questions is presented in the next 3 chapters.

CHAPTER SIX: Cross Case Analysis - Research Question One

Data was collected on 9 Customer Oriented Systems (COS) in New Zealand. The individual case summaries are contained in Appendices 2 to 10. In these Appendices the cases are described and Within Case Analysis for each case is presented. The next three chapters contain Cross Case Analysis addressing the three research questions of this thesis.

Research Question One investigates the factors contributing to or inhibiting the participation of customers in the development of systems linking organisations with their customers. Several organisations did involve customers during development, but none of the sponsoring organisations made an explicit decision regarding customer participation: none of the organisations weighed up pros and cons of participation or studied contingencies as a prelude to participation. Instead, a 'decision' on whether to involve customers or not, was made implicitly.

This chapter first categorises the cases according to customer participation. The chapter then sets out to find the underlying factor(s) leading to the (implicit) customer participation decision. This is done, firstly, by testing for factors previously identified in the user participation literature as facilitating or inhibiting participation. Then, pattern-matching techniques are used to find major factors which distinguish between the cases that did and those that did not involve customers during system development.

1 Categorising the cases according to customer participation

Each of the three research question requires the cases to be separated into those that developed the system with and those that developed the system without customer participation. It is therefore crucial to the validity of this research that the cases are clearly and correctly categorised according to the dependent variable 'customer participation'. A systematic method (Miles and Huberman, 1984) is used to rate and classify the cases.

First, since customer participation is defined as "activities performed by customers during system development", various customer participation activities were identified. Even though authors disagree on the number and names of stages and activities in the development process, the IS community agrees on the general process that takes place: a project moves progressively from the initial project definition stage, through analysis of requirements and design of the system to programming, testing and installation. Because there is no agreement on the number and names of development stages this study does not adopt an existing model and does not attempt to adapt case findings to that model. Instead, the various development activities are described according to the stages mentioned by informants during the case interviews. These stages, in progressive order, were:

- project definition (justifying and defining the broad parameters of the project);
- analysis (requirements and high level specifications);
- system building
- beta-testing (testing of final product at customer sites).

These 5 stages identify the columns in Table 6.1. Table 6.1 presents a categorisation of the cases according to customer participation in the development of the initial system. The rows of Table 6.1 show the data for each case. The interview data for each case was searched for the information describing the actual development of the systems in order to extract the data pertaining to customer participation in any of the development stages. The data was entered in rows.

The final ratings for each case are shown in the right-hand column. Participation was rated "high" if there was evidence of customer input *during the analysis* and *design* phases as well as at other stages of development (Johnston and Vitale, 1988; Reich and Benbasat, 1990). Participation was rated "moderate" if customers were involved *during initial project definition* and at the latter stages of development (user participation literature). Four systems were rated with "low" participation because customers were only involved at the end of development *during beta testing of the finished system.*

Within each category, cases are presented in alphabetical order.

Table 6.1 - Categorisation of cases according to customer participation

	Participation activities				Rating
	Project definition	Analysis (requirements definition)	System building	Beta-testing	
Bendon	x	x		x	high
Stevens		x		x	high
ASB	x			x	moderate
NZ Cargo	x			x	moderate
CPL				x	hybrid
ANZ				x	low
Baycorp				x	low
Mainfreight				x	low
OTC				x	low

One system was difficult to categorise: CPL's electronic order entry system introducing Portable Data Entry devices (PDEs) to pharmacists. This system was not developed with customer participation ("No, we did not involve the customers" - Managing Director, CPL). However, the system was developed with the input of practising pharmacists. The pharmaceutical wholesaler CPL was set up by a practising pharmacist in 1967; an Advisory Board has been set up and all members of this Board are pharmacists; several members of the Board of Directors are practising pharmacists. In this way the organisation had practising pharmacists (ie "customers") in a decision-making capacity on the Board. The input of these pharmacists did, however, not extend to the design of the system:

> "They had some input into the overall objectives that the system was trying to achieve, but they really didn't influence the design I don't think." - Data Processing Manager in charge of development, CPL

This is an unusual case and for that reason this study identifies the CPL case separately as a system development project with a "hybrid" form of customer participation. The case is categorised between 'low' and 'moderate' participation: 'moderate' participation indicates that there was involvement in overall project definition but not design; 'low' indicates that customers were not involved.

Of the 9 cases studied only 2 systems were developed with "high" customer participation, 2 of the systems were developed with "moderate" participation, 1 was a case of "hybrid" participation and 4 cases were developed without the input of customers. In all cases customers were involved during the final testing stages of the systems' development.

2 Factors impacting on customer participation decision

The user participation literature suggests a number of underlying factors which might contribute to involvement or non-involvement of users in the system development process. The first research question of this thesis sets out to test the appropriateness of these factors for predicting participation of potential users in a different context: the development of systems linking organisations with customers.

Data about each of the previously identified, potentially contributing factors was obtained for all cases. It is thus possible to list the factors, to place a value on each factor for every case and thus to ascertain whether these factors are valid predictors of customer participation.

Aggregate data for each factor is presented but for the majority of factors such data is not very illuminating. Therefore finer-ground analysis of the various factors is presented as well. The extent to which individual factors support the research model is evaluated on the basis of the case data. If distinct values of factors do not separate the organisations according to the dependent variable, then it can be argued that the factor is not important as a contributing factor to customer participation in COS design.

Organisational factors, project-related factors and customer-related factors are now discussed in turn.

2.1 Organisational factors

Table 6.2 summarises the case findings concerning organisational factors which may encourage or discourage customer participation in the development of COS. Potential organisational factors impacting on customer participation include the extent to which the system is developed under a time constraint, with a financial-constraint and with commitment and support from top management.

Table 6.2 - Summary table: organisational factors impacting on participation

Factors	Value	Expected effect on participation [1]	Customer participation High (N=2)	Moderate (N=2)	Hybrid (N=1)	None (N=4)
time constraint	yes no	- +	2 -	1 1	- 1	1 3
financial constraint	yes no	- +	- 2	- 2	- 1	- 4
top management commitment	high normal	+ -	- 2	1 1	- 1	- 4

[1] This was discussed in Chapter 4; for details see Table 4.2, p50

This aggregate presentation of findings shows unexpected results. The systems developed with a time constraint appear to involve customers during development which is contrary to expected findings. None of the systems were developed under financial constraints and all but one of the systems enjoyed normal levels of top management commitment. This suggests that neither the financial constraint factor or the top management commitment variable are factors distinguishing between system developed with or without customer participation.

Aggregate findings give some indication of the incidence of variables in certain categories, but do not show full information on each factor or for every individual case. Previous empirical research on participation contingencies only reports aggregate findings. This study investigated variables in depth using a multiple case methodology. It is therefore possible to discuss the three organisational factors in detail and to present findings showing individual values for each variable for every case.

Time constraint. User participation literature suggests that systems which need to be developed in a limited time frame tend to be developed without user input, while user participation is more likely for those systems where there is no development time constraint.

The case findings concerning the time available to develop the COS in this study are summarised in Table 6.3.

Table 6.3 - Relationship between time constraint in development and participation

		Time constraint	Pressure to complete		
		Description	Yes		No
			Internal	External	
High particip.	Bendon	**customers** initiated and waited for system		x	
	Stevens	main **competitor** offering a system; **customers** waiting for system		x	
Moderate particip.	ASB	main **competitors** offering system; top mngt wanted to be first with specific functionality	x	x	
	NZ Cargo	top mngt wanted to gain a **competitive edge** with system	x	x	
Hybrid particip.	CPL	someone had to be first to bring this change			x
No particip.	ANZ	all major trading banks were moving this way			x
	Baycorp	top mngt wanted to prove itself to share-holders	x		
	Mainfreight	system to provide a service			x
	OTC	system to be an extra service			x

The rows of Table 6.3 contain the cases, separated according to the 'customer participation' dependent variable outcome. One part of the table briefly outlines the circumstances surrounding development of each system (and reflect the researcher's interpretation of data provided by informants); a second part to the table then assigns values to the time constraint variable for each case. The time-constraint construct was measured in terms of the extent to which the development team was under pressure to complete development. The right-hand columns show whether there was such pressure on development time or not and, if there was, whether the time constraint was imposed from forces internal or external to the organisation.

Table 6.3 shows that the organisations which involved customers during development were also the ones which were under external pressure to complete the COS. Conversely, the organisations which did *not* involve customers tended to have *no pressure* to complete. This finding is contrary to the established research findings on user participation in the development of internal systems.

Bendon was under pressure from customers to complete the EDI development; one of its customers has a policy that it will not trade with major suppliers *unless* they are EDI capable. Stevens needed to replace an outdated product in order to compete in the market and was pressurised by some keen customers to complete development as soon as possible. In each of these cases the organisations had customers literally waiting for the system's launch.

Two further cases were under both external and substantial internal pressure to complete system development. The ASB bank had to develop a cash management system in order to be able to compete seriously in the corporate and retail market since other banks already offered such systems. Internal pressure was put on the development team so that the ASB would be the first bank in New Zealand to offer a cash management system with a Windows version. NZ Cargo developed its EDI capability as a strategic tool in a very competitive industry. In order to be able to gain a competitive edge with the system top management felt the company had to be a clear first-mover.

It appears that time pressure itself is not associated with customer participation, but that the *source* of that time pressure is correlated with customer participation. External pressure to develop a system puts a time-constraint on development and, at

the same time, is correlated with participation. External pressure may make an organisation anxious to develop a good product and may thus encourage an organisation to involve customers during development *in spite of* pressure on time.
It is interesting to note that 3 of the 4 organisations which were under external pressure to complete system development launched their COS prematurely. In the cases of Stevens, ASB and NZ Cargo, pressure to bring their products on the market was such that the COS were launched even though the development teams were not 100% satisfied with the system's quality. Stevens' Shopmaster, in particular, still contained bugs which would have been eliminated if more time had been allowed for development.

Availability of financial resources. The user participation literature suggests that a constraint on financial resources inhibits participation during system development. When the system's budget is not of paramount importance, systems are more likely to be developed with user input during development.
Table 6.4 summarises the data collected on the financial resource factor. The table shows the importance accorded to cost of the COS development projects by indicating whether projects had to be cost justified or not. The table also shows whether the costs of the COS development project were 'high', 'average' or 'low' compared to other IS projects in the organisation. The right-hand column shows the researcher's interpretation of the case data to determine whether or not the COS was developed under financial constraints and with limited finances.

Table 6.4 - Relationship between financial resources and participation

		Actual devt costs			Project cost justified			Evidence of financial constraint
					No		Yes	
		High	Aver	Low	company culture	strategic project		
High particip.	Bendon		x			x		no
	Stevens		x			x		no
Moderate particip.	ASB		x			x		no
	NZ Cargo	x					x	no
Hybrid particip.	CPL			x	x			no
No particip.	ANZ			x		x		no
	Baycorp	x			x			no
	Mainfreight			x	x			no
	OTC			x	x			no

In all cases financial resources for development of the COS were potentially available within the organisation. In 8 out of the 9 cases the project was not cost justified. In some of those organisations such projects were never cost justified either because there was plenty of money around at the time (Baycorp and OTC) or because of the entrepreneurial nature of the organisation (CPL and Mainfreight). The other 4 cases did not cost justify the project because the system was considered to be of strategic importance; the project was to be completed with no specific regard to cost.

NZ Cargo was the only case where development of its system had to be cost justified. The parent company, Daily Freightways Group, insists that any project must show cost savings and every development proposal is scrutinised before any money is invested. In this case it was hard to justify the project on cost savings:

"There is no real cost saving. All you are looking at is improving customer

> relations and getting increased business... We tried to back it up with [market] research and by pointing out that we would be the first in the industry. They accepted that." - EDI Co-ordinator, NZ Cargo

Although NZ Cargo had to cost justify the project it was not able to do so convincingly. In spite of this, top management approved the project - on strategic grounds rather than on the basis of cost savings.

The sponsoring organisation of each system considered the development costs 'low' and/or 'unimportant'. The finding that all of the cases studied in effect disregarded cost as a significant factor in development of each system may indicate that this is a factor that is present for any COS development to take place at all. Such a finding corresponds to earlier research findings concerning interorganisational and strategic systems (King et al, 1989; Reich and Benbasat, 1990).

The willingness on behalf of the organisations to make all necessary financial resources available would facilitate customer participation. In spite of this facilitating factor only few organisations did involve customers during design of their systems (the two organisations with a "high" participation rating).

The case evidence does not support the financial resources factor as a contingency variable which distinguishes between systems that are and those that are not developed with customer participation during design.

<u>Management commitment</u>. Management commitment is important in order to provide the funding, resources and clear support for IS which then enables development of systems. User participation literature has shown that user participation in IS development projects is more likely in organisations where such commitment from top management is high. When top management are less committed, user participation is less likely. Management participation is not necessarily required for management commitment, but is a strong indicator of management commitment.

Table 6.5 presents case findings for the management commitment variable. The table charts the extent of top management commitment for each case distinguishing between, on the one hand, decision-making at the start of a project and, on the other hand, on-going commitment. At the start of a project the necessary

resources need to be made available while on-going commitment is indicated by top management showing interest in the project's progress through regular, special briefings or by actually participating in the system's development.

It is recognised that varying levels of commitment and participation may reflect different company culture and as such may not necessarily indicate a particular commitment to the systems project under study. For this reason, a further column is added which indicates how the level of management commitment for the COS project compared to that extended to other IS projects.

Table 6.5 - Relationship between top management commitment and participation

		At start of project	Throughout development		Compared to other projects
		Decision-making	Regular briefings	Hands-on participation	
High participation	Bendon	x	-	-	normal
	Stevens	x	-	-	normal
Moderate participation	ASB	x	-	-	normal
	NZ Cargo	x	x	-	greater
Hybrid participation	CPL	x	x	x	normal
No participation	ANZ	x	-	-	normal
	Baycorp	x	x	x	normal
	Mainfreight	x	x	x	normal
	OTC	x	x	-	normal

In all cases top management was aware of and gave the go-ahead for development of the system. As was explained earlier, in all cases management made available the financial resources to enable development. Top management commitment beyond the early stages of the projects varies among the cases. Informants of the cases where management did not get involved beyond the early stages of the project all mentioned that top management was interested in having the project carried out and completed, but otherwise concentrated on the core business. Those organisations were also the larger, more established organisations, while the organisations where management remained involved all the way through, were the more entrepreneurial companies.

The case evidence indicates that the organisations with the highest management commitment and involvement tended not to involve customers during development of the system; customers did participate in development of systems where top management commitment was less obvious. This finding is contrary to the suggested and expected relationship between top management commitment and user participation.

In the cases where top management fully participated in the development project (CPL, Baycorp and Mainfreight) managerial enthusiasm for and commitment to the project seemed unlimited. In all three cases the managers were convinced of the worth and value of the project. Such enthusiasm and conviction that the system they were developing was "right", precluded rather than encouraged customer development. In one case the project manager even commented that the high degree of top management commitment in some ways was detrimental to the project:

> "He could not keep his hands away! He liked to influence the technical decision-making even though he had no technical expertise. Quite often things were done because he thought they were a good idea, rather than what we knew the clients really wanted..." - DP manager in charge of Baynet development, Baycorp

Fine-grained analysis of the commitment variable has presented an interesting finding: top management hands-on participation appears to correlate negatively with customer participation.

In only one case was top management commitment for the COS project considered to be greater than commitment to other projects in the sponsoring organisation. NZ Cargo mentioned that top management involvement and interest was higher than normal. Management was making a substantial investment in a strategic system the benefits of which were mostly intangible and, as such, hard to quantify at the outset. Making a substantial strategic investment was unusual for the parent company and hence their wish for weekly meetings to be kept informed of progress was understandable.

In 8 out of the 9 cases the extent of top management commitment was normal. This suggests that top management did not consider the development of the COS to be particularly special. This case evidence therefore suggests that top management commitment is not a contingency particularly associated with customer participation in COS development.

2.2 Project-related factors

Table 6.6 presents a summary of the case findings concerning project-related factors which impact on customer participation during the development of COS.

The combined findings for project-related factors show mixed results. Moderate and high structuredness of task correlates with lower levels of participation. There appears to be some support for low complexity of task as a factor associated with customer participation. Confidentiality seems not to have been an issue for any of the case organisations. Aggregate results of the other two factors are inconclusive or contrary to expected results. Each of the project-related factors are now discussed in turn.

Table 6.6 - Summary table: project related factors impacting on participation

Factors	Value	Expected effect on participation [1]	Customer participation: High (N=2)	Moderate (N=2)	Hybrid (N=1)	None (N=4)
structuredness of task	high moderate low	- +	1 - 1	- 2 -	1 - -	1 3 -
complexity of task	high moderate low	+ -	- 2 -	- 2 -	- - 1	1 1 2
initiator of system	customer orgn	- +	1 1	- 2	- 1	- 4
expected change	high low	+ -	1 1	1 1	1 -	1 3
confidentiality required	yes no	- +	- 2	- 2	- 1	- 4

[1] This was discussed in Chapter 4; for details see Table 4.2, p50

Structuredness of task. Projects are considered structured if requirements are well-known or are standard. Transaction processing systems address relatively structured tasks and are not likely to be developed with user input; relatively unstructured tasks, like the development of decision-making systems, benefit from user participation.

In all COS cases the projects' objectives and their high level requirements were clear-cut. Structuredness of specific project tasks varied according to functionality of each system. Table 6.7 rates the structuredness of the tasks to be automated by the various COS developments. Using Johnston and Vitale's (1988) categorisation of IOS according to system function, it is possible to assign a structuredness rating to the various systems. System projects which merely automate boundary transactions are more structured than systems which move away from the sponsoring organisation's main business.

The shaded areas in the Table indicate the expected relationship between structuredness of task and participation: the more structured tasks tend to be associated with no participation; the less structured tasks with high levels of participation.

Table 6.7 - Relationship between structuredness of development task and participation

		Functionality of system	Structuredness rating		
			High (Handling boundary transactions)	Moderate (Enabling retrieval and analysis)	Low (Enabling back office support for user)
High particip.	Bendon	transmitting purchase orders and invoices	x		
	Stevens	full POS system with electronic order entry			x
Moderate particip.	ASB	cash management		x	
	NZ Cargo	transmitting consignment notes, customs documents; freight tracking		x	
Hybrid particip.	CPL	order placing	x		
No particip.	ANZ	cash management		x	
	Baycorp	searching and analysing credit database		x	
	Mainfreight	transmitting consignment notes; freight tracking		x	
	OTC	order entry	x		

Only one of the 9 cases involved the development of a system which was relatively unstructured. Stevens' POS system had broad functionality which extended beyond the tasks with which a pharmaceutical wholesaler is familiar. The system developed by Stevens was therefore an obvious candidate for development with customer participation: the system was meant to provide full back-office and point of sale support for pharmacists, the intended user organisations, with electronic order entry as just one of the modules in the system.

Bendon's case stands out in that the Bendon system provides essentially simple transaction processing facilities and yet was developed with 'high' customer participation. However, Bendon was forced to involve customers since the customers initiated the system's development and presented Bendon with the required system design. Bendon had to adapt its system to the EDI format used by the two customers and had to follow customer direction on their EDI development.

Eight of the 9 cases concerned the development of systems automated relatively structured tasks (having a "high" or "moderate" structuredness rating). The finding that the vast majority of the COS were relatively structured is consistent with previous findings in the interorganisational literature (Copeland and McKenney, 1988; Johnston and Carrico, 1987; Reich and Benbasat, 1990).

When examining the expected pattern of participation according to structuredness of task (as graphically shown by the shaded area in Table 6.7), it is clear that this case evidence does not conform to the expected pattern. Case findings show therefore no support for a potential correlation between structuredness of task and customer participation during COS design.

Complexity of system. Complexity of the project is increased by the task being technically complex, by increasing the size of the project and by the project crossing functional boundaries. Greater complexity is associated with user participation in development.

Table 6.8 (overleaf) summarises the complexity of the cases. Operationalisation of the complexity construct was based on the definitions of "complexity" by several previous studies: McFarlan (1981) associates complexity with size, newness of the system and experience of the development team; Beath (1987) suggests that cross-functional projects increase project complexity; Hirschheim (1985) reports on size as an indicator of complexity. Previous research has not operationalised the construct.

In order to be able to compare cases according to the complexity variable, a composite measure was used for the purpose of this research. Technical complexity of the cases was operationalised in two ways: firstly, by the extent to which the system was new or was built on existing systems and, secondly, by the extent to

Table 6.8 - Relationship between complexity of the system and participation

		Newness of system		Size of system		Experience of team		Total rating[2]	
		Description	Rating[1]	Description	Rating[1]	Description	Rating[1]		
High particip	Bendon	existing	1	aver	2	part experienced ("we had worked with receiving electronic data, but not with EDI")	2	5	moderate
	Stevens	partly new	2	large	3	experienced ("a specialised software company developed and designed it")	1	6	moderate
Moderate particip	ASB	existing	1	aver/large	2-3	part experienced ("staff had worked on similar concepts, similar types of systems")	2	4-5	moderate
	NZ Cargo	existing	1	large	3	experienced ("they employed a couple of guys from the US who had been involved with EDI at Ford")	1	5	moderate
Hybrid particip	CPL	existing	1	small	1	experienced ("we went with the manufacturer [of PDEs] that had the capacity and supporting technology")	1	3	low
No particip	ANZ	existing	1	small	1	part experience ("we had experience but not specifically with this kind of system")	3	5	moderate
	Baycorp	new	3	v large	3	no experience ("one person had experience of on-line credit reporting - but only from a users' point of view...")	3	9	v high
	Mainfreight	partly new	2	small	1	experienced ("a contractor built the system for us")	1	4	low
	OTC	existing	1	small	1	experienced ("our computer consultants set it up")	1	3	low

[1] **Ratings** Newness of system: build on existing system 1; partly new system 2; develop all new system 3. Size of system: relatively small 1; average 2; large 3. Experience of team: experienced 1; part experienced 2; not experienced 3

[2] **Total rating** Low complexity (3,4); moderate (5,6); high (7,8); highest complexity (9)

which the development team had experience with the kind of system and the technology. Size of the projects was measured by asking informants to compare the size of this COS with the size of other development projects in their organisations. All COS projects crossed, not just functional, but organisational boundaries and were therefore deemed to be of similar complexity in that respect. By adding up ratings for each sub-category a total rating for "complexity of the system" was obtained; this rating is given in the right-hand column.

Table 6.8 shows one 'high complexity' case. The Baycorp system rates as the most complex of all 9 cases and yet no customers participated in design of their system at all. The reason for involving users during the development of complex systems is to obtain their help in defining requirements (eg Land, 1981; Markus, 1985) The reason given by the Baycorp informants for *not* involving customers is also related to complexity of the system. *Because* the system was new and complex, it was felt that customers would not be able to contribute to the development process in any meaningful way. The Baycorp case clearly shows that, contrary to recommendations in the user participation literature, complexity of the project can have an inhibiting effect on participation.

The cases which did not involve customers tended to be the systems of lower complexity. Case evidence therefore provides some support for the proposition that lower project complexity correlates with the absence of participation of intended customers. However, there is no evidence that higher complexity correlates with increased participation.

Initiator of project. A system project can be initiated by the users or by non-users. Projects initiated by non-users benefit from user participation as it is prudent to ensure that user requirements are met and to enhance acceptability. Conversely, systems which are initiated by users do not require participation.

In only one case did the idea for the system originate from intended users. Bendon was approached by two separate customers to become EDI trading partners. Each of those customers have an EDI strategy which aims to link the organisations with all major suppliers; one of the two now demands that major suppliers are EDI capable if those suppliers want to be considered as serious trading partners. Each of these two customers approached Bendon with plans for electronic transmission of purchase orders and, in one case, invoices.

In all 8 other cases the systems were initiated by top management of the sponsoring organisation. The ideas for the COS generated from inside the organisation came in response to a perceived potential need in the market (ANZ), because the technology was available (Baycorp, CPL, Mainfreight, OTC), because of competitive pressure (ASB, NZ Cargo, Stevens).

In spite of these 8 systems being initiated by non-users (ie the sponsoring organisation) instead of the intended users (ie the customer organisations), only one was developed with use of customers during the design stages of the project. Stevens involved customers to elicit requirements for the finished system; this participation was considered essential to the project:

> "We found out what they wanted. I can't see the point of building a system for something that nobody wants." (- MIS Manager, Stevens)

> "It is essential that you involve the people who will be using the system, so that you have a good idea what their requirements are. Unless you have actually worked in a pharmacy or are currently working in there, you are not going to see the trends" (- Manager, Foundation Systems).

Stevens' reasons for customer participation in design are exactly those put forward by the user participation literature for involving users during development (eg Land, 1981).

Since 7 out of the 8 systems initiated by the sponsoring organisation did not involve customers in design, this case evidence does not support the 'initiator of project' variable as a factor which distinguishes between systems developed with and those developed without customer participation. Only one out of the 8 who were expected to involve customers actually did use customer input during design.

Expected change. When the system is expected to bring about significant change for the user it is desirable to seek user input during development. The users can then help ascertain the kind and extent of impact the system will have. This information can be used by the system developers during design of the system and, later, at the implementation stage by modifying design and by adequately preparing users for change. Systems which are not expected to affect user operations in a significant way do not require the same kind of user participation.

Table 6.9 shows the extent to which each system in the case sample was expected to change customer operations.

Table 6.9 - Relationship between expected change and participation

		Description	Expected change		
			Not considered	Low	High
High particip.	Bendon	"[the customers] were [already] doing EDI and said they would like to do it with us"		x	
	Stevens	"they don't realise how different it is to be run by a computer"			x
Moderate particip.	ASB	"..until we got beta sites we did not know exactly how it would impact on them"	x		
	NZ Cargo	"we try to create a link to their system so that they do exactly what they always do and then they just hit the button to mail it"		x	
Hybrid particip.	CPL	"with PDE units suddenly there was a requirement for change.."			x
No particip.	ANZ	".. I don't think we worried about that"	x		
	Baycorp	"we knew it would change the way that clients would do credit-checks"		x	
	Mainfreight	"this was offering great changes for the better for our clients.."			x
	OTC	"..I don't know that we expected change..."	x		

The Table first presents a description in the form of a quote from each organisation indicating how aware the organisation was of potential change and how willing to consider this during design. Based on this description a rating was assigned for 'expected change'.

Table 6.9 shows that several organisations did not even consider the potential impact of the system on the customer's business. Of those who did consider potential impact, most foresaw that the customers' businesses would change significantly with the system.

The shaded areas of the Table show the expected relationship between expected change and customer participation: little expected change is associated with low levels of participation; great change is expected to be associated with high levels of participation. The case evidence shows no correlation between expected change and participation and therefore does not support 'expected change' as a factor distinguishing between participation and non-participation cases.

Confidentiality required. A need to keep the development of a system confidential is expected to discourage participation in development. If there is no need for strict confidentiality participation is more likely.

None of the informants mentioned the need for confidentiality. When prompted about the possible need to keep the system confidential during the development stages, informants' reactions showed that confidentiality had not even been considered. Usually competitors were aware that the sponsoring organisation was developing a system, but did not know any details of the development project.

The sponsoring organisations were quite happy for the market to know that they were developing a system. Such knowledge among customers and would-be customers prepared the market for the launch of the product. One of the informants of the ASB bank related an interesting experience, which shows clearly that the market knew about their development and that the bank was only slightly concerned about this knowledge.

> "I got a call at one stage from a company who were not a client at the bank, who had no business at all with the bank. They had heard about the project (and this is before we actually got into the development stage as we were still

finalising the direction) and wanted to know when they could sign up for the product. That shot some alarm bells as to security: how did someone who has got no contact with the bank find out we were building this product...? But it was quite good too: someone was wanting to sign up already!" - Project Manager in charge of Gateway development, ASB

Since confidentiality had not been considered by any of the sponsoring organisations, it was not possible to test the Reich and Huff (1991) suggestion that the need for confidentiality may play a role in inhibiting customer participation in the development of COS.

2.3 Customer-related factors

The two final factors which potentially impact on user participation are related to the potential users: customers' willingness and customers' ability to participate in COS development.

It is hard to assign values to customers' willingness and ability to participate in the development of the systems. Asking customers retrospectively whether they would have been willing and able to participate in development is not likely to give reliable data. Similarly, asking sponsoring organisations about customers' willingness and ability to participate is likely to provide biased data: system development teams usually underestimate the users' abilities and, secondly, organisations may wish to justify their involving or not involving customers by now presenting biased views.

Customers and sponsoring organisations were not asked directly about customer-related factors. Instead, interview data about industrial conditions and organisational circumstances at the time of system initiation and development were used to assign values to the two customer-related factors. A summary of the data obtained is presented in Table 6.10.

Table 6.10 - Summary table: customer-related factors impacting on customer participation

Factors	Value	Expected effect on participation [1]	Customer participation High (N=2)	Moderate (N=2)	Hybrid (N=1)	None (N=4)
willingness to participate	high low	+ -	2 -	1 1	- 1	2 2
ability to participate	high moderate low	+ -	1 1 -	- 1 1	- - 1	- 2 2

[1] This was discussed in Chapter 4; for details see Table 4.2, p50

This aggregate data suggests that there is little evidence to indicate that the factors (customer willingness and customer ability to participate) as being correlated with customer participation. Each of these two factors is now discussed in turn.

Willingness to participate. If a potential system is considered important by the user the user is likely to be willing to participate in the system (Anderson, 1985; Locke and Schweiger, 1979).

Interview data for the 9 cases was searched for evidence to indicated whether customers regarded the proposed systems important or not. It is of course always possible for a sponsoring organisation to seek out the forward-thinking and more progressive of the customers; those customers would be likely to be willing to participate in the development of a new system. This study is, however, concerned with the *general* willingness to participate among the prospective users of the system.

Table 6.11 shows the extent to which customers were interested in the system and, hence to what extent they were likely to be willing to participate during development of each COS. One column gives a description (or a quote) indicating whether potential users considered the system important. Based on the description, a rating of 'willingness to participate' is assigned.

Table 6.11 - Relationship between customer willingness to participate and participation

		Description	Rating	
			Low	High
High particip.	Bendon	Customers initiated development		x
	Stevens	"[Pharmacists] now know that a system is a critical success factor in their business"		x
Moderate particip.	ASB	Large, corporate customers wanted an electronic business package		x
	NZ Cargo	Freight is not considered important	x	
Hybrid particip.	CPL	Pharmacists in the late 70s were conservative and just expected service	x	
No particip.	ANZ	"Bigger customers have a need to see their information on a daily basis"		x
	Baycorp	"It was always considered the ideal [by customers]: to do their own credit checks"		x
	Mainfreight	"Freight is low down on the priority"	x	
	OTC	"Stationery is a very old-fashioned business"; considered a cost centre	x	

Table 6.11 shows that 4 of the 9 cases could be expected to encounter little enthusiasm of customers to be involved in system development. The reasons for a lack of interest of customers in the COS are two-fold: the function to be supported by the COS was considered as a low priority by the customers (Mainfreight, NZ Cargo, OTC) and, in one case, customers were averse to any change or use of technology (CPL).

The freight and distribution function tends to be regarded as a low priority area in many organisations. Similarly, stationery supplies is often regarded as a cost centre: a necessary, though not important part of the business. Improved efficiency in the areas of distribution and stationery supplies are not considered high priorities.

Hence the systems of Mainfreight, NZ Cargo and OTC were not likely to attract a lot of customer interest.

CPL introduced electronic order entry to pharmacies in the late 70s. At the time, pharmacies were set in their ways and were not particularly interested in change. For this reason it is expected pharmacists would not have been particularly willing to participate in the development of CPL's system.

In 5 out of the 9 cases customers could have been expected to be willing to participate in development: the COS addressed known or latent customer needs. Two of these 5 cases (Bendon and Stevens) did indeed involve customers during design of the COS. However, two others of the 5 did not involve customers and the last of the 5 cases concerns a COS development with only moderate participation.

The case findings are inconclusive and show little support for the proposition that willingness to participate is positively related to customer participation in design of COS.

Ability to participate. Users' ability to participate in development is dependent on the user's understanding of the system to be developed (eg Anderson, 1985), the geographical distance between the user and the system development team (Beath, 1987) and the extent to which the users' job takes priority over system development (Beath, 1987).

In COS the intended users are customers who, by definition, are outside the organisation. Because customers are not members of the sponsoring organisation there is a definite geographical distance between customers and the team developing each COS. Secondly, because customers are outside the sponsoring organisation their commitment lies with their own organisations rather than the organisation which is developing a system. This means that jobs of individuals in the customer organisations take priority over any involvement with COS development tasks. In both these respects all cases are similar in terms of customer ability to participate.

Customer ability to participate varies across cases when considering the level of understanding of users. Table 6.12 shows to what extent the customer base for each COS was familiar with technology and, hence, to what extent customers could be expected to be able to participate in COS development. The shaded areas in the

Table show the expected relationships: higher ability to participate is expected to be associated with higher participation.

Table 6.12 - Relationship between ability to participate and participation

		Description	Rating		
			High	Moderate	Low
High particip.	Bendon	Customers were already using EDI and hence knew more about the technology than Bendon	x		
	Stevens	Many pharmacists were using computers in the dispensary		x	
Moderate particip.	ASB	Most individuals expected to use the system were Fin controllers and Accountants who are familiar with computing		x	
	NZ Cargo	Distribution function not usually computerised			x
Hybrid particip.	CPL	Pharmacists in the late 1970s had no awareness of technology at all			x
No particip.	ANZ	Financial controllers and Accountants familiar with computing		x	
	Baycorp	Credit controllers and financial people are familiar with computing		x	
	Mainfreight	Distribution function usually not computerised			x
	OTC	Stationery ordering not computerised			x

One column gives a description of the customers' familiarity with technology; the right-hand columns then rate the customers' ability to participate based on the description. The 'ability to participate' was rated as 'high' if customers were familiar with the application and the specific technology, 'moderate' if customers were familiar with computing, though not necessarily the specific application, and 'low' if customers were not familiar with computing or the use of technology.

The Table shows that the customers of the 4 'no participation' cases were considered to have either low or moderate understanding of the system to be developed. In only one case had the customer obvious technical understanding of the system to be developed: at Bendon, where the customers asked the company to become EDI partners, the customers were familiar with the application and experienced with the technology. Bendon's customers could be expected to be able to participate in COS development and, in fact, indeed did participate during design of their EDI system.

The shaded area in Table 6.12 indicates the expected relationship between ability to participate and customer participation, but only few cases fall into the expected categories. Therefore, the conclusion must be drawn that this case evidence provides no clear support for a correlation between 'customer ability to participate' and actual customer participation during development of a COS.

2.4 Summarising the testing of the contingency model

The previous section tested propositions in order to determine if certain factors known to impact on user participation in the development in internal systems are also valid in the development of interorganisational systems. In order to do so the study started off with factors in mind and then searched for specific data on those factors for each case.

A number of factors have previously been shown to correlate with user participation in the development of organisations' internal systems. However, on testing these factors in the context of external systems, little support for these contingencies was found. Table 6.13 summarises the conclusions that, based on this case evidence, must be drawn concerning the support for the various potential contingency variables impacting on customer participation.

Table 6.13 - Summary table: support for potential customer participation contingency factors

Variables		Strong support	Some support	Inconclusive findings	Findings **opposite** to expected results
Organisational	Time constraint				x
	Financial constraint			x	
	Top mngt commitment			x	
Project-related	Structuredness of task			x	
	Complexity of task		x		
	Expected change			x	
	Initiator of system				x
	Confidentiality required			x	
Customer-related	Willingness to participate			x	
	Ability to participate			x	

None of the factors potentially affecting customer participation were strongly supported by case evidence. Some support was found for 1 of the 10 factors (complexity of task). The results of 2 of the factors results of this study were exactly opposite to expected findings (time constraint, initiator of system). The remaining 7 factors were not supported.

One could argue that the lack of positive findings may be due to methodological or other limitations of this study. The specific research method (multiple case research) and the small sample size may have made it difficult to obtain conclusive results. Also, the specific environment from which the cases were drawn

(New Zealand) may have introduced a regional bias which might account for disparate results.

However, there is also a further possible explanation for the lack of consistency between the findings of this study and the findings of previous ones: in this study the contingencies were being investigated *in a new context.* Previous researchers (Doll and Torkzadeh, 1989; Ives and Olson, 1984; King and Lee, 1991) have suggested that different types of systems create different contexts for user participation and that different contexts may present different contingencies for participation. This study investigated participation of potential users who were outside the organisation. The interorganisational context may be so different from internal system development conditions that traditional user participation contingencies may not be appropriate for explaining customer participation in the development of COS.

3 Customer participation - pattern matching

Accepting that there is a real possibility of the previously identified factors not being applicable to the context of systems linking organisations with customers, it is prudent to investigate the data further. The analysis method of testing for previously identified factors did not provide conclusive findings to answer Research Question One. Therefore an additional, different data analysis approach was adopted in order to try and find out "what factors encourage or discourage customer participation in the development of Customer Oriented Systems?".

Rather than starting off with the factors and testing for these by searching for evidence among the data, data analysis in this section starts off with the data, looking for patterns, and then generates a hypothesis concerning the factors encouraging/discouraging participation of customer in COS development. Using the principles of grounded theory (Glaser and Strauss, 1967), factors were identified which distinguish between cases which did and those which did not involve customers during development. With this in mind the data was examined for a second time and in a different way: the interview transcripts were searched for reasons, volunteered by informants, as to why or why not customers had participated in development.

The analysis method used was one of pattern-matching. The cases were divided into 2 groups: those with 'high' and 'moderate' participation and those without customer participation. Analysing the 'high' and 'moderate' participation cases revealed a common thread among these cases; there were identical conditions present in each case. When comparing this condition with the group of 'low' participation cases, it was found that this second group displayed a different pattern which was opposite to the 'moderate' and 'high' cases. Using analytical logic (finding literal replication among each group and theoretical replication between groups) it was possible to find a causal pattern which explains why some organisations did and why others did not involve customers during development.

Having briefly explained the method used for the analysis presented in this section, details of the findings, based on case evidence, are now presented.

3.1 The group of cases developed with customer participation

An in-depth look at the comments made by informants of the 4 organisations which had 'high' and 'moderate' participation revealed 4 separate reasons for seeking customer participation. Examining these reasons one common thread could be found. First the four separate reasons and then the common pattern will be described.

3.1.1 Reasons for involving customers

There were 2 cases with 'high' and 2 cases with 'moderate' participation in system development. In each of these cases the development team of the sponsoring organisation felt it was necessary to seek customer involvement either for defining and justifying the project definition and/or for obtaining help in defining system requirements.

<u>Need to adopt customers' system design</u>. In Bendon's case customers approached the company with the idea for the system and with the specific technology to be used. The customers did not only suggest a general idea for the system, but also specifically laid down the standards and formats to be used for electronic file transmission. The mainframe-to-mainframe EDI technology forced Bendon to involve customers in the development. Because each of the two customers already had an EDI system in place, Bendon had to adopt their respective standards and formats in order to enter into an EDI relationship with each. Bendon thus had to adopt a system which was already

basically designed by each customer.

Need to develop system with superior functionality. Stevens decided to develop Shopmaster because they wanted to keep up with their major competitor. Like the competition Stevens wanted to provide a one-stop-shop for pharmacists, offering not only dispensary items and over-the-counter products but also the electronic systems which help pharmacists with their inventory and ordering. There were already two similar products on the market; in terms of functionality the system would have to be very good in order to be able to compete. In order to ensure that Shopmaster would meet market needs, Stevens sought customer input when determining specific requirements for the system.

Need to change top management view of system. The ASB had taken the decision to develop a Cash Management System for its customers in order to match the competition: banks have to be able to offer an electronic business package in order to be taken seriously when tendering for corporate accounts. In order for the product to be competitive it was imperative that Gateway was the 'right' product. The major ASB shareholder wanted the development team to use an Australian product as the basis for Gateway; the development team disagreed with such an approach, but needed confirmation that their "gut-feel" was correct. In order to resolve the issue the ASB approached customers to obtain direct feedback on general requirements. It was found that customers requirements were contrary to the approach advocated by top management and in agreement with the approach suggested by the development team. In view of this evidence top management changed their position and allowed the development team to proceed with building a new, Windows-based product. Thus the Gateway project was defined with the help of and according to customer input.

Need to make system fit into customers' operations. The EDI project at NZ Cargo was undertaken in order to gain a competitive edge over the competition. The transport industry is an traditional industry with many competitors all offering very similar service. Top management hoped that the EDI project would make NZ Cargo differentiate itself in offering superior service to customers. The high projected costs of developing the system were justified on strategic grounds. Thus the development team was under pressure to deliver. The intention was to make the system as attractive as possible to customers by making the system fit easily into clients operations. It was therefore essential before starting design and building of the system to find out about general customer requirements and the computer equipment used on customers' premises. In this way customers influenced the general direction of NZ Cargo's Tradelink project.

3.1.2 The pattern: external reason for developing the COS

The development teams at each of the 4 organisations were under pressure to develop the 'right' system. In Bendon's case the customers told Bendon how to develop their system in order to be able to link into their respective EDI networks. Stevens had to develop a system that would be able to compete against the systems already on the market and put out by competitors. ASB bank needed to develop a system to give the bank credibility and to be able to compete in the corporate market. NZ Cargo wanted to enhance its competitiveness in the transport industry - an industry which is characterised by a lack of differentiation in service and cost among competitors. In each case the reason for developing the system and the pressure to develop the 'right' system came from external sources: the sponsoring organisations faced competitive pressure and/or customer demands to develop the COS.

This section has identified external reasons for system development (relating to competitive pressure and/or customer demands) as a factor common to all systems which used customer participation in the development of their COS. In order to confirm this as distinguishing factor the reasons for development amongst this group of cases must be compared to those of the second group of cases. If the pattern of the first group is significantly different from the pattern relating to the second group, then confidence in the finding is enhanced (Yin, 1989). Therefore, if the reasons for system development among the cases which did *not* involve customers are *different* from those of the first group, then a strong conclusion can be drawn concerning the contingency of customer participation in COS development.

3.2 The cases developed without customer participation

There were 5 cases where customers did not participate in development: the 4 'low' participation cases and CPL, the 'hybrid' case. In order to allow for comparison with the previous group of cases this group's reasons for developing the COS are described and then the reasons for not involving customers during development are outlined.

3.2.1 Reasons for developing the COS

The cases in this group mentioned two main reasons for developing their systems: to improve internal efficiency and/or to enhance customer service. None of the cases reflect urgency, particular importance or need for the development of the system.

<u>Improve internal efficiency</u>. CPL introduced electronic transmission of orders to pharmacies in order to increase their own efficiency and, hence, profitability. At the time the New Zealand pharmaceutical wholesaling industry took all orders from pharmacies over the telephone. No market research was done to investigate if the market would accept electronic transmission of orders. CPL's Managing Director had seen similar systems work in the US and decided it would enhance CPL operations if he could encourage New Zealand pharmacists to place their orders electronically.

<u>Enhance service</u>. ANZ bank, Baycorp, Mainfreight and OTC all mentioned they built their systems in order to enhance service to their customers.

The ANZ bank developed ANZCash as an extra service. ANZCash is an adapted version of a basic cash management product developed by Databank. Databank had developed the system because overseas banks were offering electronic business packages. After development the basic package was offered to the main New Zealand trading banks who all decided to take the product on board. The ANZ bank did not consider the project particularly important or urgent. This is reflected by the fact that project members and programmers were continually changed. In addition, they put in charge of the project a manager who had no IS experience at all ("When I was put into that job, I had never touched a PC; I had, what you might call, 'techno-fear' - and I was expected to get the product off the ground...").

Baycorp developed the Baynet system to provide an on-line credit reporting facility to customers. Baycorp was originally a debt collecting company that had recently become a listed company on the New Zealand stock exchange. When venturing into credit reporting the Chief Executive of the company wanted to show shareholders that Baycorp was innovative and could move quickly. No market research was carried out; "we just did it - we had plenty of money...".

Mainfreight built their Freeman system with freight tracking facilities as an extra service to customers. At the time several days of delay between a consignment leaving customers' premises and receipt of a proof of delivery was accepted as standard. Customers had not asked for access to a freight tracking system; everyone accepted the time-delays. Since Mainfreight already had a computerised internal freight tracking system, the building of a customer interface was a fairly simple add-on. There was no need to develop such an add-on, but "we decided that it had to be created".

OTC developed the Oscar electronic order entry system after seeing similar systems in the US. OTC already had an internal order entry system and by developing Oscar offered dial-in access to that system. It was not something that customers had asked for; no market research was carried out; at the time that Oscar was developed "it was a very simple thing; it was just a service".

The systems developed by this group of organisations are all internally initiated. None of the cases expressed a competitive reason for developing their system. Although 'enhancing customer service' is likely to have a competitive effect, none of the informants mentioned a desire for a strategic impact as a reason for developing their COS. If mentioned at all, a competitive effect was seen as a potential fortunate *outcome* of or *corollary* to offering the service to customers; it was not given as a *reason* for developing the service.

This group of cases lacked external pressure, a push or a real need to develop a system. Instead, the systems were developed because it seemed an interesting and innovative thing to do.

3.2.2 Reasons for not involving customers

In none of the cases was there a pressing need to involve customers in development. Two of the cases (ANZ and OTC) did not consider customer participation at all and almost prided themselves in having presented a finished product to customers rather than one which was not (yet) complete. Informants of the other sponsoring organisations volunteered reasons for not involving customers.

Customers do not understand the concept. Mainfreight tried to discuss the concept with a customer but found that the customer could not easily understand the concept. "They wouldn't believe that it would only take a few seconds for each consignment note instead of 3 minutes. You don't believe it until you see it... Until we actually did it and showed it to people, they wouldn't believe it".

Customers do not know what they want. CPL felt that customers could not contribute to development of their electronic order entry system, because customers "could not know what they wanted from it". Because it was a new system, the customer would not be able to understand it and hence would not know what they would want from it.

Customers all want different things. Baycorp's development of Baynet tool place without customer participation though customers were involved in beta-testing. It transpired fairly quickly that customers had several, sometimes conflicting suggestions for improving the system. Baycorp then decided that "it was far easier to set a standard that encompassed everything that they would all want and then we said 'this is the way it is'. That way there was no problem."

Sponsoring organisations of these cases felt justified in not having involved customer during development because, in their opinion, customer participation would not have aided development of the COS. These organisations consider that their customers lacked the ability to participate in development in a meaningful way.

3.3 Comparing the two groups of cases

On comparing the groups of cases which did involve customers with the group of cases which did not seek customer participation during development, two distinct differences between the groups can be reported. There are clear differences in the reasons for COS development and in the attitude of the sponsoring organisations towards customer participation.

3.3.1 Reasons for COS development

Development of systems among the cases which did involve customers was clearly externally motivated. These systems were developed as a result of customers initiating development or because competitive pressure pushed the sponsoring organisations to develop the COS.

In contrast, development of systems which did not involve customers was internally motivated. Although the completed system were interorganisational and linked with customers, the reason for developing the system was internal: systems were not only internally initiated but were also developed for internal reasons (Bakos and Treacy, 1986). The sponsoring organisations found out about a new technology and its application and then wanted to use the technology to enhance internal operations or to offer additional services to customers. Among this group of cases there is evidence of enthusiasm for technology and its application, but no evidence of a competitive motive (Bakos and Treacy, 1986) for system development.

The 2x2 matrix in Figure 6.14 shows how the two groups of cases fall in two opposite quadrants when categorised according to their reasons for COS development, indicating whether this development was internally or externally motivated.

Figure 6.14 - Customer participation and reason for development matrix

Reason for development	Customer participation: high/moderate	Customer participation: low
external	ASB Bendon NZ Cargo Stevens	
internal		ANZ Baycorp CPL Mainfreight OTC

This case evidence suggests that the absence of external pressure and absence of real need to develop a system is correlated with a lack of customer participation. Conversely, when there is strong pressure from outside the firm almost forcing the organisation to develop a COS, moderate or high customer participation takes place. External pressure corresponds to a pressing need to develop a 'good' and 'right' system. Sponsoring organisations that experience such pressure may therefore be more likely to involve customers during system development.

3.3.2 Attitude towards customer participation

The organisations which did not involve customers during COS development advanced several reasons for not seeking customer participation. Those reasons concern the perceived lack of ability of customer to contribute in the COS development process. The group of organisations which did involve customers were aware of the difficulties associated with customer participation.

The difference between the two groups of cases is not related to the ability of various customer groups. Instead, the major difference between the two groups lies in the attitudes of the sponsoring organisations towards these difficulties. The non-participation group considered the difficulties sufficient reason to not even attempt to involve customers. In contrast, the group which did seek participation was wanting input even from those customers who might appear unable to participate.

Stevens provides a good example of an organisation aware of the difficulties of customer input, but still determined that customer views should be sought. Stevens sought input from customers for requirements of their Shopmaster system. They approached pharmacists who ran successful businesses and invited them to meetings. The pharmacists who took part in those meetings represented both pharmacies that used a computerised system and pharmacies that did not. The manager in charge of Shopmaster development was aware of the difficulties of involving pharmacists who did not know computerised systems ("sometimes it is very difficult to know what you want until you actually see something working"). However, input from both types of customer was considered important. Stevens felt that the criterion for a customer's ability to take part in participation should not be based on the customer's computer knowledge, but on the ability of the customer to run a successful pharmacy. Successful pharmacists would be able to bring successful ideas to the meetings, which is exactly what Stevens were looking for when developing requirements for Shopmaster.

Attitude towards participation is correlated with customer participation and with a strong external pressure to develop the COS. It is difficult to determine whether the favourable attitude (which enabled participation) was created as a result of external pressure, and hence of the need to develop a good COS system, or whether a favourable attitude towards participation existed in the sponsoring organisations anyway. Similarly, it is hard to determine whether an unfavourable attitude towards participation is retrospectively used as a justification for not having involved customer during COS development or whether such unfavourable attitudes prevailed in the non-participation organisations anyway.

4 Summarising Research Question One

Evidence from the 9 cases investigated in this study suggests that participation of customers during development of COS is not explicitly considered by the sponsoring organisation. Customer participation is not an issue and is not considered per se.

In the first part of the chapter a number of factors were investigated which were identified in the user participation literature are common or likely contingencies for participation. However, analysis of data for these cases offered very little support for these factors see Table 6.13 which summarised the findings relating to contingency factors). Analysis of two of the factors (time constraint and system initiator) returned results that were opposite to those expected. The previously identified factors may be good reasons for involving customers, but case evidence shows that the factors were not actual predictors of customer participation or non-participation.

The latter part of the chapter analysed the case interview data using pattern-matching techniques in an attempt to find factors which distinguish between the cases where customers did and the cases where customers did not participate in COS development. It was found that the underlying reason for developing the system separates the two groups of cases: the cases which did involve customers were under external pressure (from competitors or customers) to develop a system; the cases which did not involve customers lacked such pressure. It was also found that informants in the two groups vary in their attitude towards customer participation: the organisations which did not involve customers perceived customers as unable to contribute in development; in the cases where customers did participate it was considered necessary to seek customer input in spite of possible difficulties.

The next chapter addresses Research Question Two which is concerned with describing customer participation on several dimensions.

CHAPTER SEVEN: Cross Case Analysis - Research Question Two

This chapter addresses the second research question of this study: "In what ways do customers participate in COS development". Researchers concerning themselves with the process of participation have reported that participation is not a simple construct, but that participation can take many forms (Mumford, 1979; Robey et al, 1989; Newman and Noble, 1990). With this in mind, this chapter focuses on customer participation itself by discussing participation during intial and on-going development of the system. First, customer participation is described according to the activities performed by customers during development. Then, three further dimensions of customer participation are addressed: type, degree and content of participation.

1 Customer participation activities

Customers can participate at various stages in the development process. In the cases under study customers participated in a number of activities which ranged, in some cases, from initial project definition to, in most cases, testing the system. In many of the cases customers have input in on-going development of the system.

Chapter Six commenced with a categorisation of cases according to customer participation on the basis of activities engaged in by customers during initial development (Table 6.1, p94). Such categorisation enabled a grouping of cases according to those that did and those that did not involve customers during initial development. Nearly all organisations used customers and customer input in the on-going development of the systems.

Table 7.1 presents an expanded version of the Table in Chapter Six; activities beyond initial development of the systems have been included in order to present a complete picture of customer participation in the development of the systems under study. Table 7.1 shows all various activities identified by the organisations as activities in which customers participate(d). The initial ordering and categorisation of the cases is maintained.

Table 7.1 - Categorising cases according to customer participation activities

	Initial development				On-going development		
	Project definition	Analysis (req. definition)	System building	Beta testing	User group set up	Customers polled for views	Customers request changes
Bendon	x	x		x			x
Stevens		x		x	x	x	x
ASB	x			x			n.a.[1]
NZ Cargo	x			x			n.a.[1]
CPL				x			n.a
ANZ				x			x
Baycorp				x	x	x	x
Mainfreight				x			x
OTC				x			x

[1] Not applicable: these application have not been on the market long enough

The findings summarised in Table 7.1 will first be described and then discussed.

1.1 Description of findings

The activities at the various stages of development are described and, where appropriate, examples are given.

Project definition. At the project definition stage the high level decision as to the look and feel of the system is taken. Three organisations involved customers during this early stage of development.

The EDI system at Bendon was initiated by customers. The two customers were already EDI users and therefore had a system already defined. Bendon was asked to link into those systems. Hence project definition at Bendon was highly influenced by customers.

At the ASB bank the decision, in principle, for developing a cash management system had been taken, but there was no agreement as to the direction that should be taken. Customers were then involved at a very early stage to gauge high-level requirements and to assess the type of equipment available on customers' premises. On the basis of these findings the project was defined and development was started.

AT NZ Cargo, also, the basic idea of developing an EDI system had been advanced by a senior manager but the exact direction of the proposed project was unclear. A cross-section of customers was approached to measure interest and to ascertain the kind of equipment used by customers. This customer contact then helped define the project and enabled the start of development.

Of the 4 organisations that involved customers in the early stages of initial COS development, only one did not use customers at this early stage of development. Stevens' top management had taken the strategic decision to develop Shopmaster; the general direction of the system was defined. Only once that decision was taken, were pharmacists approached for participation in development.

Analsyis (requirements definition). At this stage of development detailed requirements are specified. Johnston and Vitale (1988) considered participation at this stage essential for the development of interorganisational systems; the only two empirical studies looking at COS (Reich and Benbasat, 1990; Runge, 1985) define participation as participation in the actual design of the system. Only two of the 9 organisations involved customers at this stage. Because their systems were developed with customers participation at the design stage, both cases fall in the 'high' participation category.

Bendon had been asked to become a partner in the EDI systems set up by two of its customers. Since Bendon was not the initiator in either case, Bendon was required to adopt the requirements set by each user.

Stevens actively sought input from customers to identify requirements. They discussed requirements during meetings, drew up a requirements document which was circulated to several pharmacists. The official requirements document was subsequently modified according to customer advice.

System building. In all cases the physical design and programming of the systems was accomplished without customer involvement.

Beta testing. In all cases the completed system was tested in customer premises prior to the official launch of the product. The systems were installed in one or more customer sites for final de-bugging and modification.

The 4 organisations which involved customers in the early stages of the project, approached customers from the same group for beta-testing of the product. The Project Manager of Gateway development, ASB bank, mentioned that customers who are involved early on in development like to see the progress to a final product.

The criteria for the selection of test sites varied among cases. Some organisations used a cross-section of potential users so as to test the product in a variety of settings (eg Stevens, NZ Cargo). Other cases took their system to potentially large users (eg Baycorp, Mainfreight, OTC).

On-going development. On-going development can be initiated by the sponsoring organisation or by customers. New versions of a COS may be offered to customers when sponsoring organisations improve their internal systems and at the same time make availabe those enhancements to their customers. Modified versions of a COS may also become available when sponsoring organisations respond to customer suggestions for enhancements.

Informants mentioned several ways in which users participate in on-going development of the systems. In all cases customers provide feedback on the systems' facilities and make suggestions for improvements and enhancements. In a few cases organisations actively seek views from customers: user groups have been set up by at least two of the organisations; the same two organisations also survey their clients to keep track of changing requirements.

1.2 Discussion of findings

It is interesting to note that all organisations use customer input in *on-going* development of their systems, whilst only few appreciate the importance of involving customers in the definition and design stages of *initial* development. There are two possible explanations for this.

Firstly, when customer views are known, they can not easily be ignored. Once a product is launched and is adopted by customers, customers give feedback and come to the sponsoring organisation with requests for changes to the system. Though not always acted upon, customer views are taken into account when designing new versions of the system.

Secondly, organisations learn and may come to appreciate the value of customer participation as time progresses. Informants at the ANZ, for instance, mentioned that customers were only involved to a very limited extent in the initial development of ANZCash in 1987, but that the bank has now changed its way of developing systems. Now, customer input is actively sought; general ideas for a system and specific requirements are discussed with a cross-section of customers prior to building (or modifying) a system which is designed for customer use.

1.3 Comparing findings to previous research

The findings concerning the participation activities of customers during the development of COS support findings in the user participation and the strategic information systems literature.

The user participation literature suggests that user participation, if it does take place at all, is prevalent in the early development stages where a project is defined and requirements identified and then again in the testing stage (Edstrom, 1977; Franz and Robey, 1986; McKeen, 1983). This research, investigating participation in the development of interorganisational rather than internal systems, confirms these findings. The kinds of activities in which proposed customers are involved in COS development are the same as the kinds of activities in which users participate during development of internal systems.

Johnston and Vitale (1988), in a seminal theoretical article on interorganisational systems, suggested that "it is critical" to seek customer participation during design of a system (Johnston and Vitale, 1988, p158). This case evidence suggests that only a minority of organisations (two out of the 9) do involve customers at that stage of development. This finding is consistent with the empirical research findings of Reich and Benbasat (1990) and Runge (1985) who both found that customers participate in design in only a minority of the cases examined.

Empirical research in strategic information systems indicates that continued exploitation and enhancement of systems is necessary to maintain a competitive edge

(Copeland and McKenney, 1988; Reich and Benbasat, 1990). All systems in this study undergo continuing development; all organisations seek and/or obtain customer advice on ways in which to improve and enhance their systems. It appears that organisations are aware of the fact that continuing success of their systems depends on satisfying customer requirements. In this respect the case evidence corresponds to previous research findings.

2 Type of customer participation

Participation can vary in the extent to which users are involved (Mumford, 1979). Consultative participation describes system development where users are consulted only; representative participation refers to development where representatives of users are part of the design team; consensus participation implies that all users are actively involved in the design process. Table 7.2 shows the types of participation found in the development of the 9 systems studied.

Table 7.2 - Type of participation at initial and on-going development of COS

Type of participation	Initial development (N=4)		On-going development (N=9)
	High (N=2)	Moderate (N=2)	
consultative	-	2 (ASB, NZ Cargo)	9
representative	1 (Stevens)	-	-
consensus	1 (Bendon)	-	-

2.1 Description of findings

Findings concerning initial development and on-going development are discussed in turn.

Initial development. This section is based on the data from 4 systems since only 4 of the 9 cases involved customers during initial development.

In Bendon's case the organisation was approached by two of its customers to become EDI trading partners. Each of the two customers was fully involved in the development process. The mainframe-to-mainframe EDI development took place with consensus of all users involved. This type of participation was, however, not voluntarily adopted by Bendon. Instead, consensus type of participation was necessitated by the technology used: because, in each case, Bendon was a follower in the EDI trading partnership, Bendon had to agree to specifications of the files to be transmitted and as such Bendon had to allow full participation from each of the two EDI trading partners.

Stevens approached customers to take part in meetings to find out what pharmacists really wanted from a POS system. They targeted pharmacists who ran successful businesses. They included both pharmacists who were familiar with computerised systems and who were not and thus obtained views from a representative cross-section of successful pharmacies in New Zealand. Several meetings were held with up to 20 pharmacists; in later stages meetings were held with 3 or 4 key people only to draw up the initial requirements document. The type of participation in the Stevens case is categorised as representative.

The two other organisations which involved customers during initial development both consulted users but did not involve them in decision-making. Both the ASB and NZ Cargo approached customers in the early stages of system development. Customers were consulted; information gained from customers provided advice. This advice formed the basis for decision-making by the sponsoring organisations. Consulting customers for advice is a different type of participation from participation of Bendon's and Stevens' customers who were more directly part of development.

2.1.2 Ongoing development

Ongoing development of the systems takes the form of improvements and enhancements which are either internally initiated or are added in response to customer requests. Customer views on the system and advice as to improvements and new requirements are obtained in two main ways: either customers are solicited for their input or customers volunteer advice and forward requests to the sponsoring organisation.

Two of the cases (Stevens and Baycorp) mentioned that they regularly poll users by sending out questionnaires asking about the use of the system and asking for suggestions for improvement. The same two organisations also set up a user group; obtaining user feedback and gauging user requirements was one of the reasons for setting up these groups.

All organisations obtain unsolicited customer suggestions for changes to the systems. The case evidence shows that on-going development of each system is strongly affected by customer suggestions and requests. For that reason the unsolicited advice is here categorised as consultative customer participation.

2.2 Discussion of findings

According to the evidence of these 9 cases the type of customer participation corresponds to the level of participation. In the 'high' participation cases, where customers take parti in several development stages, customers were also closely involved during development and worked closely together witht he design team. In the 'moderate' participation cases, where customer take part in initial project definition only, customers were less closely involved in the development process.

This finding is notable since there is no specific need for a correlation between, on the one hand, high participation in terms of activities in which customers are involved and, on the other hand, close involvement of customers in terms of type of participation. It is conceivable that customers participate in many activities, including the drawing up of detailed requirements, but that such participation is low-key and consultative only. The fact that this is not the case among the systems studied suggests that the organisations which involved customers were genuinely interested in customer participation. In the Bendon case such cooperation with customers was almost a requirement, since they had to adopt customer standards and lay-outs of documents; in the Stevens case close cooperation with customers was voluntary. Both 'high' participation cases were willing to spend time and make the effort to work together with the customers.

3 Degree of customer participation

Users participating in system development may have varying amounts of influence over system design. Ives and Olson (1984) suggest that customers may participate only symbolically (and are ignored), may be involved by giving advice (which is solicited by the system sponsor), may have weak control (having sign-off responsibility), may be involved by doing (as part of the design team) or may have strong control (and be fully responsible for development). Table 7.3 presents the degree of customer participation that was found in the 9 cases.

Table 7.3 - Degree of participation in initial and on-going development of COS

Degree of participation	Initial development (N=4)		On-going development (N=9)
	High (N=2)	Moderate (N=2)	
symbolic involvement	-	-	-
involvement by advice	-	2 (ASB, NZ Cargo)	9
involvement by weak control	1 (Stevens)	-	-
involvement by doing	1 (Bendon)	-	-
involvement by strong control	-	-	-

3.1 Initial development

Bendon, developing an EDI application with customers, had a high degree of participation from customers. Each of the two customers initiated the project and, to some extent, drove the project forward. Standards and file lay-outs were determined by the customer. Customers thus had a strong influence over the design of the system. This involvement can be categorised as 'involvement by doing' (= users are part of the design team).

At Stevens customers had some influence over the Shopmaster development though their influence was less than of the customers in Bendon's case. At Stevens, the customers fully participated in the drawing up of a requirements document. The document was sent out to a dozen pharmacists for comment. Requirements were then modified in the light of customer feedback so that the final requirements document definitely reflected pharmacist views as to what the system should be able to do. The degree of responsibility given to customers is reflected in the categorisation of this customer participation as 'involvement by weak control'.

In two other cases (NZ Cargo and ASB bank) customers participated by providing advice whilst all decision-making remained with the sponsoring organisations. In each case customer opinion and customer advice was solicited through interviews. This advice was taken seriously: in each case customer information was instrumental in giving early direction to the project and getting development off the ground. NZ Cargo used the customer information to justify the development of an EDI system. The direction of the ASB bank's cash management system was based on customer input:

> "... This was *one of the core things* behind the product and I guess the *users' input was critical to that*: from a technical point of view the system needed to run on someone's X with a mono screen through to a 486 Windows machine - the same product, the same interface, the same way of operating... That was a *fundamental decision* made at the early stages of the project." - Project Manager in charge of Gateway development, ASB bank

3.2 On-going development

Customer requests for enhancements to and modifications of a COS are noted but not always acted upon by sponsoring organisations. Customers may identify bugs in the system and these are rectified immediately. However, requests for changes and enhancements are not always acted upon; customers' input is treated as advice.

The number and type of requests often make it impractical to react to every request. Instead, organisations prioritise requests. Customers do not always agree with the prioritisation of suggested changes by the sponsoring organisations. Particular individual suggestions for change may only require minor modification and are considered by the customer to be easy and quick to adopt. Customers find it at times difficult to accept that a modification which would not take long to develop is not immediately adopted. In addition, individual customers tend to consider their own suggestion to be of primary importance and may not see that the requested change is not necessarily something that many other customers would want.

Customer suggestions are considered and are incorporated in new versions of a COS if the improvements are likely to benefit the customers at large. Some organisations have their own list of planned enhancements and further functionality they wish to add to their system; those organisations (eg Mainfreight, ASB) have found that customer requests for changes often refer to items already planned to be incorporated in further versions.

3.3 Discussion of findings

In all cases development of the systems linking organisations with their customers is controlled by the sponsoring organisations. The systems which were developed with customer participation in initial development accorded some responsibility to the customers; all participation in on-going development mounted to involvement by advice only. This is not an unexpected finding. The system is usually initiated and is financed by the sponsoring organisation, whilst the intended users are outside that organisation. It can thus be expected that control of and decision-making during development remain with the sponsoring organisation.

It is interesting to note that the case evidence suggests there is a correlation between 'high' participation and higher levels of customer control and responsibility during development. Customers may take part in many development activities but that is not necessarily a guarantee that customers have any real influence over development. However, both Bendon and Stevens did not only use customer participation for advice but also shared responsibilities with customers. This finding strengthens the earlier proposition that the 'high' participation cases treated customer participation seriously.

4 Content of participation

Users may participate in different aspects of system development (Hirschheim, 1983). User input may be sought on technical aspects of the system; user participation may also include consideration of social impacts of the system on the users and their work. Table 7.4 shows to what extent customer participation in the 9 cases related to technical or to socio-technical aspects of development.

Table 7.4 - Content of participation in initial and on-going development of COS

Content of participation	Initial development (N=4)		On-going development (N=9)
	High (N=2)	Moderate (N=2)	
technical	2	2	9
technical and social	-	-	-

In all cases participation in development was concerned with the technical aspects of the system only. The 4 organisations which involved customers during initial development were interested in making sure that the technical system would fit customer requirements in terms of functionality. 'Ease of use' and 'convenience' of the system was considered important, the development teams resorted to their own perceptions as to how the system should look and feel and did not involve customers in this aspect of design. Customer participation in on-going development also concerned requests and suggestions for changes in functionality of the system only.

The 'content' dimension of customer participation relates to a variable discussed in Chapter Seven: the sponsoring organisations' expectations concerning the potential change that the proposed system would bring to customer operations. Case evidence showed that those involved with initial system development may have had a sense of potential impact of the system, but that such impact was not considered to be a reason for adapting the system development effort. In all cases initial system development was concerned with technical functionality of the systems and not with social aspects of system design. Hence is it not surprising that participation of customers was also related to only technical design of the system.

5 Summarising Research Question Two

This chapter has described customer participation in the case sample according to 4 previously identified dimensions: customer participation activities, type of participation, degree of participation and content of participation.

Only a minority of cases involved customers during system design, though all accepted customer input to guide on-going development of the systems. Type of participation and degree of participation correlated with the level of participation in terms of activities. The two 'high' participation organisations, Bendon and Stevens, sought repeated and close customer contact and gave customers responsibility during development. This suggests that these organisations were genuinely interested with receiving customer input and took this input seriously. In each case customers were only involved in the technical aspects of design which reflected the focus of development efforts in all organisations.

The next chapter addresses the research question which investigates to what extent customer participation during system development contributes to subsequent COS success.

CHAPTER EIGHT - Cross Case Analysis: Research Question Three

This chapter investigates the link between customer participation during development of Customer Oriented Systems (COS) and the subsequent adoption of such systems.

First, the 9 cases are categorised according to the dependent variable 'adoption' and the relationship between participation and adoption is presented. Then, findings concerning the various factors impacting on adoption are discussed. Next, the relative importance of these factors, including customer participation, is discussed. Lastly, the importance of adoption of the system is discussed as the main determinant of ultimate success of the system.

1 Categorisation of cases according to COS adoption rate

Before being able to discuss the relationship between participation and COS adoption, the cases have to be compared and classified according to the dependent variable 'adoption'. As discussed in Chapter Five (section 2.2.5) adoption of the COS was measured by the time-based variable 'adoption rate in the first year after launch'. Data was collected on adoption targets and penetration (in terms of number of customers adopting the system and/or percentage of business moving through the system). Informants were also asked about their perceptions of the rate of adoption of the system.

During data collection it soon became apparent that several organisations (6 out of the 9) had not defined penetration targets for their systems prior to system launch. Similarly, several organisations had not closely monitored adoption and use of the COS and they could therefore not easily quantify the actual penetration of their systems. Organisations themselves could not assess adoption success in terms of actual penetration compared to target figures. This meant that quantitative data on the adoption of various systems was not available for every case. In the cases where hard data was not available, informants' perceptions of adoption and use had to be used as the only indicator of speed of adoption.

Table 8.1 categorises the 9 cases according to adoption of the COS. The columns show which organisations set initial targets (and what those targets were), present quantified adoption rates as reported by informants and report sponsoring organisations' own perceptions of the adoption rates of their COS. The first columns thus provide descriptive data on each case. Based on this data, the researcher assigned a value (fast or slow) to the adoption rate of each COS; this rating is presented in the last column. Adoption rate was considered 'fast' if targets (set by the sponsoring organisation) had been quickly and easily reached and if informants perceived adoption as having been fast. Adoption rate was rated 'slow' if sponsors perceived adoption to have been slow or disappointing in terms of achieving targets.

Table 8.1 - Categorising of cases according to adoption of COS

	Initial targets set	Adoption rate - quantified	Adoption rate - as perceived by sponsor	Adoption rate - success rating
ASB	yes: 100 in first year	target of 40 sites in 6 months was achieved in just 2 months	"..we are way ahead of target!"	very fast
Baycorp	no	1/4 of current users joined immediately	"we had an initial burst and then steady growth"	fast
NZ Cargo	yes: 70% of customers in 2 years	8 sites in first month; 35 waiting for connection	"the vast majority [of customers] are saying: yes, I want it"	fast
ANZ	no	-	"frustratingly slow"	slow
Bendon	n/a	both customers who asked for system; otherwise none	"we want to make a plan and decide where we are actually going to go..."	slow
CPL	no	"even at the best times only 1 per week"	"slowly; it was always a difficult thing to sell"	slow
Mainfreight	no	less than 30 sites in first 2 years	"I thought everyone would ... want it right now - but it didn't happen..."	slow
OTC	no	10-12 sites in first 2 years	"it's fairly gradual"	slow
Stevens	yes: 3 per month	15 sites in first 3 months, then 1.5 per month	"I think it is fairly rapid; .. but we are below target"	slow

Although the data is not exactly comparable for each case, it is possible to classify the cases into two clearly separate groups; within each group the cases are presented in alphabetical order. One group of 3 cases can be categorised as enjoying relatively fast adoption of the COS by customers; the second group, consisting of 6 COS, were adopted at a much slower rate.

One of the cases is not easy to classify according to the dependent variable 'adoption'. Bendon became EDI trading partners with two of its customers; the first of these links went live in 1991, the other in 1992. The two customers each initiated EDI trading with Bendon and Bendon adapted their system to accept the different EDI standards used by the two customers. However, Bendon has not extended its EDI links any further and has not offered EDI trading to any of their other customers. The company intend to write up an EDI strategy after which they want to go out and gain more EDI trading partners, but at the time of data collection no plans had yet been made. Adoption of Bendon's EDI system is therefore 100%, for the two customers who asked for the system, but 0% for the potential customer base, who have not (yet) been offered the opportunity adopt the system.

Adoption of the Bendon system has been classified as 'slow' for two reasons. Firstly, adoption rate and penetration of their EDI system is zero, apart from the two sites which adopted the system after initiating development in the first place. Secondly, interviewees themselves expressed disappointment with the lack of penetration of the system: Bendon's intention is to be pro-active and gain further penetration, but at present the organisation has other priorities and Bendon's EDI capability is underutilised.

2 The relationship between customer participation and adoption

It is sometimes considered axiomatic that participation during system development leads to more successful systems in that they are adopted more quickly, are used more and lead to greater user satisfaction. However, empirical research in user participation has reported mixed results regarding the participation-success relationship. Focusing on participation of customers in the development of interorganisational systems linking organisations with their customers, two studies found correlations between customer participation and early adoption (Reich and Benbasat, 1990; Runge, 1985).

This study investigated the participation-adoption relationship. Table 8.2 presents aggregate results comparing the various levels of participation against adoption rate.

Table 8.2 - Customer participation and adoption rate (aggregate results)

Adoption rate	Participation		
	High (N=2)	Moderate (N=2)	Low (N=5)
Fast	-	2	1
Slow	2	-	4

This study's findings indicate that 'low' participation tends to be associated with slow adoption, though does not necessarily preclude fast adoption of the COS. In this respect the findings are similar to those of the two studies that investigated this same relationship. However, previous findings concerning 'moderate' and 'high' participation cases are not supported. Reich and Benbasat (1990) found that all cases built with customer participation enjoyed fast adoption. Runge (1985) found that 11 out of 12 participation cases enjoyed fast adoption. In contrast, this study returns mixed results: the two 'high' participation cases were adopted slowly; the two 'moderate' participation cases were adopted quickly.

In order to investigate the participation-adoption relationship more closely Figure 8.3 plots the individual cases in a participation-adoption matrix. 'High' and 'moderate' participation were collapsed into one category (consisting of organisations involving customers during early stages of development). The cases can thus be displayed in a 2x2 matrix.

The bottom left-hand quadrant of Figure 8.3 contains the findings which are different from those reported by Reich and Benbasat (1990) and Runge (1985). The COS of both Bendon and Stevens were developed with customer participation; in fact, participation in each case was 'high', indicating participation not just in project definition but in actual design of the system. And yet the systems were adopted slowly. Bendon's system was adopted only by the two customers who asked for the system; Stevens is selling and installing their Shopmaster system but actual adoption rates and penetration figures are well below target.

Figure 8.3 - Customer participation and adoption rate matrix

		Customer participation	
		high/moderate	low
Adoption rate	fast	ASB NZ Cargo	Baycorp
	slow	Bendon Stevens	ANZ CPL Mainfreight OTC

The case evidence indicates that customer participation is not a factor which clearly distinguishes between fast or slow system adoption. This would indicate that other factors are intervening in the participation-adoption relationship.

Reich and Benbasat (1990) and Runge (1985) identified several factors which influence COS adoption. Customer participation during development is one of the factors, though its relative importance among the factors has not previously been investigated. This study collected data concerning all the previously identified variables impacting on adoption. It is thus possible to first discuss case evidence for each of the adoption factors independently and then to examine interrelationships and relative importance of the factors.

3 Investigating individual adoption factors

Four factors impacting on adoption of COS were identified in previous research: customer participation in the system's development, expressed customer need for a system, financial cost to the customer of obtaining and using the system and, lastly, marketing of the system. During data collection informants repeatedly referred to a further factor impacting on system adoption: technological awareness of customers. It was clear that informants considered this to be a significant factor and for that reason the factor was added to the four factors previously identified as factors influencing COS adoption.

Customer participation in development has been discussed at length in the previous 2 chapters and is not separately considered in this section. Case evidence relating to the other four factors is outlined in this section.

3.1 Expressed customer need

Previous studies found that systems that are built in response to known and expressed customer needs tend to be adopted more quickly, while systems which are built in the absence of identified needs are adopted more slowly.

Customers can express their needs in a variety of ways. The idea for a system can be generated by customers: customers can initiate development or can approach an organisation with requests for change or for improved service. When a system idea is generated from within the sponsoring organisation needs and general requirements of customers can be ascertained by polling potential users through market research or by seeking customer input at the project definition stage. Table 8.4 summarises to what extent systems were developed in response to expressed customers' needs.

The shading of two areas in effect changes the table into a 2x2 matrix in which the shaded areas present expected results while the unshaded areas highlight the unexpected findings.

Table 8.4 - Expressed customer need and adoption rate

		Customer needs expressed: Yes	Customer needs expressed: No
Fast adoption	ASB	x	
	Baycorp		x
	NZ Cargo		x
Slow adoption	ANZ		x
	Bendon	x	
	CPL		x
	Mainfreight		x
	OTC		x
	Stevens	x	

3.1.1 Systems built in response to an expressed need

Customers express a need when they perceive a need for greater convenience, lowering costs or saving time. The sponsoring organisation can take this into account when designing a system and thus enhance the potential attractiveness of the system to the customer. Three of the 9 systems were developed in response to expressed customer needs, though only one of these enjoyed fast adoption.

Fast adoption. The ASB was aware of customer need for a cash management system. Other banks were already offering electronic banking facilities of this type and corporate customers now require such a system from their banks, which is reflected in corporate evaluation criteria of tenders for banking arrangements. In addition, several retail customers had asked if and when the ASB was launching a cash management system. When building Gateway the ASB knew that it was fulfilling a customer need; adoption of the system once launched was fast.

Slow adoption. Stevens' Shopmaster was built to fulfil a known customer need.

Their main competitor was offering point-of-sale systems with electronic order transmission to pharmacists; pharmacy profitability was falling and individual pharmacists were increasingly interested in ways of making their operations more efficient. However, in spite of building Shopmaster in response to needs, Stevens' system was not adopted very readily.

Bendon's EDI system was developed when customers approached Bendon with a request to trade electronically. This was a clear case of customers specifically expressing a desire for a system. Overall adoption of the system though is very slow: 100% of the customers who had for the system are now using it, but no other customers have adopted the system.

3.1.2 Systems not built in response to an expressed need

In 6 out of the 9 cases the system was not built in response to a known and expressed customer need. Existing conditions in the various industries were considered the norm and were perceived by customers as the only way in which to obtain a service or product. Technology, however, enabled the sponsoring organisations to change conditions and to begin to offer the product or service in a new way. All the systems developed in the absence of an expressed need were also first-mover systems: the systems were a 'first' in their industry.

The organisations which developed systems in the absence of an *expressed* need by customers perceived there to be a *latent* need for their system. In each case the sponsoring organisation perceived the proposed system to fulfil customers' latent needs in that the system would enable customers to save time and money and would offer improved service.

Fast adoption. Both Baycorp and NZ Cargo fulfilled a latent customer need with their systems.

Baycorp felt their system was fulfilling a customer need since credit reporting clients had always wanted to be able to carry out their own credit checks instead of having to rely on a third party. Customers had not specifically asked for a system, accepting the norm of having to use the telephone and ask a credit reporting service for information to be sent out to them. However, access to instant credit information is vastly preferable: organisations want to be able to inform a potential client immediately whether they will provide a service or product. If a client is made to wait several days for a credit check, the organisation may lose that client. Hence, Baycorp felt sure that the Baynet project was going to provide an improvement in service that customers would want and that customers would adopt the system quickly. This did indeed happen and many customers signed up for Baynet very quickly after launching the product.

NZ Cargo's Tradelink system fulfils a customer need. Its customers are exporters who are normally involved in a great deal of paperwork with multiple copies of the same document or very similar copies being required for customs and freight forwarders in this and in the country of destination. EDI facilitates the preparation and transmission of these documents. Since goods are in transit across the Tasman Sea for 11 or 12 days customers often do not know for days if and when goods are held up somewhere in transit. The freight tracking module of Tradelink enables both customers and the customers' customers to keep track of consignments throughout. Customers do indeed perceive Tradelink as very useful, benefiting both themselves and their respective clients; adoption of Tradelink is fast: customers are signing up for the system faster than NZ Cargo can install.

Slow adoption. In the cases of ANZ, Mainfreight, OTC and CPL customers did not adopt the systems quickly at all. In each case the organisations felt their system was fulfilling a need, but customers did not see it that way.

CPL was offering Portable Data Entry units (PDEs) to pharmacists who were used to spending a long time on the telephone passing 150-line orders on to the wholesaler; Mainfreight offered a system that cut down time spent on preparing consignment notes from several minutes to a few seconds; OTC's Oscar enabled the speedy and accurate transmission of orders at the customer's convenience. However, in each case adoption was slow.

ANZ bank built the ANZCash cash management system with corporate customers in mind: corporate customers did many transactions and were interested in computerised access to accounts. However, when approaching those customers with the finished product not many adopted ANZCash. One reason for this could be that corporate customers usually have split banking arrangements and require access to accounts in several banks; the early (late 1980s) cash management systems in New Zealand only allowed access to one bank. This effectively implied that corporate customers needed to acquire multiple products and still were not able to complete transactions between accounts of different banks[1]. Hence, at its launch ANZCash did not fully meet the known needs of the customers which were targeted with the system. This may have accounted for slow early adoption, particularly among corporate customers.

The COS offered by the organisations in this sub-category were not adopted quickly, even though the sponsoring organisations appeared to have identified ways in which their customers could save time and money and could obtain a service in a more convenient manner.

3.1.3 Importance of customer expressed need

Customer *expressed* need may account for some very early adoption of systems by customers, but is not necessarily the only or the most important factor affecting general adoption of a COS.

Bendon is one case which illustrates very clearly that a system which fulfils customers' expressed need may guarantee adoption by those customers who expressed that need, but that adoption by further customers is not automatic. Bendon developed EDI capability and became EDI trading partners with the two customers who expressed the wish to do so and who initiated development of the system. Beyond those two customers, Bendon has no EDI links with further customers.

Both Stevens and the ASB mentioned that several of their early adoption sites were customers who had specifically asked for the system and who had been waiting for the COS to be completed. ASB mentioned 15 out of the 40 sites in the first 2 months were of this type; 6 out of the 15 sites that Stevens installed in the first 3 months were sites that had asked for a system. But both organisations indicated that, apart from the few early customers who had expressed a need for the system,

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[1] This situation was rectified a few years later. With the introduction of the All Bank Access Scheme in 1990 the main trading banks allowed customer access to and money transfer between accounts at each other's banks.

sponsoring organisations have to go out and 'sell' the COS to customers. Customer expressed need is therefore a factor encouraging early adoption by those who expressed the need.

The fact that some customers express a need may reflect a real, latent need among customers at large. In this way systems built in response to customer expressed need can still be expected to be adopted more quickly than systems developed in the absence of expressed needs. Case evidence, though, has shown that this is not necessarily so and this indicates that there are more factors impacting on adoption than just need, whether expressed or latent.

3.2 Cost to the customer

High acquisition and/or operation costs have previously been found to discourage adoption of COS. In contrast, no, low or nominal costs are associated with fast adoption.

Actual costs of the various systems charged to customers are not easily comparable across the cases. Systems are based on different technologies ranging from use of a Portable Data Entry device (at CPL) to mainframe-to-mainframe EDI (at Bendon) and this affects the costs of the system to the customers: the cost of obtaining a PDE is much less than the cost of preparing a system for mainframe-to-mainframe EDI. And yet, the cost of the PDE to the owner of a pharmacy may be greater, relatively speaking, than the cost of mainframe-to-mainframe EDI preparation for a large retail chain. Instead of comparing systems on actual costs, cases can be compared according to costs to the customer.

3.2.1 Various aspects of cost to customer

Costs of a system to the customer are two-fold: there are the costs associated with acquisition of the system and the on-going costs of using and maintaining the system. Acquisition costs of various COS refer to the costs of acquiring the hardware and software required to operate the COS.

Hardware acquisition costs. Hardware costs vary according to the type of industry (and hence the type of customer) and the time of launch of the system.

Customers are usually expected to provide their own hardware and communications software (if applicable). If the hardware and communications software is already available in the customer organisation then acquisition costs in this respect are low, but if hardware has to be specially obtained for COS use then costs are high. The availability of existing hardware for COS use varies across systems for different industries. Customers of systems like the ANZCash cash management system are accounting functions of ANZ customer organisations; such customers already have the basic hardware and software available to run the system. In contrast, potential users of Stevens' Shopmaster are pharmacists who usually do not yet have computer hardware for their point-of-sale. Therefore, varying costs for hardware acquisition reflect industrial differences in terms of the *type of customer* of each particular COS.

The likelihood of necessary hardware being available for COS use has increased over time: as organisations become more widely computerised, availability of hardware has become more prevalent. Even within the same industry it is apparent that over time changes have occurred on customer premises. When OTC first offered its Oscar order entry system to customers in 1987 hardly any organisation had computerised its stationery purchasing function. In 1993 the situation is quite different: many large organisations have begun not only to computerise inventory of stationery but also to integrate it with their general purchasing systems. The 'cost to customer' reflects conditions in customer premises *at the time of launch* of each COS.

<u>Software acquisition costs</u>. Software costs differ according to the technology used and the pricing approach adopted by the sponsoring organisation.

The COS which allow customer access to the sponsoring organisation's mainframe (eg OTC, Baycorp) do not involve customers in any software acquisition costs. Customers do have to obtain software for COS which require use of dedicated software (eg Stevens) or which are EDI-based (eg Mainfreight). Mainframe-to-mainframe EDI applications (eg Bendon, NZ Cargo) involve the customers in costs of modifying their system in order to become EDI capable.

Organisations use different approaches to pricing their system ranging from free acquisition, maintenance and use (at NZ Cargo) to full cost recovery with a profit-margins (at Stevens). Free use of software translates as zero cost to the customer in terms of software acquisition; a profit-oriented venture by the sponsoring organisations is likely to involve the customer in more substantial costs.

On-going costs. On-going costs concern communication and other usage costs. Usage costs can be of two types. As with software acquisition costs, some sponsoring organisations absorb the on-going support costs of a system (eg OTC) while others charge their customers. Some sponsoring organisations charge monthly, on-going support fees (eg Stevens) which cover general support of the system in terms of a help-desk for customers and regular software upgrades. Other COS (eg ANZ and ASB) involve usage costs based on the number of transactions carried out.

3.2.2 Comparing systems on cost to customer

As has just been shown, the cost of a COS to the customer can be broken down into various components. Within each of these, cost is affected by the type of industry, the COS technology, the time of launch of the COS and the pricing approach adopted by the sponsoring organisation. Table 8.5 compares cases according to cost to the customer.

On-going costs to the customer are low for *all* COS; for that reason, on-going costs are not included in the Table. Instead, cases are compared on acquisition costs of the COS. Acquisition costs of the systems vary considerably. All systems with high (acquisition) cost are adopted slowly. All systems which are adopted quickly also involve low cost to the customer, but low system cost is not necessarily associated with fast adoption. There are low cost systems (eg Mainfreight's Freeman and OTC's Oscar) which were not adopted rapidly.

Table 8.5 - Cost to customer and adoption rate

		Acquisition costs		
		hardware	software	Rating for acquisition cost
Fast adoption	ASB	low	moderate	low/mod
	Baycorp	low	none	v low
	NZ Cargo	low	large customers: moderate; small customers: none	low/mod
Slow adoption	ANZ	low	moderate	low/mod
	Bendon	low	moderate	low/mod
	CPL	high	n.a.	high
	Mainfreight	moderate	low	mod/low
	OTC	moderate	low	mod/low
	Stevens	high	high	high

3.2.3 Strategies to lower cost of systems to customers

Sponsoring organisations are aware of the fact that cost can present a significant barrier to system adoption. Costs can inhibit adoption of first-mover systems and costs are also an important factor when a customer is faced with a choice between competing systems. In an attempt to ease the inhibiting impact of system cost on adoption organisations use a number of strategies to lower cost or apparent cost to customer.

Offering free access to COS (Baycorp, Mainfreight, NZ Cargo, OTC). Several sponsoring organisations do not require customers to pay for acquiring or gaining access to their systems. The cost of developing the system is absorbed by the sponsoring organisation and is considered as a strategic investment.

The systems of Baycorp and OTC are simple dial-in systems where customers obtain access to the sponsoring organisation's mainframe. Customers are not charged for this access which is considered by the sponsoring organisations as an extra service provided. Mainfreight and NZ Cargo each offer the software developed by them for the COS free to customers. The software is offered at zero cost to the customer in order to encourage adoption. The main informant at NZ Cargo commented that internal impact on their own organisation is greatest if adoption of the system is high:

> "We are saying: if we absorb the costs, we will sell more and therefore our revenue will be greater in the long run. ... We can afford to wait before we see those results. I guess that is one of the advantages of being part of a big company." - EDI Coordinator, NZ Cargo

NZ Cargo feel that their customers (exporters) are so cost-conscious that they might be put off adopting Tradelink if they have to pay for it. NZ Cargo know that competitors, offering similar systems to customers but at a cost, have had difficulty selling their systems. As soon as there is a cost involved the shipping managers have to be able to justify adoption to their general managers and then might consider the system as a 'nice to have' instead of a 'need to have'.

<u>Offer system at nominal cost</u> (ANZ, ASB). Both banks charge nominal fees for their cash management systems. Both the ANZ bank and the ASB offer their systems at a cost to the customer which covers costs of installation and support; development costs are not recovered. The rationale for effectively selling the system below cost is that the system enhances bank services for existing customers and facilitates in the tendering business; as such helps a bank retain and gain business respectively.

<u>Offer incentives for adoption and use of COS</u> (CPL). The PDEs offered by CPL in the late 1970s for use in pharmacies were offered at cost. The price of $1,600 represented pharmacists with a substantial cost. In order to make the acquisition of a PDE attractive to pharmacists CPL created a discount structure so that pharmacists would be able to obtain discounts when using the PDE; this discount was not available if goods were ordered in the traditional manner (by telephone). In this way pharmacists were able to pay for the PDE out of profit within one year of beginning

to use the system.

Show that system is cost-effective (Stevens). Several organisations try to show customers that use of the COS has a tangible, financial pay-off for customers.

Stevens argue that use of a point-of-sale system translates into money savings by improving control over stock. It is estimated that a $20,000 system pays for itself within 6 to 9 months by reducing stock that does not sell and keeping adequate stock levels of items which do sell. Stevens have one customer who was able to reduce purchases by $7,000 per month after only 3 months of Shopmaster use. The most dramatic savings are made by the customers who are least efficient, though all customers are able to make savings in terms of reducing slow-moving stock.

Offer free COS in return for customer patronage (NZ Cargo, Stevens). A few organisations use the offer of free acquisition of the COS as a bargaining tool to obtain the customers' business. Stevens have installed free software to some key pharmacies when trying to gain their business. Similarly, NZ Cargo negotiate with large customers offering free software and free modification of customer mainframe set-up in return for a 3 or 4-year contract securing patronage.

3.3 Marketing of the system to customer

Previous research findings indicate that superior marketing efforts are associated with high adoption while poor marketing of COS leads to slow adoption. Eight of the 9 case organisations are involved in marketing their system to customers; Bendon is the one organisation that has not put any effort into marketing.

The types of COS marketing activities and the number of organisations using each strategy are summarised in Figure 8.6.

Figure 8.6 - Types and prevalence of COS marketing activities

	Number of cases (N=8)
Demonstrations at customer site	7
Demonstrations to groups of customers (at conferences, trade fairs, etc)	3
General advertising (newspapers, letters to customers)	2

The listing of specific marketing activities does not give an indication of the effectiveness of the marketing effort. Informants volunteered information on factors which they felt contribute to a superior marketing effort and, conversely, factors associated with a poor marketing effort. These factors will first be described and will then form the basis for evaluating the marketing efforts of the 9 case organisations.

3.3.1 Criteria for evaluating marketing effort

Resources for sales and support. An insufficient number of sales and support staff inhibits the marketing of a COS. Nearly all organisations felt that they would be able to achieve greater penetration of the COS if they had more staff to sell and to support the product and more staff specifically trained to help market the COS.

Some organisations delegate the marketing of the COS to existing sales-staff or branch-managers. In these cases COS tend to be marketed without specific training of staff; staff are not expected to devote a significant amount of time to COS marketing. With hindsight these organisations feel that they underestimated the importance of putting resources into marketing of the COS. - The interview guide contained a question which asked informants what they would do differently if they could start development of the COS all over again. The response of one informant related specifically to marketing resources:

> "The only thing that I would do differently would be the way I marketed it and introduced it. I would look at putting somebody full-time on to it - perhaps not full-time but a big part of their job would be to go out there and get the news around." Financial Controller, Mainfreight Transport

Other organisations have a team dedicated to the marketing and support of their COS. Yet, even in these cases it is still sometimes felt that the resources put into marketing of the COS are inadequate and that the team is too small to support and market the system effectively.

Priorities in organisation. A separate sales force dedicated to the COS is an indication that the COS is considered a priority in the organisation. Some organisations feel that the COS is an addition to but peripheral to their core business and for that reason do not consider the marketing of COS a high priority.

Two of the case organisations were involved in recent mergers and a third was in the process of a take-over bid. Each of the three organisations mentioned that such business activity hampered the time and effort they were able to put into promotion of the COS. Mergers require effort to be put into integration of systems which is conceived as higher priority than promoting the COS. Bendon mentioned a recent merger as the exact reason why they have not sat down and planned an EDI strategy.

Initial profile. Adoption of the COS is encouraged when the sponsoring organisation is able to create a good image and a high profile for the COS when it is first launched. Subsequent marketing of the COS is facilitated by early publicity and also by being able to use successful, early installations as reference points.

Once news of the COS becomes known and customers have begun to adopt it, the word spreads and the system begins to market itself. Many customers know each other and meet regularly at trade fairs, Chamber of Commerce meetings and industry meetings. In this way information about the availability of a COS and the value of the COS spreads by word of mouth. CPL mentioned that pharmacists talking to each other helped gain acceptance for the Portable Data Entry units CPL tried to introduce to their customers. Baycorp found that they gained customers for their credit reporting system Baynet by various subsidiaries of large organisations adopting the system after hearing about it from someone in another subsidiary.

Similarly, early installations can provide important reference points as potential adopters may prefer to gain information about the COS from a peer instead of relying solely on the marketing information provided by the sponsoring organisation. Both

NZ Cargo and Stevens mention they make active use of reference points when discussing their COS with potential adopters: they encourage customers to contact other COS users to discuss their experiences.

Targeting. All organisations target customer organisations which can potentially benefit from COS use and approach them individually to demonstrate the system. However, sponsoring organisations have to target the right market and, secondly, the right individual within the customer organisation.

Not all organisations targeted the correct market for their COS. The manager in charge of developing ANZ's cash management system had been surprised to find that the corporate customers were very slow to adopt ANZCash. ANZCash had been targeted at the corporate clients, but the retail customers who had not been specifically targeted accepted the product much more readily.

It is important to target the right individual in the customer organisation. The individual needs to be someone who has vision (and thus can understand the potential benefits of COS use) and who is in a decision-making position (and thus can implement the system and encourage COS use). Some organisations were aware of at times having targeted the wrong person in the customer organisation. Mainfreight, for instance, found out what the consequences can be of not targeting correctly. They demonstrated the Freeman system to a junior member of staff in the distribution office in one customer organisation. This person did not like/understand the system and passed negative feedback on to her manager. When two years later Freeman was demonstrated to senior managers in the same customer organisation, the reaction was totally different and management insisted on adoption of Freeman in their freight department.

3.3.2 Comparing cases on marketing effort

Table 8.7 compares the cases on marketing effort for each COS. The columns show ratings for the resources made available for selling and supporting each COS, the extent to which COS marketing is a priority in the organisation, the initial profile of the COS and the success of targeting potential adopters. The final column gives an overall rating for marketing of the COS to customers.

Table 8.7 - Marketing of the system and adoption rate

		Criteria				Rating
		Resources	Priority	Initial profile	Targeting	
Fast adoption	ASB	high	high	high	specific customer groups	high
	Baycorp	high	high	high	larger customers	high
	NZ Cargo	mod	high	high	two types of systems for two types of customers	high
Slow adoption	ANZ	mod	mod	mod	poor	mod
	Bendon	low	low	low	none	none
	CPL	low	low	mod	all customers	low
	Mainfreight	low	low	low	at times poor	low
	OTC	low	low	low	at first large customers only	low
	Stevens	mod	mod	high	all customers	mod

According to case evidence marketing of the COS is closely correlated with subsequent adoption of the system. The cases with superior marketing efforts were also the cases which enjoyed fast adoption of their systems; systems offered by the organisations with moderate or poor marketing efforts were adopted only slowly.

3.4 Technological awareness of customer

All organisations mentioned that the lack of technological awareness among customers had been found to be a significant barrier to COS adoption. When individuals are unfamiliar with the use of computers and do not understand what computers can do for them, then it is hard for them to understand and realise the benefits which can be obtained from COS use.

3.4.1 Reasons for lack of technological awareness

Many customer organisations were reluctant to accept a COS because it would involve computerising a hitherto manual function. Lack of awareness and understanding characterised many potential adopters. Informants perceive there to be a few, closely-related reasons for the lack of technological awareness among customers.

Low priority area of the business. It is hard to introduce computerisation of processes in parts of organisations that are considered to be low priority. In those business areas the costs of computerisation are not easy to justify.

Mainfreight has found that computers were not common in the despatch area of a businesses in the late 1980s. The costs of buying a PC were considered as a huge investment and computerisation of consignment note preparation was considered a huge change.

OTC found that companies had not computerised their purchasing functions. Customers might have computerised the core area of the business, but not the purchasing of services. Staff working in purchasing did not have the hardware and were unfamiliar with computers which hampered adoption of Oscar.

Lack of understanding of technology. There is resistance to the various COS because customers do not understand the technology. Sponsoring organisations explain the concepts, but customers still find it hard to grasp the way that technology is able to speed up and facilitate business processes.

Customers could not believe that it is possible to prepare consignment notes in a matter of seconds instead of minutes (Mainfreight's Freeman system) or that customs clearance can be done within a few minutes instead of days (NZ Cargo's Tradelink). Similarly, customers had difficulty accepting that electronically placed orders (CPL's Portable Data Entry units and OTC's Oscar system) arrived and were processed in the same way as telephone orders.

3.4.2 Comparing the cases according to technological awareness of the customer

All informants considered a lack of technological awareness to have inhibited adoption of their COS, but the problem of dealing with customers who did not understand the technology was worse in some cases than in others. Technological awareness of customers varies according to type of industry, size of customer and time of launch of COS. In some cases only parts of the customer base were not very technologically aware, but in other cases the whole customer base lacked knowledge of technology.

Table 8.8 compares cases according to the technological awareness of the potential adopters of the COS. A rating of 'high' technological awareness indicates that the majority or all of the customers were familiar with computers and their uses; 'moderate' indicates a mixed situation where some (probably the larger) customers were and other customers were not familiar with the technology; 'low' indicates that the majority or all of the customer base was new to the technology. Bendon has successful EDI partnership links with two customers but expects difficulties when trying to sell the technology to further customers - hence the classification of their system in the 'moderate' category.

Table 8.8 - Technological awareness of customer and adoption rate

		Technological awareness		
		High	Moderate	Low
Fast adoption	ASB	x		
	Baycorp		x	
	NZ Cargo		x	
Slow adoption	ANZ		x	
	Bendon		x	
	CPL			x
	Mainfreight			x
	OTC			x
	Stevens		x	

The shaded part of the Table shows expected results: 'high' technological awareness of customers correlating with fast adoption and 'low' technological awareness with slow adoption. Informants of the cases with 'moderate' technological awareness among customers reported that the pro-active customers adopted the COS fairly rapidly while the more conservative customers took a 'wait and see' attitude and adopted the system later.

3.4.3 Technological awareness improves over time

The three organisations that faced a large majority of customers with very low familiarity with computers have all found that technological awareness of customers has improved over time. In each case several years have passed since the launch of the COS and customers have become more familiar with use of technology in their particular business or part of the business:

> "What we did with PDEs ten years or more ago was actually fertilising the market ready for the other technology that has come along since ... Now there is quite some acceptance of technology in pharmacy, though a lot of pharmacists are still only computer literate in the most general sense of the word.." - DP Manager, CPL

> "In the last three years there are more and more companies that are getting PCs everywhere. So it is no longer the frightening thing that it was. ... We were a bit ahead of our time [in 1989] with that sort of thing and people are only just catching up" - Financial Controller - Mainfreight

> "Most of them were unfamiliar with using a computer, let alone having one that was using a modem - it was a major thing for them. ... As time has gone on everyone now knows what a keyboard is and most people know what a modem is." - Financial Controller, OTC

Low technological awareness is correlated with slow adoption. However, with technological awareness improving over time adoption is likely to increase over time too. Therefore, in spite of slow early adoption a COS can still achieve high penetration over time.

3.5 Aggregate findings

The findings concerning adoption factors and their effect on adoption of the 9 COS are summarised in Table 8.9. The final column indicates the extent of support for the various relationships.

Table 8.9 - Summary table showing adoption factors and effect on COS adoption

Factors	Value	Expected effect on adoption	Fast adoption (N=3)	Slow adoption (N=6)	Extent of support
Customer participation	high/mod	+	2	2	mixed
	low	-	1	4	high
Expressed customer need	yes	+	1	2	mixed
	no	-	2	4	mixed
Cost to customer	low	+	3	4	mixed
	high	-	0	2	high
Marketing of system	superior	+	3	0	high
	moderate		0	2	
	poor	-	0	4	high
Technological awareness of customer	high	+	1	0	high
	moderate		2	3	
	low	-	0	3	high

The case findings indicate an association between low participation and slow adoption. There is a strong correlation between marketing of the system and technological awareness of the customer and, on the other hand, COS adoption. There is also strong evidence that high cost of the COS inhibits adoption. Other relationships show mixed results.

4 Inter-relationships between adoption factors

The previous section has described the various adoption factors and their association with the adoption outcome. This section takes the discussion beyond description towards explaining the relationships among the adoption factors and their links with COS adoption. The process of explanation leads to generation of a causal model showing inter-relationships between the adoption factors.

4.1 Looking for patterns

The first step to a more inferential level of analysis is to draw up a predictor-outcome matrix (Miles and Huberman, 1984). Rather than describing tendencies and associations (as in Table 8.9) a predictor-outcome matrix begins to indicate if various adoption factors are good predictors of the adoption outcome.

Figure 8.10 presents a site-ordered, predictor-outcome matrix ordering the cases according to adoption rate and showing data for each site on each of the 5 adoption factors. In this way it is possible to see how the various adoption factors work together in relation to the adoption outcome. For each adoption factor individual values are shown as well as positive (+) and negative (-) signs. The signs denote respectively a clearly positive (facilitating) and a clearly negative (inhibiting) influence on adoption; 'moderate' values have not been rated either positive or negative.

Figure 8.10 - Predictor-outcome matrix showing COS adoption factors for each case

		Customer participation	Expressed need	Cost to customer	Marketing of COS	Technological awareness of customer
Fast adoption	ASB	moderate	yes (+)	low/mod	high (+)	high (+)
	Baycorp	low (-)	no (-)	low (+)	high (+)	moderate
	NZ Cargo	moderate	no (-)	low (+)	high (+)	moderate
Slow adoption	ANZ	low (-)	no (-)	low (+)	moderate	moderate
	Bendon	high (+)	yes (+)	low (+)	none (--)	moderate
	CPL	low (-)	no (-)	high (-)	low (-)	low (-)
	Mainfreight	low (-)	no (-)	moderate	low (-)	low (-)
	OTC	low (-)	no (-)	moderate	low (-)	low (-)
	Stevens	high (+)	yes (+)	high (-)	moderate	moderate

Some cases are very clear, showing many negative or many positive values for adoption factors and thus falling clearly into the slow or in the fast adoption category. Three of the slow adoption cases (CPL, Mainfreight, OTC) show negative values for at least 4 of the 5 adoption factors; none of the adoption factors facilitated adoption. One of the fast adoption case (ASB) shows 3 of the 5 adoption factors facilitating adoption and no negative influences from the other 2 factors.

The remaining cases show a mix of negative and positive values. These cases are of interest since they begin to show that some of the factors may be more important than others and that positive (negative) values of some factors may outweigh negative (positive) values of others.

For example, Stevens responded to expressed customer need and involved customers in the design of their system; the only factor clearly inhibiting adoption by customers was the high cost of the COS. The high cost of Shopmaster may have discouraged adoption despite the system fulfilling expressed customer needs. Marketing seems to play an important role in adoption: in the Bendon case the only factors actively inhibiting adoption is a lack of marketing the system. Baycorp seems to be able to overcome a lack of customer participation and an absence of customer expressed need with low cost and a superior marketing effort.

The information outlined in Figure 8.3 can be used for causal modelling. The aim is to transcend mere association between factor and outcome and, secondly, between two or more factors. Building a model involves the integration of sets of relationships showing causality.

4.2 Building the model

It is possible to use case evidence for formalising relationships between variables and to build a causal model (Miles and Huberman, 1984). Site evidence and informant perceptions on causal links form one source of information regarding causal links. Secondly, previous research may suggest plausible connections between variables. Lastly, causality implies a temporal ordering of variables: for A to be able to cause B, A must happen earlier in time than B. These rules of thumb enable a researcher to generate a theoretical model grounded in empirical evidence.

One way of beginning the model building process is to start with the outcome and reason back along causal links (Miles and Huberman, 1984). Following this approach the explanation presented here begins with COS adoption and customer reasons for adopting COS; links with the various adoption factors are then discussed.

4.2.1 Needs, benefits and costs

When discussing reasons for adoption of a COS it is helpful to consider the point of view of the customers who are being offered the COS and who may have to pay for its acquisition and use (Johnston and Vitale, 1988). COS adoption involves the customer in costs, benefits and organisational impacts though not all of them may be tangible or predictable at the outset. A major factor influencing COS adoption is likely to be the benefits offered by the COS to the customer, the extent to which the COS fulfils known or latent customer needs, the opportunity offered by the COS for improving customer efficiency and/or effectiveness (Johnston and Vitale, 1988). This plausible connection between 'need' and the 'adoption' outcome was verified by checking case evidence and by contacting customers of some of the COS cases.

The direct need-adoption relationship is confirmed by case evidence. Cases where the COS fulfils a known or latent customer need and where customers were aware of and understood the benefits of the COS were also the COS which were adopted quickly. In contrast, the cases where COS which did not fulfil a need or where the customer did not understand the benefits, the COS was adopted only slowly.

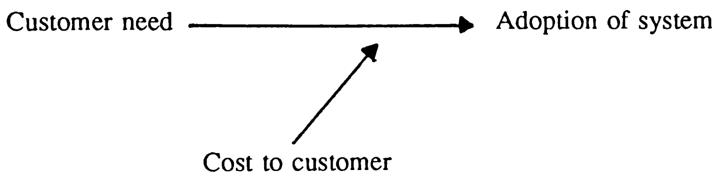
The validity of the 'need' factor as a major determinant of COS adoption was confirmed by responses from customers. Several customers of 4 of the COS (CPL, NZ Cargo, Mainfreight and Stevens) were telephoned to find out what had been their reason for or against adopting the COS. All customers gave need-related reasons for adopting the COS: "convenience", "efficiency" and "a way to lower costs".

The reasons for *not* adopting were two-fold. One reason was, again, need-related: customers would not adopt if they could see no need for the system or if the system did not suit their environment. This reason for *not* adopting is opposite to, and hence coherent with, the major reason given by other customer *for* adopting a COS. The second reason forwarded for not adopting was related to cost: cost of the system inhibited adoption even if the need for or the benefit of the system was recognised.

The mention of costs inhibiting adoption, even when the system fulfils needs and even when the customer wants to adopt, indicates that 'cost to customer' is an intervening variable in the need-adoption relationship. If cost is high then cost to the customer may become an intervening variable impacting on the need-adoption link. If cost is low or negligible or is perceived by the customer to be offset by benefits, then cost does not intervene in the direct need-adoption relationship.

Figure 8.11 graphically presents the relationships between 'need', 'cost to customer' and the outcome variable 'adoption.

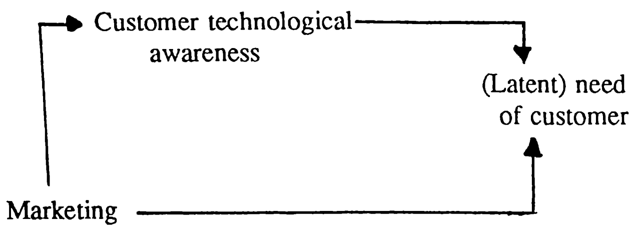
Figure 8.11 - Need, benefit and costs relationship



4.2.2 Marketing, technological awareness and need

'Need' (and awareness of benefits) is affected by 'marketing' of the system and by the 'technological awareness' of the customer, which itself is affected by marketing of the system (Figure 8.12).

Figure 8.12 - Marketing, technological awareness and need relationship



Nearly all organisations commented on the fact that customers are not aware of the benefits to be gained from COS use *because* the customers do not understand the potential impact of technology on their operations. Higher technological awareness increases customer demand for service, heightens customer awareness of benefits, raises customer expectations from the sponsoring organisation and makes customers aware of needs which can be fulfilled by adopting the COS. Hence, 'technological awareness' is directly and positively related to 'need'.

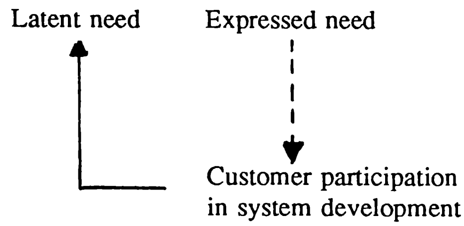
Marketing of the COS by the sponsoring organisation has a dual role to play: firstly, in raising customer technological and business awareness by educating customers in availability and use of technology and, secondly, in helping customers understand how they can improve their operations. Marketing of COS is not simply a matter of advertising the availability of the system. A superior marketing effort also helps the customer overcome the initial resistance to a technology by educating the customer and raising technological awareness. One strategy often used to help de-mystify the COS is on-site demonstrations of the COS to staff and managers at the customer site.

A superior marketing effort involves analysing the customers' business operations, explaining how the customer can improve their operations and then showing how the COS can play a part in making customer operations more efficient. In this way the marketing effort helps create a need for the COS and helps transform a latent need into a real, expressed need. For example, OTC showed customers how use of their Oscar ordering system enables centralised control over departmentalised ordering and thus helped an organisation keep track of stationery expenses. NZ Cargo showed customers that their Tradelink system, which enables across-Tasman freight tracking and customs clearance, allows customers to provide a better service to *their* customers. 'Marketing' impacts on both 'technological awareness' of customers and on customer 'need'.

4.2.3 Customer participation and need

Expressed customer need leads to the involvement of customers during system development; effective customer participation in turn leads to a COS which is likely to better fulfil customer needs than COS developed without customer participation. The relationship between 'customer participation' and 'customer expressed need' is mutual, non-recursive as is shown in Figure 8.13.

Figure 8.13 - Customer participation and need relationship



Case evidence has shown that customer participation took place when there was a strong, external pressure on the sponsoring organisation to develop a system. In 3 out of the 4 high and moderate customer participation cases, customers' need for a system was well-known; in the fourth case (Bendon) customers specifically requested development of the COS. Need appears thus to be associated with customer participation. Since the expressed need precedes system development (and hence precedes customer participation in development) this case evidence suggests that 'expressed need' may cause 'customer participation'.

However, none of the informants laid a causal link between expressed need and customer participation; not one of the informants mentioned that customer participation was sought *because* customers had expressed a need for the COS. The relationship between expressed need and customer participation may be one of association rather than a causal one. In order to acknowledge this uncertainty the arrow denoting the link from 'expressed need' to 'customer participation' has been dotted.

Some of the main reasons for involving potential users during system development are to ensure that the completed system fulfils user requirements and to enhance acceptability of the system by users (eg Land, 1981; Markus, 1983). User participation literature thus implies the existence of a causal link from participation to fulfilment of need.

Case evidence confirmed this plausible connection: informants of all 4 customer participation cases mentioned that customers had been involved in development *in order to* ensure that the COS would fulfil customer requirements. ASB and NZ Cargo involved customer at the project definition stage so that the project would be defined along the lines of that which would fit in with customers' general requirements. Stevens and Bendon involved customers during design to make sure that specific functionality of their system fulfilled customer needs. Customer participation enabled the building of a COS which was more likely to satisfy user needs than a COS built without the participation of customers. For this reason a causal relationship is shown from 'customer participation' to 'need'.

4.3 The completed model

The discussion so far has shown that the various COS adoption factors are interrelated. The discussion has also shown that the relationships are more complex than a simple series of direct, causal links between each separate factor and COS adoption. By integrating the various sets of relationships it is possible to generate a causal model linking all adoption factors. Figure 8.14 shows the complete model of relationships between adoption factors; the Figure combines the three separate components discussed above.

Figure 8.14 - Causal model of early COS adoption factor relationships

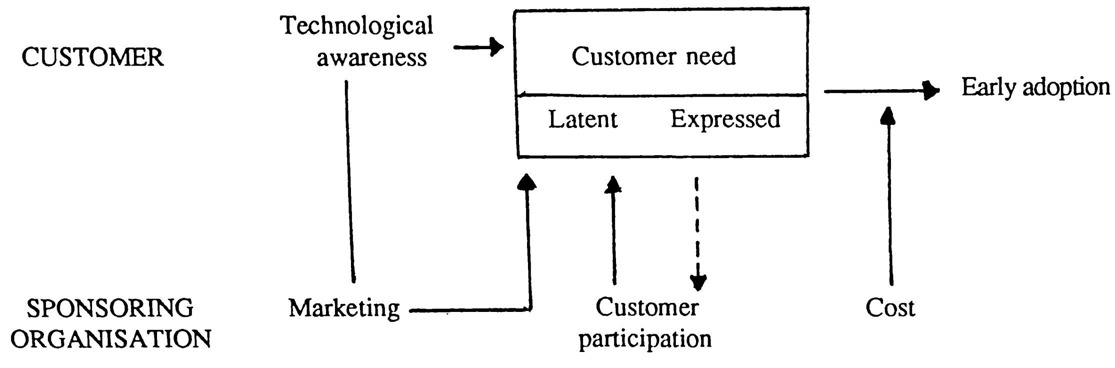


Figure 8.14 shows graphically that some of the factors can be controlled by and originate from within the sponsoring organisation while other factors are related to the customer.

The sponsoring organisation has control over its 'marketing' effort: it can decide the amount of resources to be put into marketing and the direction of the marketing effort. The sponsoring organisation can also control 'customer participation' in that the organisation has to agree to or initiate involvement from customers during COS development. The third variable under control of the sponsoring organisation is 'cost to customer': the organisation can follow various strategies regarding the pricing of the COS and can thus affect the COS cost to customer.

The two other factors influencing adoption are both customer related factors. 'Technological awareness of the customer' and 'customer need' can only change through some change in the customer. However, the sponsoring organisation can influence each of these through their marketing effort and can enhance the potential of the system fulfilling customer needs through customer participation in COS development.

4.4 Verification of the model

The model presented in Figure 8.14 was verified by returning to field notes in order to check whether the model accounts for all case evidence (Miles and Huberman, 1984).

The case evidence on factors impacting on adoption of each case was re-examined. The evidence included facts and informants' perceptions concerning events and circumstances at the time of launch. Summarised case data is shown in Figure 8.10, fuller information is given in the case summaries in Appendix 2 to 10; still fuller information is contained in the case files which are held by the researcher. This data was checked to see if the model accounted for all individual case "stories" and their outcomes.

After checking the model against each case it was found that the model describes the COS adoption process for each case. The model also explains slow or fast adoption for each individual case. Since no disconfirming evidence was found, confidence in the model was enhanced.

It was not possible to check the model against previous research findings. There are only two previously published empirical studies which have considered COS adoption factors (Reich and Benbasat, 1990; Runge, 1985). Unfortunately, both of these studies report aggregate findings only and do not enable a researcher to check the values of each factor for every separate organisation.

4.5 The relationship between customer participation and adoption - revisited

Section 2 of this chapter provided details of the association between participation and adoption rate of the COS in the case sample. The section concluded by stating that participation was not a clear determinant of adoption rate for the case sample and suggested that the interrelationship among adoption factors might explain the mixed results. Having generated a causal model explaining adoption for the cases, it is appropriate to return to the earlier findings in order to explain the participation-adoption relationship.

The model presented in Figure 8.14 hypothesises that there is only one direct, positive relationship with COS adoption: the link between customer need and adoption. The relationship between customer participation and adoption is indirect through customer participation enhancing the system fulfilling a need and hence affecting adoption. Hence, participation does not necessarily lead to high adoption rates and 'low' participation does not necessarily correspond with slow adoption.

Figure 8.1 highlighted two cases which had been developed with the input of customers during design of the COS but which were adopted only slowly. Compared to previous research findings, the placing of Bendon's EDI system and Stevens' Shopmaster system in the quadrant denoting 'high' participation and 'slow' adoption, was unexpected. However, referring to the relationships among the various adoption factors (as depicted in Figure 8.14), it is easy to see why those two systems were not adopted as quickly as might be expected.

Bendon's EDI capability has not been marketed at all; the organisation put other project higher on the priority list and has not even attempted to gain adoption of their system - even though Bendon wants to and intends to make their system available to more customers, penetration of their EDI system is as yet very low. In Bendon's case the marketing effort is completely lacking, which has meant that customers are not aware of the system, its availability and its benefits. For that reason Bendon has not gained any adoption of their COS beyond the two initial customers in spite of high levels of customer participation during development.

Stevens' Shopmaster system fulfils a need and most customers are aware of the importance of adopting a system like Shopmaster. However, some customers are not comfortable with the technology and the COS is expensive to obtain. Improved marketing can help raise familiarity of customers with the technology and overcome the fear of some customers that they may lose control over their business once adopting a computerised Point of Sale (POS) and order entry system. The high cost to the customer can only be overcome by lowering prices of the product or by raising customer awareness of the cost benefits associated with obtaining a POS system for their businesses. The high cost to customers, in particular, is inhibiting fast adoption of Shopmaster in spite of close involvement of customers in design of the COS.

5 Adoption rate and penetration

The previous sections in this chapter have specifically addressed Research Question Three which concerns the participation-adoption link. The last two sections of the chapter place COS adoption in the larger context of COS success and extend the model explaining COS adoption (Figure 8.14) to include further success measures: penetration and impact on the sponsoring organisation (see Figure 8.15).

Table 8.15 - Adoption in larger context of COS success

Figure 8.14 → Early adoption of COS → COS penetration → Impact of COS on sponsoring organisation

This section discusses the link between COS adoption rates and the constructs 'COS penetration' and 'COS use'. Adoption rates do not necessarily correlate with adoption penetration several years after launch of the COS; penetration does not necessarily imply constant and full use of the COS by the customer. Each of these two issues is addressed in turn.

5.1 Linking adoption rate and COS penetration

Fast early adoption rates enable the sponsoring organisation to gain wide penetration of the COS in a smaller period of time than slow adoption rates. However, COS which are adopted slowly can still attain wide adoption, although this may take more time. Also, COS which are adopted slowly when first launched may be adopted more quickly as time passes: increased technological awareness, improved marketing effort and adaptation of COS prices can affect adoption rates over time. Therefore, slow early adoption does not necessarily indicate low penetration in the long run or low penetration after a set period of time.

The case sample contained 7 COS which had been available for more than 2 years, 4 of which had been launched more than 4 years ago. These 7 COS were categorised as having achieved 'high', 'moderate' or 'low' penetration according to the percentage of business moving through the system (75% or more was defined as 'high', 25% or less was defined as 'low' penetration). Combining this data with the data on adoption rates for the respective COS it was possible to draw up a Figure showing the relationship between adoption rate and penetration (Figure 8.16).

Figure 8.16 - Adoption rate and COS penetration

Adoption rate	Penetration: High	Moderate	Low
Fast	Baycorp ('88)		
Slow	CPL ('79)	ANZ ('89)	Bendon ('90) Mainfreight ('91) OTC ('87) Stevens ('91)

There was only one 'fast adoption' COS amongst the sub-sample of cases which had been available for more than 2 years and this COS (Baycorp's Baynet credit reporting system) also achieved high penetration. While a quarter of the current customers had adopted Baynet immediately when it was launched, now 75% of credit reporting business of Baycorp is conducted electronically through Baynet.

Three of the four 'slow adoption' and 'low penetration' COS were launched just 2 years ago. These relatively new systems may not have had sufficient time for the COS to recover from slow early adoption rates. The sponsoring organisations of all three COS (Bendon, Mainfreight and Stevens) are planning marketing efforts to enhance adoption and increase penetration of their respective systems. If measuring penetration of these systems two years from now, their penetration ranking may well have moved from the 'low' to the 'moderate' or the 'high' category.

One COS, launched 15 years ago with very slow early adoption rates, has achieved high penetration over time. At present more than 85% of orders received by CPL are transmitted electronically. It took several years for customers to feel comfortable with the technology but the initial slow adoption of PDEs did not inhibit widespread adoption over time.

This case evidence confirms that slow early adoption is not necessarily correlated with low penetration after 4 or more years.

5.2 Penetration and use

Adoption and penetration of a COS do not necessarily imply that the COS is actively being used by the customers. The services provided by each COS are also available in alternative forms: customers can use telephone, fax or mail or can visit the sponsoring organisations to obtain the same service. If customers are not satisfied with the COS they may revert back to their original means of obtaining the product or service from the sponsoring organisation.

In most cases customers, once having adopted a COS, actively use the COS. Customers adopt the COS because it fulfils a need and provides organisational benefits. In addition, customers may have had to spend a considerable amount of money to adopt the COS (eg Stevens' Shopmaster) or may be paying on-going charges to the customer organisation (eg ASB, ANZ, Stevens). For both these reasons customers are likely to use the system after adoption.

In one case a few customers, which had adopted the COS, stopped using the system and transferred back to obtaining the product or service in traditional form:

> "There were a couple of customers where we found after some time that they weren't bothering. We found that they had had a couple of connection problems or something and they never really let us know. Then they didn't bother and found it just as easy to phone up and place the order over the phone..." - Financial Controller, OTC

OTC had been aware of the fact that they did not have sufficient connection capacity, but had not made an increased number of incoming lines available for customer use. They now know that this has contributed to some customers having been turned away from the use of their Oscar order entry system.

The OTC example highlights the importance of on-going support for and maintenance of the COS: customers may cease COS use if the system is not adequately supported by the sponsoring organisation.

6 Adoption, penetration and organisational impact

This section looks beyond the adoption of COS and briefly discusses the link between COS penetration and organisational impact of the COS. In order to highlight the importance of COS adoption, the relationship between COS penetration and COS success is described. This section first categorises the cases according to the organisational impacts attributable to the COS; then the penetration-organisational impact relationship is presented; next, the costs associated with low penetration are described and, lastly, the tangible benefits associated with high penetration are outlined.

6.1 Categorising cases according to organisational impact of COS

The ultimate success of the COS to the sponsoring organisation was defined as organisational impact attributable to the COS (DeLone and McLean, 1992). The effect of the COS on the sponsoring firm was measured by quantitative and qualitative measures. Quantifiable benefits of system use include increases in sales, increases in market share (ability to attract new customers) and reductions in operational costs. Qualitative benefits include an enhanced image in the industry and increased customer satisfaction.

There were difficulties in identifying and quantifying the organisational impact attributable to the COS. None of the organisations had officially evaluated the effect of the COS on organisational performance measures. The benefits accorded to each system were based on informants' perception of the organisational impact of each system.

Figure 8.17 shows a site-ordered matrix indicating the relative success of each COS and the kinds of benefits the COS has brought to each sponsoring organisation. A (+) sign indicates a positive and a (-)-sign indicates a negative impact, while a blank space indicates that the particular benefit was considered insignificant or was absent or was not mentioned by the sponsoring organisation. By adding up the number of positive and negative impacts the cases can be ranked according to the organisational impact of the COS on the sponsoring organisation.

Success of the COS was considered 'high' if the sponsoring organisation could attribute tangible as well as intangible benefits to the COS; success of the COS was rated 'low' where only intangible or negative benefits were attributed to the COS.

Figure 8.17 - Site-ordered categorisation of cases (more than 2 years old) according to organisational impact of COS

	Intangible benefits		Tangible benefits			Impact on sponsor		
	Increased customer satisfaction	Image in industry	Lower operational costs	Sales up	Greater market share	Intangible	Tangible	Rating
Baycorp	+	+	+	+	+	++	+++	high
CPL	+	+	+	+	+	++	+++	high
Mainfreight	+	+				++		low
OTC	+	+				++		low
Stevens	+	+				++		low
ANZ	+					+		low
Bendon	+	+	-			++	-	v low

The Figure shows that two organisations (Baycorp and CPL) attribute definite benefits to their COS, while the other organisations have not (yet) been able to show significant returns.

6.2 The relationship between penetration and organisational impact

The matrix in Figure 8.18 depicts the relationship between COS penetration and COS success (as measured in terms of organisational impact on the sponsoring organisation).

Figure 8.18 - Penetration and organisational impact

		Organisational impact	
		High	Low
	High	Baycorp CPL	
Penetration	Moderate		ANZ
	Low		Bendon Mainfreight OTC Stevens

According to this case evidence there is a high correlation between COS penetration and the impact of COS on the sponsoring organisation: high penetration corresponds with higher levels of benefits to the sponsoring organisation; low penetration is associated with fewer benefits. Reich and Benbasat (1990) found the same relationship in their case sample when testing for factors associated with the ability to gain a competitive advantage with the COS.

6.3 Costs associated with low penetration

Low penetration is associated with few benefits and is likely to present a cost to the sponsoring organisation. With low COS penetration the sponsoring organisation is offering a new service, which requires support and maintenance, but is not able to offset the cost of the new service against savings in the operation of the traditional service. Hence, low penetration involves the sponsoring organisation in higher costs.

The Bendon case is a good example of an organisation "stuck" in the 'low penetration' and 'no tangible benefits' mould. Bendon acquired the software and modified its mainframe environment for EDI trading and has entered into EDI trading relationships with 2 customers. The two are major customers but the proportion of Bendon's trade moving through the EDI system is relatively small. The benefits of the EDI system to Bendon are largely intangible. Trading through EDI has improved service to those customers and has improved the trading partner relationship - a Bendon claim which was confirmed by the Business Systems Analyst at K-mart, one of the two customers. There are therefore positive, though largely intangible benefits associated with the system. However, the system needs maintaining and constant monitoring which is an on-going cost of EDI trading. With only two customers entering orders through EDI Bendon has not made any cost savings in terms of traditional means of ordering: through sales representative or telephone clerks.

Maintenance and monitoring of the EDI system has meant that procedures are required which were not required before. For example, orders that come in through EDI are monitored by the systems department for any errors before being passed on to the marketing department for actioning. In addition, it is vitally important that the EDI customers are continually kept up-to-date with changes in product offerings and changes in prices. New manual procedures have been put in place in order to ensure the customers are informed of bar-code changes: of modifications, additions or deletions. A computerised product catalogue linked to the EDI system would enable Bendon to automatically update products and prices. However, the cost of setting up the product catalogue is only warranted if there are more than just two EDI trading partners.

The EDI partnerships of Bendon on the one hand provide some (intangible) benefits and, on the other hand, involve the sponsoring organisation in extra work and present a tangible cost in terms of time and money. With more EDI partners and higher penetration the overhead associated with supporting and maintaining the system is spread over more users and can then more easily be outweighed by increased benefits.

6.4 Penetration and tangible benefits

Both high penetration cases in the case sample (Baycorp and CPL) also were able to reap significant benefits in terms of increased market share, increased sales and lower operational costs. It appears therefore that high penetration corresponds with the sponsoring organisations being able to reap high, tangible benefits from the COS.

CPL was able to gain market share and increase sales after launching their COS because within 2 years the competitors who did not follow and copied their lead went out of business. In Baycorp's case customers realised the potential of the system once they started using it and this caused many customers to do more and more detailed searches. In this way sales of credit reporting information increased. In terms of operational costs, both CPL and Baycorp have been able to lower costs in providing their services. At Baycorp, for example, returns per staff member in the Baynet section of the company is double that of the section of the company which deals with telephone enquiries for credit reporting. Both CPL and Baycorp attribute clear tangible benefits to their COS.

The association between high penetration and tangible benefits appears to be necessary but is not sufficient to achieve significant competitive benefits. When competitors in the industry catch up and the main players all offer the same type of COS, then the COS becomes a strategic necessity and no longer conveys a major competitive advantage to any one of the players.

The case sample included two cash management systems, one offered by an early mover (ANZ's ANZCash, launched in 1989) and the other by a clear follower (ASB's Gateway, launched in 1992). The ANZ has not been able to gain a competitive edge based on their cash management system; the ASB does not envisage significant and tangible competitive benefits to flow from their system. Each of the banks feel that they *have to* offer a cash management system as part of their electronic business services. Customers have begun to expect these facilities from their banks; without it banks are not offering a full service to their clients: cash management systems have become a strategic necessity in the industry. Both banks look towards high penetration as a means to make the provision of the service as cost-efficient as possible and to increase their image in the industry and raise customer satisfaction; tangible benefits in the form of increased sales and increased market share based on their cash management COS are elusive.

7 Summarising Research Question Three

This chapter has investigated the relationship between customer participation and COS adoption. It was found that there is no clear, direct relationship between the two constructs. Case evidence showed a correlation between an absence of customer participation and low adoption, but the opposite relationship (high participation and high adoption rates) was not supported.

Evidence concerning other adoption factors showed a high correlation between the extent of marketing effort and adoption and between technological awareness of the customer and adoption. Case findings indicate that high costs to the customer have a inhibiting effect on adoption. The interrelationships between adoption factors was explored and a model was generated to explain the relationships and their link with adoption of COS. The model is presented in Figure 8.14; after testing the model it was found that it accurately reflects the adoption process for each COS and could also predict the adoption outcome for each COS in the case sample for this study.

Next, a link was made between adoption, penetration and the sponsoring organisations' ability to reap benefits from the COS. It was found that high adoption rates are not necessarily required in order to achieve high penetration over time. However, high penetration appears to be a pre-requisite for the sponsoring organisation to reap significant benefits from the COS.

The discussion in this chapter concludes the analysis of the cases and completes investigation of the three research questions. Conclusion and recommendations resulting from this study are presented in the next chapter.

CHAPTER NINE - Summary, conclusions and recommendations

This chapter concludes the dissertation. First, the findings of the study are briefly summarised to show that the separate components of the research problem posed for this thesis were all addressed and that the research questions were answered. Next, the findings are discussed in terms of, firstly, their contribution to the academic discipline of MIS and, secondly, the implications for IS practice. Lastly, recommendations for further research are outlined.

1 Summarising the findings

This study focused on the finding reported by two empirical studies (Reich and Benbasat, 1990; Runge, 1985) that the participation of customers during design of interorganisational systems enhances subsequent adoption of those systems by customers. In each of the two previous studies this finding was one of many; in each case the association between customer participation and adoption was noted but was not discussed. Previous research has not specifically focused on the association.

Using a multiple case research approach this study investigated the relationship between customer participation in Customer Oriented System (COS) design and subsequent adoption of the system. In particular the study looked at factors impacting on the incidence and form of customer participation; the study also looked at participation as one of several factors known to affect the adoption of COS by customers. This study's findings relating to the two separate constructs 'customer participation' and 'adoption of COS', as well as the participation-adoption relationship are briefly outlined.

1.1 Customer participation in development of COS

Case evidence has shown that organisations contemplating or planning the development of a system linking their organisation with customers do not explicitly consider whether or not to involve customers during the development process. Some organisations, seemingly naturally, involve customers very early during system development. Other organisations do not consider customer participation and do not involve customers during development.

1.1.1 Incidence of customer participation

The sample of 9 New Zealand cases of systems linking organisations with their customers contained 4 cases where customers had participated during system development. Two of these 4 cases concerned systems where customers had been actively involved during design of the system; the two other cases were systems where customers had been involved in the initial definition of the project. In all cases customers were involved in testing of the completed system. Also, in all cases customers participated in *on-going* development.

1.1.2 Factors associated with customer participation

This study investigated whether factors, previously identified as associated with user participation, were associated with the participation of customers during the development of interorganisational systems. The user participation literature suggests that there are a number of factors which encourage or facilitate participation while others discourage or inhibit user participation during system development. Empirical studies have indicated strong associations between several variables and the incidence of user participation in internal system development. However, this study found little support for the variables as predictors of customer participation in COS development.

Since the tested variables did not explain the occurrence of customer participation the case data was used to try and find conditions that *did* distinguish between cases where customers participated and cases where customers did not participate during development. It was found that a major distinguishing feature was the extent of external pressure to develop the system. In the cases where the sponsoring organisation was under external pressure from competitors or customers to develop a system, customers were involved during development; cases which lacked obvious external pressure and which developed the system in response to a purely internal initiative did *not* involve customers during development.

A second factor which distinguished between cases of systems developed *with* and cases of systems developed *without* customer participation was the general attitude towards customer participation. All organisations were aware of the difficulties associated with customer participation, but the organisations differed in their attitude towards the problems. The non-participation group of cases was not willing to consider customer participation; the group of cases where customers *were* involved, were willing to accept the difficulties: for them, the benefits from customer participation outweighed the problems surrounding participation. The organisations that had involved customers felt that such participation had been essential to and had added considerable value to the development process.

1.1.3 Form of customer participation

Customer participation was described according to the activities that customers were involved in during development, according to the extent to which customers were involved in development (type of participation), according to the influence that customers had over system development (degree of participation) and according to aspects of system development that customers were involved in (content of participation).

In each participation case, representatives of customers were involved during development. It was found that the organisations which sought participation took customer input seriously and acted upon customer advice. In each case customers were involved only in the technical aspects of system development, not in the social aspects which would include consideration of the impact of the system on the adopting organisation.

In on-going development, customers participate in development in an advisory capacity only. The sponsoring organisations prioritise customer requests for changes and additions to system functionality, but do not actively involve customers in design.

1.2 Adoption of COS

Previous research found evidence of several factors which affect the adoption of COS by customers. This study investigated these factors and their interrelationship.

Case evidence identified an adoption factor not previously cited in the literature: technological awareness of the customer base. All informants commented on the inhibiting influence of a lack of technological awareness on the part of the customer on the rate of adoption of the COS. In nearly all cases such a lack of awareness had been found to inhibit adoption.

It was found that the various adoption factors are not necessarily directly linked to adoption of COS. Evidence derived from interviews with informants and evidence obtained by contacting some customers of some organisations indicates that the main factor influencing adoption is customer need for the system. High cost of the COS to the customer intervenes in the need-adoption relationship and inhibits adoption. Customer participation enhances the system's ability to fulfil customer needs by ensuring that customer general and/or specific requirements are met. Superior marketing of the COS has a positive effect on the customers' awareness of their need and thus encourages adoption.

The study showed a clear link between adoption rate, penetration and the ability of the sponsoring organisation to reap benefits from the COS. High adoption rates correlate with faster and greater penetration; high penetration is associated with greater benefits. The benefits from COS adoption for the sponsoring organisation are mostly intangible and include an improved image in the industry and greater customer satisfaction. Tangible benefits are only obtained by those cases where penetration is wide-spread. Low penetration is associated with tangible costs since the support and maintenance of the COS in cases of low penetration can not be off-set against clear, tangible benefits derived from the COS.

1.3 The participation-adoption relationship

A major research issue in this study was the participation-adoption relationship. Previous studies on interorganisational systems have found positive associations between customer participation and adoption, though user participation studies have reported mixed results when investigating the participation-success relationship.

This research has found inconclusive evidence concerning the relationship between customer participation and subsequent adoption of the system. Half of the cases of systems which were developed with customer participation were adopted rapidly, while the other half were adopted slowly. Of the systems that were developed without participation the majority (4 out of the 5) were adopted slowly. The finding concerning the systems developed *without* participation corresponds to the findings of previous studies on customer participation in the development of COS (ie absence of participation tends to be associated with slow adoption). The finding concerning the systems developed *with* participation does *not* support the findings of previous IOS literature (which claims a positive relationship between participation and adoption), though does correspond to findings in the user participation literature (which returns mixed results).

The model explaining the relationships among adoption factors and the relationships between adoptions factors and adoption itself (Figure 8.14, p174) hypothesises that the participation-adoption relationship is not a direct one. Customer participation enhances the potential of the COS to fulfil customer needs/requirements and as such impacts on customer need and not on adoption directly. Because of the indirect link between customer participation and adoption, participation as such does not necessarily lead to high adoption rates and, conversely, an absence of participation does not necessarily correspond with slow adoption.

2 Contribution of the findings to academic debate

The previous section has shown that the 3 specific research question of this thesis were all addressed and that findings can be reported for each. Now, it is important to point out to what extent these findings affect existing theory. By demonstrating the significance of the study in relation to previously existing research, the contribution of this thesis to the MIS discipline can be assessed.

This study and its findings contribute to research on user participation and to discussion on interorganisational systems.

2.1 'User participation' debate

The existing literature on user participation is substantial. Judging from the number of published studies, interest was high in the late 1970s and early 1980s, while interest in the user participation debate appears to have waned since the late 1980s. User participation literature investigates factors associated with participation in development and studies the participation-success relationship.

The study of the participation of intended users in the development of systems and the effect of this on subsequent success of the system is not novel. However, the contribution of this particular research project to the user participation debate is two-fold. Firstly, the study looked at contingencies for user participation in the setting of one type of system and as such responds to calls for such research by previous researchers. Secondly, the study focuses on participation in the development of interorganisational systems where intended users are outside the sponsoring organisation and as such this research adds a new dimension to the user participation debate.

2.1.1 Focus on one type of system

During the 1970s it was considered axiomatic by the research community that participation during development led to better quality systems and increased acceptability of systems and that therefore participation enhanced system success. However, empirical research has reported positive, negative and inconclusive findings when investigating the participation-success relationship. The inconsistency of these findings has concerned researchers and possible reasons for inconsistencies have been put forward. There is some question concerning the validity of some findings, but most of the reasons put forward as potential explanations for inconsistent findings are related to lack of comparability of individual study findings.

Since it is likely that different environments create different contexts for participation, various researchers have called for studies of user participation in the development of particular types of systems and in a variety of environments (Doll and Torkzadeh, 1989; Franz and Robey, 1986; King and Lee, 1991; Ives and Olson, 1984). By building up a cumulative research effort for various types of systems or various environments, prescriptive models of participation and its effect on adoption may be generated. Different models may have to be developed for different contexts.

Some research has concentrated on decision support systems (Alter, 1978; Anderson, 1985; Alavi and Henderson, 1981; Mann and Watson, 1984)); other studies focused on end user computing (Doll and Torkzadeh, 1989; King and Lee, 1991). This research has focused on a further type of system: interorganisational systems. Contingencies for participation were tested and the participation-success relationship was investigated in this particular context. No previous studies on user participation have considered this particular type of system. By adding an investigation into a further type of system this research adds to the existing body of knowledge on user participation.

In terms of specific findings this research has found little or no support for the user participation contingencies which were identified in previous empirical studies. After in-depth investigation of each of the factors in the interorganisational context the study suggested that existing contingency factors may not be applicable to the interorganisational system environment. As for the participation-success relationship, the study returned inconclusive findings.

2.1.2 Focus on users outside the organisation

User participation literature to date has concerned itself exclusively with the participation of users in the development of *internal* systems and with users *inside* the sponsoring organisation. User participation studies focusing on internal systems exclusively were entirely appropriate in the 1960s and 1970s, but since the early 1980s information systems are not just internal to the organisation. Increasingly, organisations are developing and using information systems that link themselves to other organisations.

This study investigated the participation of intended users in the development of *interorganisational* systems and with users which are by definition *outside* the sponsoring organisation. To date the user participation literature has not addressed participation in the context of interorganisational systems. This study therefore extends the user participation debate beyond discussion of user participation in the context of internal systems and as such adds a new dimension to the user participation debate.

Contingencies for participation in the development of interorganisational systems are different from those in internal system development. Case evidence showed that participation of users outside the organisation (in this case, customers) was not automatic. Organisations do not explicitly consider the involvement of customers, though some organisations do use customer input during development while others do not. Customer participation appears linked to the extent to which the COS is developed for strongly externally-oriented, strategic purposes. According to the study findings, the interorganisational context has a stronger impact on the participation decision than traditional user participation contingencies.

Extending the user participation debate to participation in the development of interorganisational systems also means that the participation-success link has to be seen in a new light. Since the potential users are outside the organisation, users can not be coerced into adopting and using the system. The system has to be carefully marketed so that customers are convinced of the benefits of system use and thus decide to adopt the system. Success of the COS depends on its adoption by customers and adoption is not solely or directly influenced by participation.

2.2 Research relating to the 'Success of IOS'

The success of COS as a particular type of IOS has been investigated before and customer participation has previously been identified as a factor impacting on COS adoption. However, no research has yet been published which *focuses* on customer participation as a factor impacting on successful adoption of COS. The present study contributes to research on interorganisational systems in two ways. Firstly, this study investigated the customer participation construct in detail while previous research merely noted the existence of a participation-adoption link. Secondly, this study examined the relative importance of participation as one of various adoption factors while previous studies noted the existence of factors without assessing their interrelationship.

2.2.1 Focus on customer participation variable

Customer participation is a variable which can be controlled by sponsoring organisation. Organisations may be interested in involving customers during design if it can be shown that participation is indeed a crucial variable in encouraging adoption.

Existing research suggests that customer participation is not a feature of all COS development projects: customers participate in the minority of cases only (Reich and Benbasat, 1990; Runge, 1985). However, no explanation is given about the reasons for participation or the contingencies which are associated with participation of customers during development. Since participation may be more appropriate in some conditions and may be irrelevant in others it is important to investigate contingencies.

Previous empirical research on successful COS adoption identified customer participation during system design as one of the adoption factors. However, the customer participation construct is not defined or described in any detail. User participation literature suggests that participation is not a straightforward concept; different types, degrees, content of participation can be identified. There was a need to investigate customer participation in some detail in order to build up information on the construct.

This study investigated contingencies for customer participation and found participation to be associated with external pressure on the sponsoring organisation to develop a COS. The type and degree of participation were related to the level of participation in terms of activities. The more deeply customers were involved the more responsibility was given to them, indicating that the sponsoring organisations took participation seriously.

2.2.2 Focus on interrelationships among COS adoption variables

Previous studies mentioning customer participation note the impact of several factors on the adoption of COS by customers (Reich and Benbasat, 1990; Runge, 1985). Neither of the two studies mentions interrelationships between the factors or relative importance of the factors in affecting adoption.

This thesis moved the knowledge on COS adoption factors *beyond* mere association and has attempted to explain relationships between variables and to model the relationships. Once it is understood how the COS adoption factors are related and how they affect each other, their relative importance in encouraging or inhibiting adoption becomes clear. This study is the first attempt at generating a predictive model of COS adoption.

It was found that customer participation is not directly related to COS adoption, but affects adoption indirectly by impacting on 'customer need for the system'. Since several other factors impact on customer need, customer participation is not automatically associated with fast adoption.

3 Implications of findings for practitioners

The value of applied research can also be evaluated according to the practical outcome of the study (Keen, 1987; Orlikowski and Baroudi, 1991). Having investigated the link between customer participation and COS adoption and having generated a preliminary model explaining interrelationships between the various adoption factors, this study has generated findings which are potentially useful to practitioners. An understanding of the factors impacting on COS adoption, their interrelationships and relative importance, helps practitioners when planning the development and subsequent launch of the COS. Confirming the importance of adoption in the quest for success from the COS, this study highlights the necessity to encourage and facilitate adoption as much as possible.

3.1 Factors impacting on COS adoption

In order to be able to enhance adoption organisations must be aware of and understand the interrelationship and relative importance of factors that encourage or inhibit adoption of COS by customers. This study identified 5 main adoption factors; two of these are customer-related and three can be controlled by the sponsoring organisation.

3.1.1 Customer-related factors

Certain factors affecting adoption concern attitudes and perceptions of the customer. Once aware of the relative importance of these factors, the sponsoring organisation can try to influence them by specific actions and strategies.

<u>Customer need for the system</u>. This is the major adoption factor: without the customer being aware of a need for the COS or understanding the benefits the COS can bring to their operation, customers will not adopt the COS.

The 'need' and the potential benefits may not be apparent to the customers for two reasons. Firstly, customers may be used to a traditional way of doing business and of obtaining products and services. Secondly, customers may not understand the technology and its potential impact on their business. A sponsoring organisation wishing to enhance COS adoption must induce the 'need' for the system by making customers aware of their, perhaps latent, needs and by showing that the COS fulfils these needs.

<u>Technological awareness of customer</u>. A lack of technological awareness among

potential adopters of the COS discourages adoption. All cases reported that technological awareness among customers had inhibited adoption.

A lack of understanding may make the customer unable to see the benefits that adoption of the technology could bring to the business. A lack of technological awareness can also make individual customers afraid of the change that introduction of the technology would bring to their business or their department. In either case, the customer does not feel a need for the COS and thus will not adopt the system. In order to enhance adoption, the sponsoring organisation must be aware of the lack of technological awareness amongst customers and must be prepared to educate customers.

3.1.2 Factors controlled by the sponsoring organisation

Some adoption factors are directly controlled by the sponsoring organisation. When alert to the impact of these factors on adoption, organisations can adjust their actions and policies in order to ensure that these factors encourage and enhance adoption.

<u>Cost to the customer</u>. Cost can have a significant negative impact on adoption. According to case evidence none of the high cost systems were adopted quickly; adoption of the low cost systems was either fast or slow.

A high cost can stop a customer from adopting a COS *even if* the customer is aware of the need for the system and understands the benefits of adopting the system. In order to lower costs to the customer organisations may adopt one of several strategies: customers can be given free access to the COS; charges for the COS may be kept at a nominal level; discounts and incentives may be offered for COS adoption and use. The sponsoring organisation must be aware of the inhibiting effect of COS costs on adoption and must consider ways of minimising the costs to the customer.

<u>Marketing of the system</u>. Marketing of the COS has a significant influence on subsequent adoption. Case evidence showed that all cases with a superior marketing effort also enjoyed fast COS adoption, while the cases with poor marketing efforts were associated with slow adoption.

The marketing effort can address technological awareness of the customer, customer need for the system and, to a lesser extent, perceived cost of the system. Marketing is therefore a powerful tool to help achieve COS adoption. The marketing effort is completely under control of the sponsoring organisation: the direction and the extent of the marketing effort are both decided by the organisation offering the COS to the market. A superior marketing effort is characterised by plenty of resources, good targeting and well-trained representatives and pays off in terms of faster adoption rates and greater penetration.

Customer participation during development. Customer participation during the early stages of COS development enhances the potential of the system to accurately reflect customer requirements. When the COS fulfils customer needs and fits into the customers' business operations easily, the COS is more likely to be adopted.

Customer participation does not necessarily guarantee fast adoption: half of the customer participation cases in this study enjoyed fast adoption while the other half of the systems developed with customer input was developed slowly. Customer participation as an adoption factor may not be as important as some of the other factors.

3.2 Importance of adoption of COS

Ultimate success of the COS, in terms of positive organisational impact for the sponsoring organisations, depends on adoption of the COS by customers. The only cases showing significant benefits from the COS were the cases where the COS had achieved high penetration. Fast adoption enables an organisation to achieve a high penetration of the COS relatively quickly. Slow adoption may also lead to high penetration though it will take longer to achieve penetration targets.

When the COS is adopted and a satisfactory penetration is achieved, then the sponsoring organisation can reap tangible and perhaps competitive benefits from the COS. Without adoption and penetration the COS may provide some intangible benefits, but may cost the organisation money in real terms because of the on-going support and maintenance that a COS requires.

4 Opportunities for further research

Ideas for further research are based on two separate dimensions of the present research study. Firstly, any piece of research has limitations; recommendations for further research therefore include suggestions on ways in which to improve the validity and generalisability of the study itself. Secondly, the findings of a piece of research indicate ways of carrying forward the research beyond the boundaries of the study at hand; recommendations for further research thus can suggest closer investigation of those findings.

4.1 Research to improve the present study

One of the aims of this study was to investigate customer participation contingencies in the COS environment. Very little support was found for established user participation research findings. Since this was a somewhat surprising finding, further research could replicate the study to test the contingencies on other cases.

Qualitative data had to be interpreted by the researcher. At all times care was taken to rate and classify cases according to defined measures. However, reliability of ratings and categorisation can be improved by having the data interpreted by other researchers.

Many of the variables used in this study have not been clearly operationalised in previous studies. This study measured variables in multiple ways and various aspects of each variable were measured. Further research could re-examine the operationalisation of variables and, where possible, improve and refine measurements.

The study might also be improved by investigating COS in one particular industry, rather than studying firms from several industries. Since technological awareness of customers differs across industries and perceived costs to the customer vary according to the kind of customer and type of industry, there are good reasons for focusing on any one industry at a time.

Research could also focus on COS based on a single technology (eg EDI) to see if there are different participation patterns for different COS technologies. Mainframe-to-mainframe EDI is almost by definition a technology that requires participation among participants during development: one organisation is the instigator and the other the adopter of the technology but both organisations must agree on standards and file-formats and must adapt their mainframe environments accordingly before any electronic transmission of documents takes place. Other COS, which enable customers to access the sponsoring organisations' mainframe but do not require adaptation of the customers' computerised set-up, does not necessarily require customer participation. Further research might investigate whether participation varies according to the specific COS technology.

One possible limitation of this study was its regional bias: the cases were all COS in New Zealand. In some ways this was a strength as the economic, political and cultural environment was the same for all cases in the study and this enhances the validity of cross case analysis findings *for New Zealand COS*. However, one can not be sure that the finding are valid in other cultural environments as well. For instance, this study found that technological awareness of customers played an important factor impacting on COS adoption. This finding may be culturally based and is not necessarily applicable to other countries. Customers in Europe and North America are likely to be more technologically adept than the general customer base in New Zealand (though even within New Zealand itself changes and improvements in the technological awareness of customers are evident). In order to test for regional bias it is recommended to replicate the study in another country and compare the results with those of the present study.

4.2 Research directions suggested by this study's findings

This research has generated a model explaining the interrelationships among COS adoption factors. The model needs to be tested and this may be achieved by a case research method, using a different case sample, or by survey research using statistical testing.

The adoption variable 'technological awareness of customers' could form the basis of further study. Cross-cultural studies can compare the technological awareness of a country's population and investigate the contingencies that enhance this awareness. Studies can compare differences in awareness among various industries or among various functions even in one firm. Studies can monitor changes in technological awareness over time or as the result of the introduction of a technological innovation into the workplace.

Marketing of the COS was shown to be an important variable affecting adoption by customers. Various sponsoring organisations took different approaches to marketing of their system with varying levels of success. Further research could investigate the importance of the marketing function in launching and promoting the COS. One related issue is the question of who is the best type of person to be in charge of the marketing of a COS: a manager with a marketing or with an IS background.

On-going support of the COS is another issue that could be addressed in further research. Several of the case organisations were unsure as to their role in supporting and maintaining the COS: their core business is not IT provision and yet, by offering a COS, organisations have to take on an IT support role. Outsourcing could be one avenue for organisations to explore.

5 Conclusion

The impetus for this study came from one finding in the work of Runge (1985) and Reich and Benbasat (1990): they reported that customer participation enhances COS adoption, but found that customer participation only occurs in a minority of cases. This study was undertaken to investigate customer participation in detail.

The findings of the present research provide partial support for the relationships reported by Reich and Benbasat (1990). Case evidence shows that participation in design of the COS does indeed occur in a minority of cases only; absence of participation is associated with slow adoption; the input of customers during COS design, however, is not necessarily correlated with fast adoption.

This study also investigated other COS adoption factors and their interrelationships. It was found that marketing of the COS is a particularly important factor impacting on subsequent adoption. The model predicting COS adoption is another interesting finding warranting further investigation. Such work would contribute to academic research and could also aid IS in practice.

APPENDIX 1 - INTERVIEW GUIDE

I Demographic data

1 How many people does the company employ?

2 What are total annual revenues?

3 What market (niche) does the company operate in?

4 What are the sources of competitive advantage in the industry?
- cost
- differentiated product
- niche

II System description

5 What is the common name or acronym for the system?

6 Could you briefly describe the system.

7 What is/has been your involvement with the system?

8 Since when have you been involved with the system?

9 When was it first implemented with customers?

10 Has the system gone through changes since its first implementation?

11 What has been the schedule and content of major releases it has had? (Could you describe the the major changes?

12 Is it still considered to be "under development"?

13 What customers was the system designed to support
- the whole customer base
- part of the customer base

14 Considering that customer market, how would you describe the current state of this market's growth?
- the total market
- your share of the market

15 How does the customer use the system in connection with the product?
- to obtain information about the product
- to specify attributes of the product
- to choose a supplier
- to order a product
- to authorise and pay for the product
- to acquire the product
- to test and accept the product
- to add product to existing inventory
- to monitor access to and use of the product
- to upgrade the product if conditions change
- to maintain the product
- to transfer or dispose of the product
- to monitor how much is spent on the product

16 Does the system offer the customer non-product capabilities?

17 If YES - Could you describe these
- WP
- inventory control
- accounting
- messaging
- sales history/forecasting

18 Were these offerings -
- offered before product-related parts
- offered as part of the original system
- envisioned but not yet offered with the original system
- identified and developed after installation in customer sites

19 What is the future direction of the system?

20 What other IS currently link your organisation with customers?

III System inception (Research Question One)

21 How did the idea for the system arise?

22 Was the system developed in the light of what competitors were already doing or were intending to do?

23 Was the system copied from one in another market or industry?

24 Was the system developed to accommodate customer requests for better product/service?

25 Was any market research carried out prior to developing the system?

26 Was there, in your opinion, any risk involved in developing this system?

27 If YES - What kind of risks?

28 What was the level of risk?
- extreme
- high
- moderate
- low
- none

29 Did a particular individual (or several individuals) play a critical role in the inception or development of the system?

30 If YES - Who was this individual

31 In what ways was his/her involvement with the system critical?

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

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

34 If YES - In what ways was it unique?

35 How long did it take to develop the system (from initial definition to implementation) compared to other systems in the organisation?
- long
- average
- short

36 In terms of development costs how does this system compare to others in the organisation?
- high
- average
- low

37 Was top management involved with the project?

38 How was management involved?
- initiated project
- encouraged project (finance, manpower)
- part of project team

39 How much was management involved with this system compared to other systems in the organisation?

- a lot
- average
- little

40 Was this system an internal system before extending it to customers?

41 Did the organisation have experience with this type of system?

42 Did any of the development staff have experience with this kind of system?

43 How large is the system compared to others in the organisation?

- large
- average
- small

44 Did you think the system would change customer operations?

45 How much change did you expect the system would bring to customers?

- none
- little
- average
- much

46 Were potential customers involved in development at any stage?

IV Customer participation process (Research Question Two)

47 Was the system already written in part or totally before the decision was made to involve customers?

48 How did you go about obtaining customer involvement?

49 If YES - Could you describe the nature of this involvement. How were customers involved?

50 Were customer involved in (tick any)

- initial problem definition
- system analysis and logical design
- actual system building and programming (eg prototyping)
- installation/implementation (pilot-testing, design of documentation, etc)

51 To what extent did customers take part in development (tick one)?

- all targeted customers took part in development
- some representatives of customers took part in development

52 How did customers take part in development (tick any)?
- customers views were solicited and taken into account
- customers views were solicited by questionnaire/interview
- customers had "sign-off" responsibility at various stages in the project
- some customers acted as intermediaries between the design team and customers
- customers were part of the design team
- customers were fully responsible for development

53 Did users participate in discussion on the effect of the system on customers
- in terms of changes in job design
- in terms of changes in customer organisations

54 In your opinion, what was the value in having customers participate in development?

55 Were there any drawbacks associated with customer participation?

V System implementation and success

56 How did you go about implementing the system with your customers?
- pilot program
- training
- on-site support

57 How much attention was given to publicity, advertising, promotion of the system?
- none
- a little
- a lot

58 What types of publicity (etc) were used?
- personal visits
- letters
- demonstrations

59 Did you charge customers for the system?

60 If YES - Did the charge cover costs of the system?
- nominal costs
- customer hardware costs
- development costs
- ongoing support costs
- all costs

61 At what rate has the system been accepted by your customers?
- not at all
- slowly
- moderately
- rapidly

62 Can you quantify this rate? ----> 66

63 (IF CUSTOMER PARTICIATION) Can you indicate what proportion of the adopters were also participants in the development process?

64 And, how many of those who participated in the development process later adopted the system?

65 How quickly did the participants adopt the system:
- faster (earlier) than non-participants
- at the same rate as non-participants
- slower (later) than non-participants

66 How many or what proportion of your customers now use the system?

67 What proportion of your volume of trade takes place using the system?

68 Are system results different from expected?
- yes, pleasantly surprised
- yes, unpleasantly surprise
- no, we predicted well
- no, we did not predict at all

69 What benefits, measurable of otherwise, have resulted from the system?

70 Did these benefits last for -
- up to 6 months
- 6 months to 2 years
- more than 2 years

71 What has been the impact of the system on your organisation's ability to (quantify if poss)
- hold market share
- increase market share
- decrease costs
- increase sales from existing customers
- capture new customers
- increase customer satisfaction
- stay competitive

72 Did these impacts last for -
- up to 6 months
- between 6 months and 2 years
- more than 2 years

73 What customer set did you target for this system?

74 What percentage of targeted customers use the system?

75 Are you trying to achieve higher levels of penetration?

76 Do YOU consider the system to be successful?

77 In hindsight, would you do it again?

78 Would you do it differently?

VI Summary

79 In what ways have competitors reacted to the system?
- don't know
- ignored
- getting ready to retaliate
- copied
- copied and enhanced
- retaliated in different ways
- other

80 What do you feel are the most important factors that have contributed or that now contribute to the success of the system?

81 What do you feel are the factors that hold your company back from achieving more success with the system?

APPENDIX 2 - WITHIN CASE ANALYSIS: COMMUNITY PHARMACY LTD (PILOT CASE)

Community Pharmacy Limited is a pharmaceutical wholesaler supplying its own cooperative members and other pharmacists throughout New Zealand with prescription drugs and over-the-counter products.

Community Pharmacy Limited (CPL) was the first New Zealand pharmaceutical wholesaler to computerise internal order entry and processing operations. In October 1977 CPL introduced a screen-based, on-line order entry system for internal use. Automating the ordering process from initial order entry to invoicing greatly improved efficiency of internal operations. This internal system was extended into customer premises through the introduction in 1979 of Portable Data Entry units (PDEs) for order entry. PDEs require the pharmacist to enter and store data which can then be transmitted electronically over the phone. The pharmacist thus no longer had to call the wholesaler to enter an order, but could order automatically whenever required. In 1981 CPL developed a dispensary computer and in 1992 the Magnate retail management system was launched. Instead of manually passing orders to CPL, pharmacists now enter orders electronically into CPL's warehouse system. Electronic order entry accounts for up to 87% of all trade at CPL.

1 Data sources

Interview and documentary evidence provided the sources of information for this case. Face-to-face interviews were held with the Managing Director, the Data Processing Manager and the General Manager in charge of Apothecary Computers Ltd. Short telephone interviews were conducted with 10 customers. Documentary evidence included Annual Reports and promotional material for the company, on the dispensary system and on the Magnate Retail Management System.

2 Research Question One - Factors affecting customer participation during development

The three groups of factors, identified in the literature, are discussed in turn and the expected effect on customer participation is shown.

Organisational factors. There was no pressure on development time. The use of PDEs was an industry-first; competitors were not developing similar capabilities. Development costs were low. High financial risks had been taken with the development of the internal order processing system, but the offering of PDEs to customers did not require great financial lay-outs. Top management was highly committed to the project. The Managing Director had seen similar system being used in the US and enthusiastically promoted the idea for his own New Zealand company.

Project related variables. There were no communication standards for pharmacy to wholesaler transmission. Enabling pharmacists to electronically transmit orders to CPL was in essence a structured, operational level task. However, because the concept was new to the industry in New Zealand, it was a complex project. Default formats and standards had to be newly created. It is interesting to note that the initial formats and standards created by CPL at that time are still being followed by the industry today.

Customers knew of the developments but were unable to grasp the extent of the eventual impact of the system on their way of doing business. Most pharmacists are around 40 years old and in the late 1970s were not likely to be technologically aware. Introduction of electronic ordering, first by PDE and then by dispensary computer, required a very big change for the pharmacist: ordering had to take place in a structured format and orders could be placed at any time of day for 7 days a week.

CPL's initiatives were complex; it was recognised that great change was required from the pharmacist (the customer); there was little concern for confidentiality; the idea for the PDE project came from CPL and was not customer initiated.

Customer-related factors. CPL is a cooperative; its customers are also its members. This suggests that customers should certainly be willing to participate in development projects if asked: a development project of the organisation is also a development project of the customers.

Customer ability to participate is however questionable: owner operated pharmacies require a lot of time from the pharmacist and he/she is not likely to be able to spend much time away from the business.

Table A2.1 summarises the likely effect of organisational, project-related and

Table A2.1 - Factors impacting on customer participation decision

Construct	Measurement	Value (rating and quote)	Expected effect on UP
Organisational factors	Development time	Long (7 months)	+
	Financial resources	Low "We got the customers to pay for it"	-
	Top management commitment	High "Ian contributed the authority and the decision... He was there to actually push things through... He always was highly involved... It wouldn't have happened without him"	+
Project-related factors	Structuredness of task	High "I had worked on major interactive computer systems. I also had experience of retail systems" "everyone knows what retail systems are like"	–
	Complexity of project	High "there was no coding system for products... there were no standards" "there was nothing close to it in size" "we made a giant leap in technology"	+
	Expected change	Great "suddenly there was a big requirement for change"	+
	Confidentiality	Low "[the customers] knew what we were doing"	+
	Initiator	Non-customer "the idea cam from the MD" "I saw what was happening in wholesaling in the US"	+
Customer related factors	Willingness to participate	High CPL is a cooperative; members are likely to be willing to participate in developments which will benefit them	+
	Ability to participate	Low "all pharmacies are independently owned"	–

customer-related factors on the decision whether or not to involve customers in the development process. The chart shows the values of the factors hypothesised to affect the customer participation decision and the expected effect of these values on customer participation.

3 Research Questions Two - Describing customer participation during development

In the CPL case customer opinions or views were not sought prior to development. No market research was carried out. Customers were also not involved during development. However, at CPL a hybrid form of customer participation is evident. The Managing Director of CPL and several members of the Board of Directors were pharmacists and owned pharmacies. Thus CPL were well aware of the needs and requirements of pharmacists. These pharmacists *within* CPL were involved in the development of the electronic order entry systems.

Initial problem definition. The idea for the warehouse system and then for electronic ordering by pharmacists using a PDE was initiated by the Managing Director, a practising pharmacist. The plans for a dispensary computer were also initiated by the pharmacist Managing Director. The CPL Board of Directors, which included several pharmacists, defined the general objectives of the systems.

Design. The PDE did not require designing or building; instead a tried and tested product was selected by the Managing Director himself whilst in the USA.
Installation. The PDE system was tried out in pharmacies. The trial sites were "tame" pharmacies owned by Board members. Once the system was debugged and ran smoothly, PDEs and dispensary computer systems were offered to customers.

Customer participation at CPL did not exist in true form. Customers themselves were not consulted and did not form part of the development team. However, there definitely was input from pharmacists in the development of electronic order entry systems. Latent customer needs were recognised by the Managing Director and his Board of Directors as many of them were pharmacists themselves.

Customer participation took place in a hybrid form.

4 Research Question Three - Adoption and success of order entry system

This section discusses adoption factors, adoption rate and the spin-off effects of electronic order entry on the business of CPL.

4.1 Adoption factors

Four adoption factors were identified prior to the start of fieldwork (customer participation in development, expressed user need for the system, cost of the system and marketing of the system). Two further factors presented themselves as being particularly relevant in the adoption of electronic order entry devices by pharmacists in New Zealand: latent need from customer and technological awareness among customers.

Expressed and latent user need. Customers had not expressed a need for electronic entry devices to CPL; CPL did not carry out any market research to identify if such a need existed in New Zealand.

CPL were convinced that the systems would be adopted because that is what had happened in the USA. Electronic order entry was technologically possible, was beneficial for the wholesaler and also offered benefits to the pharmacist. In the USA the systems had been pushed by the wholesalers and customers had readily adopted the system once recognising that pharmacies could be run more efficiently with electronic order entry. It was apparent, from the USA experience, that there was a *latent* (rather than *expressed*) user need for such systems.

Cost to the customer. The cost of adopting electronic order entry devices was very high for pharmacists. PDEs were sold at $1600 in 1979-80. The price of PDE units covered the cost of those units to CPL, but did not cover development costs of the warehouse system or promotional costs.

Adoption of order entry devices presented the pharmacist with a substantial cost. PDEs were "an expensive item". In order to overcome the cost barrier of PDEs CPL created a discount structure for pharmacists using PDEs to order stock.

Pharmacists were shown that they could increase profits by using PDEs and that this would allow them to pay for the PDE on average within 16 months.

Marketing of the system. Early marketing efforts were basic: demonstrations at CPL's Annual General Meeting and at trade conferences. The efforts put into the marketing of PDEs were poor when compared to the marketing of dispensary computers and retail management systems. As CPL grew the company became more diverse and its marketing capabilities increased. A separate subsidiary was set up to market dispensary and retail management systems. Now systems allowing electronic order entry are heavily marketed by direct mail, by offering seminars and demonstrations, by advertising in trade journals and by demonstrations at tradefairs and conferences.

Technological awareness among customers. When electronic order entry was first introduced in the late 1970s, pharmacists were not aware of the potential impact of technology on their business. During the 1980s technology in the pharmacy has become accepted. Yet, even now, pharmacists are "computer literate in the very general sense of the word, that's all". The introduction of PDEs is now seen as having prepared the ground for more encompassing technological developments in the pharmacy. Within two years of the introduction of PDEs computers for dispensary functions were offered. Several years after that full-scale retail management systems were marketed to pharmacies. Initially technological awareness among pharmacists was very low, but as technology has become accepted adoption of systems has increased.

A summary of the adoption factors with ratings for each factor over time is given in Table A2.2. The Chart also shows the expected effect of each factor on adoption.

Table A2.2 - Factors affecting adoption of CPL's PDEs

Adoption factors		Value (rating and quote)
User need	expressed	None "No. That is definitely a simple no"
	latent	None "warehouses overseas went into electronic ordering. So we came back with PDE to NZ"
Cost		High $1600 in 1979 "they were expensive items"
Marketing		Basic Demonstrations
Technological awareness		Very low "many people in that age-bracket had not been exposed to technology... and could not handle it"

Adoption was likely to be slow at first as customers needed to become aware of their need, to overcome the cost barrier, to find out about the systems (marketing, particularly in the early days, was rudimentary) and needed to accept the technology. In the CPL case the major factor likely to persuade customers to adopt electronic data entry devices is user need. As has been discussed earlier, this user need was latent and not expressed.

In order to find out what actual factors persuaded customers to adopt CPL's electronic data entry a small sample of 10 customers were contacted by telephone. Pharmacists unanimously claimed that electronic order entry devices fulfil a need ("convenience", "it saves me so much time", "efficient", "it does what I need"). No mention was made of any of the other adoption factors.

4.2 Adoption rate

CPL began offering PDEs and Dispensary computers without any expressed expectation concerning adoption rates prior to launching the systems. And yet "during and after I was surprised at how slow the acceptance was". Even at the best times CPL never sold more than one PDE a week.

Adoption of order entry devices was slow to start but gradually picked up. "Having sold some the system got accepted ... and so it became an easier thing to sell as it went on." The pharmacies that adopted the devices found they saved time and created efficiencies in their operation. This would spread by word of mouth among the pharmacists of whom there is not a great number and who tend to know each other. Thus, once several units were sold the devices became easier to sell.

CPL put down the very slow early adoption of PDEs in the early 1980s to a complete lack of technological awareness among pharmacists. With hindsight it can now be speculated that the PDEs prepared the way for full-scale automated stock and inventory control for pharmacies. Having "fertilised the market ready for other technology" it is now possible to sell complex retail management systems at a faster rate than the relatively simply PDE units ever sold.

In comparison to the USA and the UK pharmacists in New Zealand have been slow to adopt electronic order entry technology. This can be attributed to the fact that New Zealand pharmacies are all independently owned, whilst in the USA and UK there are large pharmacy chains. Adoption of technology can be imposed on retailers who are part of a chain; independent pharmacists each make their own decisions regarding adoption. Hence in New Zealand adoption was expected to be slower than in other countries.

In spite of a slow start now up to 87% of all orders placed with CPL are electronically transmitted from the pharmacy. The ideal penetration of electronic order entry devices is 100% enabling all pharmaceutical outlets to order electronically. Even with full penetration of electronic order entry it is envisaged that there will always be a need for some manual order processing; the realistic target for electronic order entry is therefore "somewhere in the high 90%".

4.3 Organisational impact of the PDE system

During the past 15 years the pharmaceutical wholesaling industry in New Zealand has moved from manual order entry and processing to 80-90% electronic order entry and to automated order processing systems. Technology has become vitally important in the industry ("without [the system] we wouldn't be competitive").

Market share. CPL was able to increase market share by 90% in the first year after introducing the warehouse system and by 50% in the two subsequent years. It grew from a small, regional wholesaler with NZ $4.6 million turnover in 1977, to one of NZ $165 million in 1990. Competitors that did not offer similar service to pharmacists went out of business.

Costs. Electronic trading has allowed CPL to become "considerably more efficient" and to contain costs over time. At the time of 20% mark-up on prescription drugs CPL was able to return 8.75% rebates or discounts to pharmacists. Now that the mark-up is down to 10% CPL is still able to offer discounts in excess of 7%. This has been possible because of increased efficiency.

Sales. Electronic trading simplifies order tracking for individual pharmacies and has enabled CPL to introduce discount structures for increased volume of trade. CPL were the first wholesaler to introduce such a scheme and was able to attract increased sales. Other wholesalers have introduced similar schemes and now pharmacists gravitate towards one individual wholesaler - not necessarily CPL.

New customers. Electronic order entry in itself does not attract new customers, particularly now that all wholesalers are offering the same service.

Customer satisfaction. The increased facilities and service possible with electronic order entry has now come to be expected by pharmacists.

In all, CPL is very satisfied with the effects of their development efforts. They set out to improve internal efficiency and have found the system to be "hugely successful" in achieving that objective. Success was dependent on adoption of electronic data entry by pharmacists. Apart from increased efficiency additional benefits accrued: increased market share, increased customer satisfaction and an increase in sales.

5 Summary

Electronic entry systems were pushed by CPL in order to obtain maximum benefit from its newly installed warehouse system. The impetus for such systems came from observing the pharmaceutical wholesaling market in the USA. The technology was available and so ".. it was something that had to happen; if we didn't do it, somebody else would do it; if somebody else dit it, then we could be left behind. You have to at least keep up with technological innovation".

Customers were not involved during development. There was however a hybrid form of customer participation: the MD and several members of the Board were pharmacists and owned pharmacies.

Adoption of PDEs was very slow. But once the technology became accepted it had a tremendous impact on CPL and on the pharmaceutical wholesaling industry at large. The system is considered "hugely successful", created many positive spin-off effects for CPL and changed the basis of doing business in the industry.

APPENDIX 3 - WITHIN CASE ANALYSIS: ANZ BANK

The ANZ bank is one of the 4 main trading banks in New Zealand. Computer services and bank transaction processing for these 4 banks is provided by Databank. In the late 1980s Databank had developed a basic cash management product which was offered to all 4 banks for customisation. In this way ANZ launched ANZCash, a cash management system, in November 1989. ANZ was close second to the market with a PC-based, on-line cash management system in New Zealand. The initial product was aimed at corporate customers but it soon became clear that the real demand lay not necessarily with the very large customers but with *any* customer with a large number of transactions and/or a need to obtain account information on a daily basis.

Since November 1989 ANZCash has been improved in various ways. A major enhancement to ANZCash took place in 1990: a co-operative agreement between banks enabled customers using ANZCash to access accounts at banks other than the ANZ. Similarly, products from other banks allow users to access accounts they hold with the ANZ. Development of ANZCash is on-going as the bank try to keep up with customer demands for enhancements and new features.

1 Data sources

Interviews were held with the individual who was Manager Videotext and Cash Management Systems when ANZCash was developed and first introduced to the market, with the current Manager Electronic Business Services and with an ANZCash sales representative. Documentary information includes Annual Reports, ANZCash promotional material, ANZ documents comparing ANZCash with competitors' products.

2 Research Question One

Organisational factors. Development of the product took one year but "did not cost much". Compared to other ANZ system development projects ANZCash took an average amount of time and only a small cost to develop. Top management were involved to the extent that they initiated the project and wanted to see a marketable product; top management had no involvement during system development.

Project-related factors. An inexperienced manager was put in charge of the project: he had a banking background, but no previous IS experience. "When I was put into that job, I had never touched a PC, I had what you might call 'techno-fear' - and I was expected to get the product off the ground...". Programmers and system developers were assigned to the project but not one was there from the beginning till the end: employees were continually changed. The manager liaised with Databank during system development but he "did not know what questions to ask. We would have developed it much faster if I had known more at the time".

ANZCash was unique in that its interface and security aspects were unique to the ANZ; the base product and hence it functionality was the same as the products developed by the other main trading banks. The ANZ nor the ANZCash development team had experience with on-line PC-based systems; they had a vision of how the system should work, but no hands-on experience. The potential impact of ANZCash on customer operations was not considered by the development team or its manager.

ANZCash with its various functions enables the customer to save time and costs. Previously companies would have to send a courier or employee to obtain daily account information and to handle transactions. Now all that can be done on PC at the customers' premises and all changes can be transmitted straight to the bank. Account reporting and analysis can be done electronically which saves time and probably affect workflows on customer premises. Integrating a system like ANZCash with a reconciliation package or payroll package enables the customer to streamline operations still further. Forward looking customers have achieved all of this.

It appears that the ANZ did not consider ANZCash to be a high priority or high profile product. The selection of the individual put in charge (a not very dynamic middle manager with no previous knowledge or experience of IT), the lack of continuity in system personnel assigned to the project and the absence of any concern for the product's potential impact on the market indicate that the bank considered the development of ANZCash as an ordinary, routine project and certainly not as an important, strategic project.

3 Research Question Two

No potential customers participated in development at any stage. "The first that customer saw of the system was ANZCash when the screens were ready and the system was live" (- Manager in charge of ANZCash development). Later versions and upgrades of ANZCash have involved customer participation. In the last few years the ANZ bank has slowly changed its approach to system projects which affect customers. The bank is trying to change from being a traditional bank to being customer and service oriented. "Previously [the ANZ] thought something would be good for the customer, but product turned out to be not very successful" (- Manager, Electronic Business Services). The bank needed to change and in order to do so, has taken on management graduates, is following project management methodologies and is involving customers in development of projects.

Now the bank involves customers in the early stages of a project. Customer are invited to early discussion and are informed of ANZ plans and ideas for products. According to the present ANZCash manager:

> "We tell them: 'this is what we see from a banker's point of view. What do you see from your point of view?' You would be amazed at what comes out! To a certain extent we have a very tunnel-visioned way of looking at things...".

The bank now appreciates the value of customer participation during development, but at the time of ANZCash development was still firmly set in a very traditional and conservative approach to development of systems which affect customers.

4 Research Question Three

4.1 Adoption Rate

ANZCash adoption was "frustratingly slow to start with". No official adoption target had been set but the manager was still surprised that the product did not take off faster than it did. He could understand that some industries are more pro-active whilst others are more conservative in their use of IT, but he could not understand why customers who had previously expressed an interest turned down ANZCash when presented with it.

Adoption rate increased as the product became accepted and established. Medium-sized customers knew each other and talked about ANZCash. Once one customer became comfortable with the product and found the product to be worthwhile, others were more likely to adopt the product as well. That kind of information was passed on, particularly between customers in separate subsidiaries of the same larger organisations, and in that way demand for the product increased.

The customer base has grown rapidly since 1990. The salesteam now have a 60% acceptance rate among all the customer they visit. This acceptance rate was "considerably lower" when ANZCash was first launched. Now targets are set and there targets are reviewed on a monthly basis. Knowing that the team have a 60% hit-rate the manager works out how many customers have to be visited in the next month.

4.2 Adoption factors

Customer expressed need. ANZCash was developed with the corporate customer in mind. So, "we first approached the customers who had previously expressed an interest in the product. But when we took it out and showed it to them they did not have a desire to have it any more!" (- Manager in charge of ANZCash in 1989). Corporate customers often have split banking arrangements and require access to accounts in several banks. However, ANZCash (and the other early Cash Management Systems) only allowed access to one bank. Customers would need multiple products in order to access accounts and still would not be able to do transactions between accounts of different banks. In this respect ANZCash did not fulfil the need of corporate customers. The manager in charge of ANZCash when it was first offered to the market specifically commented on the slow adoption of the product by the corporate customer: "it surprised me that the corporate customers were probably the slowest to take [ANZCash] whereas the retail customers were quite keen to get in on board."

Latent need. ANZCash did appeal to a customer base not particularly targeted: the retail customer. Smaller businesses were prepared to experiment with the product and could see advantages in its use. Those who adopted ANZCash could see the benefits associated with on-line access to their bank accounts. Those who adopted the project were the pro-active organisations who were keen to speed up business processes, who "wanted things to happen in now-time and did not want to wait for a statement for 2 days".

Cost to the customer. Customer are charged for adoption and use of ANZCash. A monthly fee covers the fee for the security component of the system and has a small profit component; a usage fee based on numbers of transactions covers the Databank charges for accessing account and doing transactions. The bank does not charge for manuals, training, upgrades or support.

To the customer ANZCash is worthwhile if a customer does about 70 transactions per month; in terms of costs a customer would break even at that point. However, apart from tangible benefits, the customer also acquires non-tangible benefits in terms of convenience and efficiency. Cost did not however seem to be a major adoption factor: "Corporate customers could afford it, but did not take it; smaller customers, who did sometimes not even need it, experimented with it and took it on board."

ANZCash was not developed as a large money-earner for the bank; ANZCash was developed to enhance bank services.

Marketing of the product. No attention was paid to publicity or advertising of ANZCash. Some written material was prepared in the form of information brochures and manuals. A small sales team of three sales representatives was brought together. None of the sales representatives had experience with IT and were trained by the manager who himself was inexperienced.

Customers were introduced to the product during site visits. The first which were customers approached were those who had previously expressed an interest, but many of those did not adopt the product. The sales team made cold calls and increasingly received referrals from business and retail banking representatives.

Now ANZCash is marketed by a sales team of 7 and "they can hardly keep up with demand. People come to use through word of mouth. People meet and talk in the Chamber of Commerce and other business associations. That helps promotion of the product without any active involvement or marketing by the bank" (- Manager, Electronic Business Services).

When first launching the product the sales team had to educate a market not used to cash management systems. Much time was spent educating customers rather than "selling" the product.

The sales team used to demonstrate to office staff or the office management. It was later realised that those were not the true customer. The system needs to be shown and its benefits explained to top management who can make a decision on whether to adopt ANZCash or not.

Technical awareness of the customer. One factor holding back adoption is the technical awareness in New Zealand companies. Customer either have out-dated equipment and/or have no concept of a cash management system. Not all customer have the appropriate hardware facilities. Some customers, driven by their head offices, have up-to-date equipment; other major customers have such outdated equipment they can not run ANZCash.

There are still customers who are unaware of the ways in which technology can help their business. The manager currently in charge of ANZCash relates: "I have been out to customers where the eyes nearly popped out of their heads when shown the product. You wouldn't think that would happen in the 1990s, but many people are oblivious to this type of system unless someone takes the time to show them."

The real benefits of a product like ANZCash come from integrating its features with an organisation's payroll or general ledger functions. ANZCash can create ASCII files which can be dovetailed to the customer's computer system. This integration was considered the customer's responsibility and was not carried out by the ANZ. Thus customers who did not have their own system development staff and who were not particularly computer literate, could not integrate ANZCash with existing systems. Those customers could often perceive the benefit of faster operations, but did not know how to integrate ANZCash and could not afford to pay for a consultant to do it for them. For this reason smaller customers might not adopt ANZCash.

4.3 Impact on the ANZ

Maintain market share. A product like ANZCash ties the customer to the bank. It also helps to keep customers who might otherwise have gone to competitors. ANZCash was developed to facilitate in the tendering process and to retain business. In 1989 and 1990 ANZCash was an added extra which helped a tender; now the bank must offer an electronic package when tendering for accounts of major clients: without it the bank's tender is not even considered.

It is hard to identify "the market" for ANZCash. ANZ have commissioned market research to identify their potential customer base and then to quantify the ANZ market share. The bank consider their customer base for ANZCash to be unlimited: from small, one-person businesses to the largest corporate customer. Any industry sector, any customer with a large volume of transactions, any customer with a need for daily access to accounts benefits from a cash management product.

New customers. ANZCash became a product in a portfolio of services offered by the ANZ. Obtaining the product became a strategic necessity and did not necessarily gain customers.

Costs. Potentially ANZCash could lead to reductions in operating costs for the ANZ in terms of staff and stationary. Back office operations can be streamlined as demand for certain manual operations decreases. Operational costs can be saved by eliminating manual intervention in transactions. Cheques move through 30 pairs of hands; reducing the volume of cheque transactions reduces labour costs. Similarly, payment of wages, which used to be a manual function in the branch, can now be completed electronically using Money Transfer functions in ANZCash.

Customer satisfaction. The product provides a service which helps customers and thus enhances customer satisfaction.

5 Summary

ANZCash was introduced when Databank suggested to the main trading banks that the market was ready for cash management systems. ANZCash was developed without customer participation; adoption of the system was very slow. ANZCash was not conceived to be a money-earner for the bank. Instead, the ability to offer a cash management system to customers is a strategic necessity for banks involved in corporate and business banking.

APPENDIX 4 - WITHIN CASE ANALYSIS: ASB BANK

The ASB has traditionally been a regional savings bank for retail customers in the Auckland area of New Zealand. Since deregulation in the banking industry ASB has branched out in two ways: firstly, by diversifying into commercial and corporate banking and, secondly, by increasing geographical coverage through an expanded branch network.

The bank's technical back-office systems are among the most advanced in New Zealand. This enables the ASB to offer a wide range of electronic services with relative ease. One of the many electronic banking products available is their cash management system, Gateway, which is designed to allow the customer access to round-the-clock business banking services from the customer's premises.

Gateway was introduced in November 1992 and is a modular, PC-based product which can be run in a Windows as well as in a DOS environment, offering the main banking services required by commercial and corporate customers. Functions include account statements, transfer of funds, cheque reconciliation, direct credits and market information. Customers may not require all functions; the modular design of Gateway allows the product to be customised according to customer requirements.

1 Data sources

Data for this case was collected in the form of interviews and documentary information. Those interviewed included the Manager of Electronic Banking Services, the Chief Manager System Development, the Gateway Project Manager and a Gateway sales representative. Documentation used included Annual Report information and Gateway promotional information.

2 Research Question One

Organisational factors. Top management was committed to the project in that the push for Gateway came from the top. Top management recognised the need for a product like Gateway as a strategic necessity and wanted to see the product added to the existing range. Whatever resources would be required were made available to turn Gateway from an initial idea into a marketable product.

The Gateway concept was not complex or unique but did involve the ASB in a new kind of application in several ways: it was ASB's first major PC-based development, it was the first customer based application, it was the first time that the ASB used certain software development tools, it was their first forray into Windows applications.

Because of these "firsts" development time became longer than it otherwise would have been. Also, the number of different stake-holders and groups that had input in the development added to the length of development time. However, for competitive reasons development time had to be limited. The ASB wanted to be first in the market with a Windows-based product and the development team were given tight deadlines to meet. Actual development time took longer than initially anticipated and also took longer than usual ASB-developed applications.

Financial resources of the ASB and its parent company were such that any resources required could be made available. Actual costs of the project were average compared to other IS development projects within the bank. Some new software tools were purchased, a contract programmer was hired and a few PC developers were involved. This was not considered an expensive project.

Project-related factors. The task to be automated was very structured. The functionality to be offered on Gateway was already available within the bank. The bank did not consider Gateway to be a complex product compared to the total product range. A very similar product was already offered: Fastphone has the same functionality but operates through the telephone; Gateway operates from a PC on the customer's premises. The Gateway delivery mechanism was new, but the product is just another way of the bank's customers gaining access to the banking system and obtaining the services that the bank provides.

Gateway is not a large product as at present it has limited functionality with only a few modules. Once further modules are added the system will be much larger.

Gateway was expected to bring change to customer operations. The extent of change would depend on the size of the customer's organisation, on the complexity of their operations and on the number of bank transactions. Some customers might use Gateway for paying bills and for payroll functions; other might integrate Gateway with their General Ledger and substantially change their existing operations.

Gateway enables the customer to save time by changing the way the customer operates. Gateway was expected to change the customer's relationships with its customers: direct debiting and direct crediting enables the customer to improve links with its own customers. Other areas of impact on customer operations include the authorisation process and cheque reconciliation. Making the authorisation process electronic, there is no longer a need for individuals to be physically present in order to authorise payments. Time can also be saved by electronic reconciliation as there is no longer a need for manually comparing cheques issued with a bank statement.

The idea for Gateway was initiated by the bank's top management. It was recognised that a product like Gateway had to be in the bank's portfolio of electronic banking products and top management therefore initiated development. Top management did not drive the project through to completion; the development itself and marketing of the product was left to middle management.

3 Research Question Two

The ASB development of Gateway incorporated customer participation at project definition and then again at the installation stage.

Project definition. Customers' views were actively sought during the project definition stage. At the time, ASB's parent company (CBA) were encouraging the bank to adopt *their* cash management system for the NZ market. However, ASB felt a new product built to interface with emerging technology was more appropriate. A number of ASB corporate clients were contacted to find out what their need were and what environment they used. The feedback confirmed ASB ideas that their cash management system would have to be a flexible project capable of running on anything from an XT to a 486, running under a DOS as well as a Windows environment. Participation from representative of customers was fundamental in bringing about the decision to drop the CBA product and instead to develop a new, highly flexible application.

Design. Customers were not actively involved in design, but feedback during the

Definition stage had identified the basic design of Gateway. Customer feedback had indicated the need for a flexible application. It would have been easy to develop the application for the lowest common denominator of hardware available in customer premises. Similarly it would have been simple to develop a product for advanced hardware and requiring customers to upgrade their hardware or lose out on functionality. Instead Gateway was designed to be the same project with the same interface and the same way of operating on various platforms.

Build. Gateway was built in-house by the bank's systems development department. Customers who were initially contacted agreed to become Beta test sites. The system development team took customer feedback very seriously.

> "It was critical that their reports were acted upon quickly and that [the customer] saw that this was done. They would then feel they could voice more about the system: they could see we were listening and acting upon it." - Project Manager, Gateway

Installation. The bank have contracted out the technical installation of Gateway. Outsiders are responsible for installing Gateway in the customers' premises and for discussing additional hardware requirements with the customer. Technical after-sales support is also provided by the contractor.

4 Research Question Three

4.1 Adoption factors

Expressed need. Perceived customer need had been one of the main reasons for developing Gateway. Whenever the bank tendered for corporate accounts they were asked about electronic banking offerings. Corporate customers expect to have access to a cash management product. When it came to customers adopting the new application "...with a lot of our earlier customers it was demand. We weren't going out to them, they were coming to us saying 'we have got to have this product'."

Latent need. With many customers the need for Gateway is not expressed. However, Gateway can improve the customers' business by automating business operations which are currently done manually and which are time-consuming. Automated payment authorisation and cheque reconciliation are two of the business operations which are currently offered by Gateway.

The bank do not view their electronic services as simply covering financial transactions. They see much potential in helping customers automate their operations with financial transactions only forming part of that automation. The rationale for helping customers with automation is that customers may be interested in obtaining further, financial services from the bank after they have experienced the bank's assistance in automating labour and paper-intensive processes in customer operations.

Cost to the customer. The customer is charged a one-off installation fee which in fact covers the fee paid to the contractor for installing Gateway in the customer's premises. The customer is also charged a monthly fee which is meant to cover the 24-hour product support offered by the bank. In addition the customer pays for some transactions.

Marketing of the product. The bank considers marketing the most important adoption factor. The cash management systems offered by the various banks do not vary greatly in terms of functionality. The bank felt it was able to differentiate in terms of presentation: user-friendliness of the product itself, presentation and ease of use of the manual, the look of the promotional documentation.

Customers are approached after having expressed an interest to the bank or at official functions and demonstration sessions. Alternatively, customers who might benefit from Gateway are referred to electronic banking by business banking. The business banking relationship managers are close to customers and can identify prospective adopters.

Taking the product to the customer requires the bank to be sales and marketing-oriented. The customer must be shown how the product can be of benefit and can change their business. The customer must realise that the use of Gateway is cost-justified in that it saves time and improves the business. Analysing the customer's business and helping automating customer operations is considered part of the bank's marketing effort.

Technological awareness. The users of Gateway in customers' organisations are Financial Controllers and Finance staff who are used to technology supporting the accounting and finance functions. Evenso, it is not always easy to gain acceptance of the automated services as offered by Gateway. The corporate customers accept it more easily than the commercial customers.

4.2 Adoption rate

Gateway was adopted by customers at a very fast rate. At the time of launching the system the bank aimed at a penetration target of 40 customers in 6 months. This target was in fact achieved within 2 months.

The early adopters included around 20 customers who had initially asked for such a system. Further adopters were new prospects and included customers who had not heard of Gateway before its launch.

In terms of volumes of transactions, several users have already passed the transaction volume initially foreseen. At the start of the project certain numbers of transactions were forecast after 5 years of use - these forecasts are already surpassed by some customers within 4 months of launching the product.

4.3 Impact on the bank

Gateway has only recently been launched. It is therefore difficult to show any significant impact on the bank attributable to Gateway.

Market share. The Gateway product is a product which the bank must have amongst its electronic banking products in order to compete in the industry for commercial and, particularly, for corporate accounts. Therefore the system is essential to maintain marketshare in the corporate market and is desirable to maintain market share in the commercial market.

Costs. The bank does not expect to recover development costs from Gateway adoption. The customer pays for installation and support of the product. Transaction fees are expected to return a significant income once transaction volumes increase with an increased number of users and increased volume of use per customer.

As Gateway stops customers from entering the branches, the launch of Gateway must have an effect on the counter operations and as such must save costs at branch level.

> "A lot of the benefits are not tangible. If the customer initiates the transaction and he stops doing something manually that we would have to process later, it has got to be saving us money... Anything the customer does instead of the bank must be saving us money. It is as simple as that." - Manager, Electronic Banking

New customers. As the bank is expanding and launching its business nationwide the bank is seeking to increase market share. The ASB is confident that Gateway will help the bank win new accounts.

The development team consider the product a technical success in terms of functionality, flexibility and ease of use. However, the Manager Electronic Banking is not completely satisfied with the product itself as, in his opinion, some modules of Gateway are not as easy to use as they could be.

5 Summary

The Gateway concept was initiated by top management. The General Manager of Information Systems (who is now MD of the bank) started the project. However, all major banks in New Zealand already offered cash management systems. The ASB realised that it would have to offer a similar, or better, service in order to be taken seriously as a corporate bank.

In order to ensure that the bank would develop the "right" system, the development team contacted customers during the initial definition stage of the project. Customers participated in development at a very early stage; actual design of the system took place without customer involvement. Initial adoption of Gateway has been very fast; the system is considered "very successful" in terms of its adoption rate and success in the marketplace ("it is way ahead of target").

APPENDIX 5 - WITHIN CASE ANALYSIS: BAYCORP

Baycorp Holdings Limited offers debt collection and credit reporting services in New Zealand. Baycorp was originally a debt collection agency but this changed when the company bought the Mercantile Gazette in 1987. The Mercantile Gazette gave Baycorp access to detailed credit reporting information. Baycorp was then in a position to place that information on electronic database and offer access to that information to customers.

In March 1988 Baycorp launched Baynet: a service which offered customers on-line access to credit reporting data. Baynet is a credit reporting system driven by two distinct databases. It contains a database on individuals which is based on court judgement information, bankruptcy information, debt collecting information and information from previous enquiries done on the system. The second database contains information on companies and their directors. Baynet enabled clients to do an independent search instead of clients obtaining credit information from Baycorp by phone, fax or mail.

Baynet's potential customer base for credit reporting is unlimited: everyone who gives credit is a potential client. All those who give credit carry a risk and that risk can be reduced by obtaining a credit report on the individual or company to whom credit is extended. Larger companies now tend to be on-line to Baynet, sometimes with a mainframe-to-mainframe connection allowing multiple users at the customer site to gain access at any one time. Smaller companies dial up Baycorp and conduct a phone enquiry; the operator then uses Baynet and sends a hard copy of the enquiry to the customer.

The data of the initial Baynet system was basic, but the information on the system built up quickly as time passed, as clients were using (and adding to) the system and as the system was maintained and enhanced.

1 Data sources

Interviews were held with the person in charge of Baynet development and managing DP at Baycorp in the late 1980s, with the present General Manager of Baynet and with the Chief Executive of Baycorp who initiated the project.

Documentation included Annual Reports and promotional leaflets about Baynet.

2 Research Question One

Organisation factors. Baycorp wanted to develop a system quickly: it was a publicly listed company that was venturing into credit reporting; as a way of creating a positive image, the Chief Executive wanted to show the market that the company could move quickly. In fact, Baynet was developed very fast: it took 9 months from initial concept (when they had as yet no idea as to how to achieve it) to the first live client.

Costs of development were high. Baycorp needed to build a complete internal system and then add a customer interface. It was a large and expensive project. Top management involvement was very high. The Chief Executive and Chairman of the Board was the project's initiator who was involved all the way through.

Project-related factors. The project was initiated by Baycorp's Chief Executive who had a vision of providing a full information service to provide any information a company or individual might want. Its main thrust was to be the credit reporting system. In the end Baynet turned out to be mainly a credit reporting system.

The task was relatively unstructured: there was little that Baynet could be modelled on: "we virtually made it up as we went along" (- Manager in charge of Baynet Development, Baycorp). Only one staff member had experience with on-line credit reporting systems - but only from a users', not from a technical point of view. In terms of size it was a very large system.

Impact on client operations was not really considered. It was taken for granted that customers were interested in doing their own credit checks and on that basis development went ahead. No market research was done.

3 Research Question Two

Initial development. Customer did no participate during initial development of Baynet. Customers were not polled; no market research was carried out; customers were not surveyed or interviewed to determine requirements. The first that clients saw was a nearly finished product - once the system had been designed and built.

When Baynet was in the testing stage it was taken out to a cross-section of large customers: to those who could be potential big users. This had substantial Public Relations value. Customers felt they were given the opportunity to have some input in the system which made them more keen to accept the finished product.

The DP Manager in charge of Baynet development at the time considered there to have been little value in obtaining customer participation. Talking to customers had PR value but no value from a development perspective: "Every customer had a different idea. So we found out very early on that it was far easier to set a standard that encompassed everything that they would all want and then we said "this is the way it is". That way there was no problem" (- Manager in charge of Baynet development, Baycorp).

Further development. Development of Baynet is based on client requirements. Clients are surveyed annually through a questionnaire sent out by Baynet and through an anonymous survey administered by the third party. The survey information provides data on client requirements. Another source of information is the outcome of regular user group meetings.

4 Research Question Three

4.1 Adoption factors

Need. Baynet fulfilled a well-known need: credit reporting clients had always considered as their ideal, a means of doing their own credit checks.

It is important for organisations to be able to do fast and efficient credit checks, because organisations have to provide a service to their clients. They want to be able to inform a potential client straight away whether they will provide a product or service. If they make their potential client wait for a credit check, the organisation may lose that client.

Everyone who extends credit has a need for credit reporting. However, there are organisations who consider they are good risk assessors in their own right. There are also organisations that are not aware of the existence of professional credit reporting services.

Marketing. Sales representatives initially targeted existing users of the Mercantile Gazette microfiche information, explaining that Baynet offered the same information electronically. Once that set of users became established, other users were targeted. Baynet was not advertised but clients and potential clients were targeted directly.

Cost to the customer. Customers are charged \$4 to \$5 per transaction. Most customers use their own hardware, though they can also rent hardware equipment from Baynet. Costs charged to the users cover Baynet maintenance costs and enables Baynet to make a profit. The cost of a credit check on Baynet is not very high and is similar to the copst or obtaining a credit check by phone or mail.

Technological awareness. The system was unique and had a lot of novelty value, but in the late 1980s the market was not very technologically aware. "In the late 1980s [the system] was very impressive: people were absolutely blown away. you would just plug [a terminal] into their telephone jackpoint, it had a function key, it would dial up and suddenly there is a menu on screen. It sounds like nothing today, but for them it was big" (- Manager in charge of Baynet Development, Baycorp).

4.2 Adoption rate

Baycorp did not set any penetration targets for Baynet. The Chief Executive had very high expectations of Baynet success, but noone really knew what to expect in quantitative terms.

Initial adoption rate was fast. Forward looking companies adopted Baynet, mostly for its novelty value. More discerning customers waited for the quality of the database to build up before committing themselves to Baynet use. About 25% of the current client base took up Baynet right at the start; further clients came when the system matured.

At present 75% of credit reporting revenue is generated by Baynet enquiries; 25% comes from clients who ring in to request information or to obtain reports.

4.3 Impact on the organisation

Increase in sales. Because clients look up information themselves they are spending more than they otherwise would: one piece of information leads to another and this leads to longer and bigger searches. Customer expectation was raised too: since information could be obtained instantaneously customers began using the system for all credit reporting enquiries. This encouraged further and more intensive use of the electronic access system. In all, Baycorp estimate they obtained extra revenue over and above that which they would have gained if the credit reporting service had remained purely manual. Total Baynet profits are now just over $1 million.

Market share. Baycorp's major competitor is a long-established credit reporting company. Since mid 1992 Baynet has been able to obtain new clients by gaining clients from the opposition. It is hoped that the newest round of up-grades will entice even more opposition clients to use Baynet.

Baynet has also helped the debt collection side of the company gain sales: debt collecting cases are passed to Baycorp because clients feel that the information held by Baycorp may provide a better chance of finding the person who owes a debt.

Image. Baynet has enhanced the reputation of Baycorp as a responsible, conservative organisation. The data held on Baynet is continually maintained and enhanced. The existence of a good, reliable database has given Baycorp a good image.

Costs. Providing Baynet has meant that Baycorp has had to develop a Baynet support team. There is a salesteam, a help-desk and a customers' support team. Staff go out and train customers and new users. There is therefore a cost associated with providing on-line credit facilities.

However, overall costs of providing credit reporting facilities have significantly decreased since Baynet. Clients can obtain credit reporting information by phoning Baycorp rather than using Baynet, but the profit per head in the division which handles telephone enquiries is half of the profit per head of the Baynet division.

5 Summary

Baycorp developed Baynet because the Chief Executive wanted to make a mark in the industry and wanted to prove to shareholders that the company was pro-active and forward-looking. Similar systems had been seen abroad and it was expected that customers in New Zealand would want similar facilities.

Baynet was developed without customer participation. A lot of money and effort was sunk into the project. Baynet was launched early in 1988. Adoption of Baynet was very fast. Baynet enabled clients to carry out credit checks instantaneously and in their own premises. This was an attractive feature for banks and retailers who may lose clients if they can not give prompt service.

Impact on Baycorp has been tangible. Operational costs have been reduce; sales and market share have increased. The operation of Baynet has also achieved its original aim of enhancing Baycorp's reputation in the industry.

APPENDIX 6 - WITHIN CASE ANALYSIS: BENDON

Bendon is New Zealand's largest manufacturer of women's lingerie; the company also manufactures men's underwear. Bendon is a subsidiary of Ceramco, which is a New Zealand listed company. Bendon are very keen to keep up with technology and look upon that as a way of maintaining a competitive edge. Bendon considers technology to be a means of improving internal efficiency, product quality and customer service.

Bendon joined an EDI pilot project initiated by GE, the network provider. The pilot involved a major retailer and several manufacturers. This pilot project fizzled out but Bendon had in the mean time obtained an EDI capability in the form of the software, purchased from the network provider, and experience.

Bendon was subsequently approached by two customers to become EDI trading partners. The first of these customers was Myer's in Australia and Bendon in 1990 became a partner in the first Trans-Tasman EDI link; the second customer was K-Mart in New Zealand. Both these customers were already using EDI with suppliers, had an EDI plan and are pro-active in securing EDI links with business partners.

Now Bendon receives purchase orders through EDI from both Myer's and K-Mart; Bendon sends invoices through EDI to K-Mart. Alternative ways of ordering include placing orders by telephone, mail or fax or ordering through sales representatives.

1 Data sources

Face-to-face interviews were held with Bendon's IS Manager, the EDI Development Co-ordinator and a Marketing representative. The EDI system of Bendon was also discussed with the Business Systems Analyst of K-Mart, which is one of the two Bendon customers involved in EDI links with Bendon.

2 Research Question One

Organisational factors. In terms of man-hours, development time was average for IS projects at Bendon. In real time, though, the development was protracted because no one person was dedicated 100% of the time to the EDI project. The project was not a particularly large one in terms of capital investment (some labour costs and "a few thousand dollars for the software") and did not need to be cost-justified. Management approved the project and was more interested in seeing it completed than in the costs. Management commitment was average: funds were provided, but management did not get personally or deeply involved in the project ("only to the extent of saying: 'Yes, let's go' ").

Project-related factors. Bendon already had systems in place to receive orders and was EDI capable before agreeing to build EDI links with Myer and K-Mart. Developing these EDI links was therefore a structured task: all that remained to be done was to enable the Bendon order system to accept purchase orders according to the formats and standards of their customers' systems.

Bendon had experience with receiving electronic data from remote sites because they receive sales data from the tills in their shops and relay price changes to shops using their computer system. Also, sales representatives access Bendon's mainframe remotely using laptops and modem dial-in. Because of this experience with remote data entry the EDI project was not a complex task for Bendon and its system staff.

Use of EDI does require change in the way one does business. But the two customers who initiated Bendon's EDI development were already using EDI. Their business procedures had already been adjusted accordingly.

Customer-related factors. In this case customer willingness and customer ability to participate was very high. The customers initiated the EDI link and really wanted the system to be developed and be successful: "They wanted [Bendon] to do EDI with them;... they were devoted to it" (- EDI Co-ordinator, Bendon).

3 Research Question Two

Bendon was approached by customers to enter into EDI trading relationships. "We were sort of pushed into EDI to start with, got two trading partners on and bought the software".

Customer participation during development was very high in Bendon's EDI project. EDI requires two business partners to transmit business documents in a standardised format. Such format must be negotiated and prepared for by system development at both sites. The system instigator usually has the easier task: the instigator simply informs his partner of the formats required and the system follower has to develop its system to conform to this format.

Initial problem definition. The two customers involved in EDI links with Bendon each initiated the link. Each was already involved in EDI and approached Bendon to join their projects. Problem definition came from the customers.

Analysis and logical design. Official EDI standards were adopted, but the specific design of documents was laid down by the customers. "Development was set around receiving their type of document... They sent us their file lay-outs [and] gave us the lay-out of the purchase order they wanted to [be able to] send us." Analysis and design had all been done already by the customers prior to Bendon becoming involved.

Building. Bendon independently set up and built the programs which would enable their computer system to accept the document sent by customers. Myer and K-Mart made their own modifications in their computer system.

Installation. Installation of EDI links with different customers is unique and needs separate testing. Each link is first tested to see if the technical system works correctly. Then the system is run in parallel with the manual system in order to compare for accuracy. Only when both parties are satisfied that the EDI system works effectively does the manual system get suspended.

Customer participation in the development of the EDI system at Bendon was "very strong". The customers had sign-off responsibilities and, in some ways, drove the project forward. The reason for the high degree of customer participation in the Bendon EDI system development was that the customers each already were trading through EDI with several of their suppliers. The customers had the EDI knowledge and had the EDI infrastructure in place; they instigated EDI links with Bendon and could tell Bendon to conform to their standards and formats.

Participation in the development of EDI links is essential as EDI involves computer-to-computer communication which necessitates computer software modification and enhancement from both partners. Bendon's EDI system became more complex than it would have been if Bendon itself had initiated the EDI links. Because of customer initiation Bendon had to accept customer plans and proposals for document lay-outs and for standards. Since the two customers were using different EDI standards, Bendon had to modify its system to accept two standards.

The development of Bendon's EDI system involved a high degree of customer participation in all stages of the technical development of the system. The customer defined and designed the structure and format of the system; the customer built and paid for the adaptation of the computer system at the customer end; the customer was fully involved in the testing and implementation of the system.

4 Research Question Three

4.1 Adoption factors

Expressed need. In the Bendon case the customers expressed the need for electronic trading. Adoption of EDI by each customer was not dependent on cost (trading partners bear their own costs) or on marketing (customers asked for the system and did not need to have the system marketed to them).

During an interview with the Business Analyst of K-Mart the reasons for K-Mart approaching Bendon with EDI plans were discussed. It transpired that K-Mart was pursuing a planned strategy of obtaining EDI trading relationships with their suppliers. In order to obtain maximum benefit from their EDI system, they aim to have electronic links with all their major trading partners. Since Bendon is their 9th largest supplier, K-Mart actively pursued the possibility of an EDI link with Bendon. K-Mart wanted this link in order to streamline their own ordering procedures. Internal customer need therefore is the reason for K-Mart's adoption of EDI links with Bendon.

The second customer involved in an EDI trading relationship with Bendon is

Myer's in Australia. They too are pursuing EDI links with suppliers to enhance their internal operations.

Technology in customers' premises. In order to be able to adopt EDI systems at the customer's premises have to be able to support EDI. Retailers must have accurate, up-to-date, computerised stock records; EDI then requires a computer link which can be PC to mainframe or, preferably, mainframe to mainframe. In many retailers' operations the background system are not in place and this makes it hard to involve them in a EDI partnership.

One Bendon customer has the background systems to support EDI but is not willing to invest in EDI itself. The company do not have enough suppliers who are EDI capable to make is worth their while to invest in the technology and its operation. The customer prepares the order electronically, then makes a print-out and faxes the order through to Bendon.

Marketing. Bendon has not marketed its EDI capability and is not pro-active in finding and securing EDI trading partners. More than 2 years after their first EDI link (with Myer's) Bendon still has no written plan for extension of the EDI system. Without a plan the Bendon EDI system is not promoted.

4.2 Adoption rate

Bendon's EDI system has not been extended beyond the two initial customers who expressed the wish to trade electronically.

Individual staff members at Bendon are aware of opportunities in terms of increasing the number and types of trading partners and in terms of the number and types of facilities offered on the system. However, commitment for such expansion is not evident. Responsibility for the EDI project has been passed down from the IS Manager to a Systems Analyst; development of the EDI system has been "pushed into the background" whilst other IS projects are taking priority.

4.3 Impact of EDI system on Bendon

Benefits accruing to Bendon

According to the EDI Development Co-ordinator "we are successful in the fact that we receive orders from them". Another informant spoke of the EDI system as "a limited success: we are successfully trading orders - but that is it...". Bendon's EDI system functions, in a technical sense, in the way it was meant to.

The main benefit of EDI to Bendon is considered to be intangible: "it enhances our trading partner relationships". These relationships were already strong with the two EDI customers before the EDI links, but the relationships "have been improved". In particular, receipting and invoicing with K-Mart has improved.

K-Mart's trading relationship with Bendon was discussed during an interview at K-Mart. K-Mart expressed satisfaction with the EDI outcome and confirmed that relationships have improved. Since trading electronically Bendon have been able to supply all goods ordered immediately: they are in stock 100% of the time.

Myer's trading relationship with Bendon has also improved. Orders are getting to the stores much faster than before. Previously orders were sent in bulk to a distribution centre in Australia; now orders are packed according to final delivery address before being sent to the distribution centre. Increased confidence in the accuracy of orders has meant that Bendon orders are only randomly checked and passed on to the stores immediately. This has led to orders getting to stores two weeks faster than before. The improved speed of order processing and getting goods on the customers' shelf "must be a big advantage" according to the IS Manager.

EDI relieves sales representatives from punching in orders and allows reps to spend more time on merchandising of the customer's store. This should, theoretically, lead to higher sales in the long run. There are no figures to support this.

Real benefits or spin-offs from EDI at Bendon are not evident. System results have not been tracked. The system technically works (in that purchase orders are received and, in K-Mart's case, invoices are sent using EDI) but any real benefit or impact of the business is not evident.

Drawbacks of EDI system

EDI at Bendon is not cost-effective at present. Bendon upgraded its EDI software to run on its mainframe and to enable Bendon to receive documents in different formats and different standards. However, with only two trading partners connected, this EDI capability is under-utilised.

The EDI system has led to more work. EDI customers must have up-to-date codes and prices for Bendon's products at all times. Because Bendon's EDI system does not include a product catalogue (giving product details, barcodes and prices) a new, manual system has been put in place to notify customers of deletions from, changes to and additions to the Bendon product range. This manual system was not required before and is subject to error.

All EDI-generated orders are monitored and checked by IS personnel.

> "Theoretically it is something we should hand over to the Sales Department, but we monitor the thing each day. Whenever something comes in, Sally checks the print-out; so we are doing what our Sales Department should be doing..." - IS Manager, Bendon.

This procedure is required because the EDI transmissions received by Bendon are not always free from errors. Customers at times have to re-send their order.

Bendon's ability to reap full benefits from their EDI system depends on the facilities offered by the system and on the volume of trade coming through the system. At present the EDI system is under-utilised and is not even fully effective with the two existing EDI trading partners.

Factors inhibiting further success

EDI at Bendon has been assigned as low priority and this is the reason for the lack of attention paid to enhancements to and expansion of the EDI system. Expanding EDI projects require a lot of time and resources. For such a project to be successful it must be recognised as a priority by top management. Management support for the project was there at the outset, but ".. obviously views have changed, otherwise we would have spent the last year working on it... [Our system] is not going anywhere at the moment" - EDI Co-ordinator, Bendon.

EDI requires the other partner to have appropriate systems in place. The backup systems on many customers' premises are lacking or inadequate. Education and raising EDI awareness could alleviate this problem. But in order to do that

Bendon needs to invest the time and energy to market the concept and its benefits to customers. Management support would facilitate the freeing up of a person to drive the EDI project and to pro-actively seek EDI trading partners.

5 Summary

Bendon was approached by two customers to enter into an EDI partnership. Bendon's EDI system was developed with high degree of customer participation and Bendon now trades electronically with both customers.

The DIE system has not been extended to include other customers whilst other projects in the organisation are taking higher priority. The EDI system has been relegated to low priority; no plan is yet in place to include other customers in the scheme.

Because only limited facilities are offered and because only two customers are part of the system, the EDI system can not offer significant returns. Even though the system technically works for the two customers who use it, Bendon's EDI system can not be considered highly successful in terms of organisational impact on the organisation.

APPENDIX 7 - WITHIN CASE ANALYSIS: MAINFREIGHT

Mainfreight Transport Ltd is a New Zealand transport operator that delivers goods from customers' premises to an assigned delivery address. Mainfreight operates throughout New Zealand whilst Mainfreight International operates internationally. Mainfreight was set up in 1979, employs 200 people and uses 100 owner operators as drivers; annual revenues amount to $60 million.

Mainfreight Transport Ltd are strongly customer oriented. Their management team realises that Mainfreight can gain more business if they help their customers be more effective and efficient so that *they* can gain more business. With this in mind Mainfreight developed their Freeman system which was first offered to customers in mid-1991.

Freeman in designed to be used by customers to prepare consignment notes and, if connected to Mainfreight's mainframe by modem, enables computerised freight-tracking from customers' premises. Freeman links into Mainfreight's accounting system and thus Mainfreight can send out invoices electronically whilst customers can check their account with Mainfreight.

1 Data sources

Interviews were held with the Transport Manager at one of Mainfreight's branches and with the Financial Controller of the company. The Financial Controller is the person who initiated the project, championed it, markets it, oversees and controls it. This was a case where one individual was the source of most information, because that one individual in the firm is the only person intimately involved with the system. Further sources of information included independently published articles and promotion literature prepared by Mainfreight.

2 Research Question One

Organisational factors. Freeman took 3 months to develop once the initial idea arose. The champion of the project considered this to be a long time but he recognises that his enthusiasm made him impatient and that "realistically speaking development time wasn't too bad".

Financial resources for the Freeman project were readily available. Development costs were about $20,000 which was "the sort of money that we didn't worry too much about". These costs were higher than other system development projects. Previously application had been written for the mainframe whilst the Freeman system was to be developed for use on a PC. It was more expensive to write the system for the PC than it would have been to develop it as a mainframe application.

Top management commitment for Freeman was very high as it had been for previous system development projects.

<u>Project related factors</u>. The Freeman system was designed to prepare consignment notes and, in addition, to allow customers to track freight. Preparation of consignment notes is a standard and structured task and is similar in all organisations. Enabling customers to tracking freight was a simple extension of the freight tracking system that Mainfreight already had in place internally. The size of the system was not considered large or complex ("it is an add-on; I always considered it to be an add-on"). The task itself was structured and not complex.

The change to customer operations was expected to be great. The despatch department is not normally computerised whilst Freeman would require distribution staff to work on PCs. Also, Freeman would change the essence of operations in many organisations. In many organisations the consignment note is prepared first, contains detailed information on every item and is used as a picking slip or packing slip. For freight purposes such detail is not important; the freight company only needs to know the number of boxes in a consignment and whether the consignment is fragile or not. Using Freeman organisations prepare the consignment slip *after* packing and enter limited information only.

The concept of Freeman came from Mainfreight. The Financial Controller had visited transport organisations in the US and had seen systems linking organisations with their customers offering consignment note preparation and freight tracking. On returning to New Zealand he set about developing a similar system for use by Mainfreight customers. The idea for the system was thus initiated by the sponsoring organisation.

Customer related factors. Customer willingness to participate in the development of Mainfreight's Freeman system must be considered low because distribution is usually regarded as a low priority in manufacturing organisations. Companies spend little money and effort on improving the distribution process. Mainfreight had previously offered to help a customer develop their own system for improving the process of consignment note preparation. This was a large customer who could potentially derive considerable benefit from improvements in the distribution area of their business. In spite of Mainfreight offering help and even supplying the specialised barcode printer required, the customer was not interested in developing the application. This experience indicated to Mainfreight that customers would not be interested in such a system until it was available and could be shown to provide benefits.

3 Research Question Two

There was no customer participation in the initial development of the Freeman system. Mainfreight are aware of the potential benefits of a participative approach but did not consider involving customers in the development of this application. Customers have been involved, though only to a small extent, in new versions of and enhancements to the initial system.

Initial development. Customers were not involved in the development of the original Freeman system in spite of Mainfreight usually seeking participation from all who will be involved in the ultimate use of the system.

During the development of the internal freight tracking system Mainfreight had involved everyone in the initial definition and design of the system. "We try and get everybody involved; that is part of the Mainfreight philosophy: anyone who might be involved in actually making things happen [gets] involved in developing it" (-Financial Controller, Mainfreight). Initial ideas and rough specifications were circulated to everyone from top management to the shop floor. Staff were encouraged to propose new ideas and give feedback. In this manner the initial system definition and logical design of the system were included full user participation.

Customer participation in the development of Freeman was not even considered. The idea of a system which would help customers write consignment notes and enable customers to track their consignment through the system, was floated with some customers. But noone could understand the concept. Noone believed that it was possible to write a program which would enable preparation of a computerised consignment note in 12 seconds instead of the 3 minutes which is the average for the preparation of a standard, manual consignment note. The project champion decided early on that the customers would not believe it, until they saw it and developed the initial system independently from customers.

Specifications were written by Mainfreight and the programming was done by contract programmers. Freeman was first demonstrated to customers when the module which enables the preparation of consignment notes within a few seconds, was complete. The freight tracking module was already planned but still had to be added at that stage. Installation and customisation to individual customers' sites was done by the programmer or by the Mainfreight champion.

During installation of the system customers always participate. Mainfreight makes minor modifications to Freeman to help the system link in easily with a customers' existing printers or procedures. At this stage the customer often suggests changes or improvements, but these are not always acted upon. It is often possible to re-arrange and thus improve existing, manual procedures at the customer's end which then enables the Freeman system to be added without requiring extensive customisation.

Enhancements to Freeman. Improvements and additions to the original system are often initiated by customers but have usually already been foreseen by Mainfreight. Mainfreight has a list of extras it still wants to add to Freeman and usually, when customers suggest enhancements, such improvements are already on the Mainfreight list.

Freeman has already gone through 4 major versions. Additional programming required for new versions is carried out by the company that wrote the original software.

4 Research Question Three

4.1 Adoption factors

Expressed customer need. Customers had not requested a system that would print consignment notes. No customer research was carried out to assess if a need existed. Freight tracking was unknown. Waiting for proof of delivery notes for 2 to 7 days after despatch was the accepted standard and noone complained about that.

Companies tend to consider freight as a cost centre. Little attention is paid to improving the distribution side of a business.

Latent user need. Computerised preparation of consignment notes saves a customer time and money. Much time in despatch departments is spent on writing consignment notes. Manual preparation of these notes takes more than 3 minutes; Mainfreight's top 100 customers write more than 200 consignment notes every week. Reducing the time spent on preparing consignment notes to 12 seconds constitutes a significant, tangible labour saving. In addition, printed consignment notes speed up delivery as problems associated with illegible notes are eliminated.

Tracking of freight is a customer service feature. It enables customers to have up-to-the minute information concerning the whereabouts of their consignments. Reducing access to proof of delivery information from 2-7 days to up-to-the-minute real time information on consignments provided a significant improvement. The benefits of this to the customer relate to convenience and service and are intangible.

Mainfreight were convinced that customers would adopt Freeman eagerly "because it was just logical and practical!". Mainfreight felt that the latent demand for the facilities offered by Freeman would make the system highly successful.

Cost to the customer. The cost of Freeman is low: Freeman requires a PC and a printer, a modem connection (to enable freight tracking) is optional, the software is provided and installed at no cost. Companies who are not willing to immediately invest in a PC for the despatch function are offered a Mainfreight PC on a trial basis.

Mainfreight feel that cost should not be a reason for a customer to reject Freeman. They therefore purposefully keep the costs to the customer minimal. Customers writing 50 consignment notes a day can save the cost of the PC in 6 months. That is a quick pay-back period.

Marketing of the system. The system is hardly been publicised. There are hand-outs which describe Freeman features; individual demonstrations have been given to customers at the various branches. Mainfreight have not been able to market the Freeman properly because there is only one person involved with the system and this person has other responsibilities as well.

Mainfreight learnt early on that marketing of a system like Freeman must be aimed at top management and not at the despatch function itself. Demonstrations of Freeman to staff who write consignment notes does not have the same effect as demonstrations to managers. Top management is more easily able to recognise benefits, particularly intangibles; top managers also have the influence to implement systems even if shopfloor staff are unwilling to accept it.

Mainfreight have also recognised that it is important to be the first to "sell" a system to the customer. Once customers recognise the benefits they are drawn to the system that was first demonstrated to them and, consequently, to the transport firm that first introduced the system to the customer. It is therefore important to demonstrate a system and make a company understand the benefits before a competitor does so.

Marketing of Freeman is the only issue that Mainfreight consider a weakness of their approach to the system. Mainfreight would like to spend more time and effort promoting Freeman.

Technological awareness. The despatch function in most companies is not computerised. Introducing computer-based processes in a functional area with low priority is not easy. Firstly, there is the fear of the technology among the staff actually working in despatch and, secondly, the cost of buying a PC for use in despatch is considered a huge investment. Over time as costs of PC come down and as retailers like K-Mart are requiring computerised service, manufacturers are slowly moving towards computerisation of all their functional areas and computers in despatch are beginning to be accepted.

The absence of an expressed need, the lack of marketing effort and the lack of technological awareness would indicate a very slow rate of adoption. Mainfreight hoped that customers would recognise their latent need for Freeman and that this together with the low cost to the customer might entice customers to adopt the system.

4.2 Adoption rate

Adoption of Freeman has been very slow. Mainfreight have 10,000 customers and after 18 months less than 30 of those have adopted Freeman; of the top 100 customers, which each do more than 200 consignment notes per week, only 25% are Freeman users.

Mainfreight did not have any specified penetration target in mind when launching Freeman. They were, however, surprised that the market did not adopt Freeman readily.

Mainfreight feel that slow adoption is due to customers not recognising the benefits. Customers look to tangible benefits whilst many of the benefits can not be quantified. One tangible benefit initially foreseen by Mainfreight was the labour saving aspect of using Freeman to prepare consignment notes. In order to be able to show yet another tangible benefit Mainfreight are planning to next develop a pricing table to go on the system. This facility enables customers to list their account to date before being invoiced. The customer can send a cheque and reconciliation of the account is done on the computer by Mainfreight, rather than by the customer reconciling one invoice for every consignment note written.

4.3 Impact of Freeman on Mainfreight

Mainfreight paid $20,000 for initial development of Freeman. This money was not recovered from customers since software is handed out free and as only 25 to 30 customers as yet have adopted the system. However, Mainfreight have been able to get back the value for the initial investment by using Freeman in-house.

Tangible benefits to Mainfreight are beginning to manifest. Legible consignment notes improves Mainfreight's operations; consignment notes electronically up-loaded into Mainfreight's mainframe save time in data entry.

The main impact of Freeman on Mainfreight has been to improve customer satisfaction. Mainfreight has retained all customers who adopted Freeman; all those customers have become stable customers as well. And "that is what the whole thing boils down to, really: retaining this customer loyalty and helping them improve themselves, so they get more business so that we get more business."

5 Summary

Mainfreight's Freeman system was developed in an attempt to improve the link between the customers' despatch department and the freight company in the form of more legible consignment notes and, if up-loaded, a reduction in data entry for Mainfreight. The system was developed without customer participation and the rate of adoption has been slow. The main reason for slow adoption appears to be a lack of customer understanding of the benefits associated with use of Freeman. Customers show little interest in efforts to improve their despatch function. Ineffective and insufficient marketing has meant that customers are not as aware as they could be about the benefits of computerised preparation of consignment notes and of freight tracking.

Mainfreight itself has regained its investment through internal use of Freeman. To date the impact of Freeman on the company has mostly been intangible in the form of customer loyalty and satisfaction.

APPENDIX 8 - WITHIN CASE ANALYSIS: NZ CARGO

New Zealand Cargo Services is a Trans Tasman freight forwarding company which is part of the Freightways Group of companies. It is a fairly small company with an annual revenue of about $40 million.

In 1991 one of the owners and the CEO of Daily Freightways Group initiated an EDI project for the Group. The CEO had become convinced that EDI is the way of doing business of the future and he felt that the company ought to get involved in EDI as soon as possible. In addition, EDI was seen as a way to differentiating Daily Freightways by adding value to the service offered. The CEO was particularly keen to get ahead of competitors in order to gain an competitive edge. It was decided to start the EDI project in one of the smaller companies in the group with the aim of extending the EDI network to all other companies later.

Since early 1993 NZ Cargo is offering customers the facility of Tradelink. Tradelink offers three options to customers: pre-clearance of goods through customs, transmission of consignment notes and freight tracking. Pre-clearance is fully based on EDI and is aimed at the larger customers; the other two options are non-EDI options and are aimed at smaller customers.

1 Data sources

The data for this case is derived from interviews with the Project manager of the EDI development of NZ Cargo and an NZ Cargo branch manager. Documentation includes general promotional literature on Daily Freightways Group and internal and promotional literature on the Tradelink system.

2 Research Question One

Organisational factors. The system took about a year to research and another year to develop. This was short compared to the Daily Freightways mainframe, for example, which took 5 years to develop. One major objective of the system was to gain a competitive edge on the basis of being first in the market with an EDI system of this kind. This put pressure on NZ Cargo to develop a system quickly.

The Daily Freightways Group needed to be convinced of the worth of the system before committing finances to the project. It was hard to "sell" the concept to the Group as the proposed system would not offer real cost savings; instead the benefits were expected to be intangible: improved customer relations and increased business. Being first in the industry with a system would allow Daily Freightways Group to gain a competitive edge. The system was thus "sold" to top management as a strategic system, not as an operational level, cost-saving system. Costs were very high, particularly because NZ Cargo's internal systems needed to be re-designed as well in order to be able to handle EDI messages. For NZ Cargo the costs were huge, but in terms of the whole Group the costs were relatively small. Since the system is to be used by the whole Group, the costs were acceptable to the Group.

Top management initiated the project, but did not participate in the actual development of the system. Management did remain closely involved with the project and was kept informed of progress at weekly meetings. The involvement from top management was more than it would usually be. Management were interested and wanted to be kept informed. This was a new move by the normally fairly conservative company in an attempt to maintain market share by staying ahead of competitors.

Project related factors. The task to be automated was a well-known and structured task: the information required on the various documents was known and EDI standards were available for the pre-clearance facility. The project was relatively complex since internal systems had to be re-developed and the freight-tracking module had to be newly designed. System development was outsourced; the IS team developing the system was experienced and included two programmers who had worked on Ford's EDI system in the US.

The system was intended to fit in easily with existing customer operations, though the impact in terms of benefits on the customer was expected to be great. Automatic clearance of customer documents would save the customer much re-keying of data and would speed up the clearance process. Freight-tracking was not so much of interest to NZ Cargo's customers, but would be highly regarded by the customers' customers.

3 Research Question Two

The intention of Daily Freightways was to make the system as attractive as possible to clients. The idea was not to design a system which streamlined NZ Cargo operations, but one which would fit into clients operations by eliminating client re-keying of data. The aim was to design a system with the customer in mind in order to improve customer service. It was therefore essential to find out customer requirements before beginning design and building of the system. "The package [was] designed specifically for exporters and we though about what they wanted first, and what we wanted second." (- EDI Co-ordinator, NZ Cargo).

Problem definition. Before starting the project Daily Freightways did some market research to gauge the level of interest in electronic transmission of documents. The company then had face-to-face interviews with the top ten clients and ten smaller clients to discuss the concept, the cost involved, the impact on the organisation. Clients were visited to find out how they did their business. Workflows were documented and it was found that the commercial invoice used for accounting purposes on customer's premises was manually retyped as an invoice for customs.

Design. Daily Freightways designed their system based on the information obtained from customers. The system had to capture their customers' initial invoice and reformat it for forwarding to customs agents, customs and the clients' customers. The customer can create one document which is then, with the touch of a button, passed on to NZ Cargo where 4 further documents are created from the initial one.

Building. The system was built by computer professionals. Two specialists, who had worked on Ford's EDI system, were contracted from the US.

Installation. The completed system was trialed in-house and then passed on to two test-sites. Several minor changes were made during this testing stage before the system was released to the market.

4 Research Question Three

4.1 Adoption factors

Latent need. The NZ Cargo client does not necessarily see any great benefit for themselves, but they recognise the benefit to their customers. Tradelink helps the client streamline operations by speeding up custom procedures and by offering access to freight information to the clients' customers. Usually the company sending goods consider their job complete when the goods leave their premises; it is their customers in Australia who are anxious about the arrival of goods and who are interested in knowing the progress of the goods through the exporting system. Knowing when the goods will arrive will enable customers to manage stock levels. There is therefore no tangible benefit to NZ Cargo customers; the benefit of using Tradelink for them is intangible: they are able to offer an enhanced service to their clients.

When exporting goods a company has to produce 4 or 5 sets of documents for the various organisations involved in taking the goods from the one country, through customs, to the customer in another country. Using EDI the production and transmission of all this documentation is simplified and this saves on labour costs, courier costs and transit time. In addition, Tradelink enables clients to offer a better service to their customers. Often the first an exporter knows about a customs problem is when their customer rings up and asks after their container. The exporter then needs to get in touch with customs and needs to send further documentation - this would take at least 2 days.

Some customers have no immediate need for Tradelink. Some are developing their own EDI systems and want to wait with linking into Tradelink till they have implemented their in-house systems.

Cost. The software is offered to clients free of charge. The system was completely designed by the Daily Freightways Group and the software is fully owned by the Group. This enables the company to offer the software for nothing. This is a significant advantage since clients are cost-conscious and do not like to spend money on distribution unnecessarily. Competitors are offering facilities to clients which cost upwards from $800 and they have difficulty convincing clients to adopt their packages. Once there is a cost involved the system becomes a "nice to have", rather than a "need to have".

Marketing. Tradelink is widely advertised. A lot of publicity has also been gained from newspaper and journal articles about the project. Several companies had heard about Tradelink from the test-sites; that has been very good publicity.

Sales representatives began marketing Tradelink three months before it was officially released to customers. NZ Cargo have been surprised by the interest this has created. That has made it difficult to fulfil demand: NZ Cargo do not want too many initial customers as some bugs still need ironing out.

Large customers are approached individually. They can potentially gain large benefits from being linked into Tradelink: shipping departments of large multi-nationals can make significant labour savings. NZ Cargo offer to modify the customer's mainframe environment to make them EDI capable in return for a 3 to 4 year contract.

In order to overcome lack of technical understanding of the concept, the system is explained in very simple terms, reference points are offered. "Physically showing them [what the system does] takes a lot of the mystique out of it." (- EDI Co-ordinator, NZ Cargo).

Technical awareness. Some companies do not seem interested in the use of technology to speed up distribution. This seems closely linked to a lack of understanding of the technology.

"There is a hell of a lot of lack of understanding about what EDI is. I guess it is just a new concept. People either don't know about it, or they are resistant to try new things... Until you sit down and explain to them what it is going to do, they don't understand it. Then you sit down and try to explain it - and they just can't believe it. 'How can my customs clearance be done within a matter of five minutes?' A lot of people find that hard to grasp. But we are getting there!" (- EDI Co-ordinator, NZ Cargo).

4.2 Adoption rate

At present (May 93) Tradelink has been offered to customers for one month and there are 8 customers already using Tradelink and 4 of *their* customers are linking into the freight-tracking module. There are about 35 customers waiting to be linked in, but they are being delayed as final bugs are being removed from the system.

NZ Cargo have set clear penetration targets for the system. They have set targets in terms of $ worth of business moving through the system and in terms of net percentage of existing customers to be linked into Tradelink. They aim to have 70% of NZ Cargo customers linked into Tradelink within 24 months.

4.3 Impact on organisation

Market share. Daily Freightways feel that their move to implement EDI helps protect their market position as leaders in the transport industry in New Zealand. "We have been pro-active in the market and are showing a willingness to utilize technology. In doing so we are protecting our market position as leaders in the transport industry."

Sales. Most customers use more than one freight forwarder in order to secure the best possible prices and service from their freight forwarders. When discussing the use of Tradelink with customers Daily Freightways ask customers to sign a contract and commit them to the full share of their business.

Cost. Daily Freightways estimate that implementation of the EDI system will mean cost savings in terms of labour costs, courier costs and documentation to a total of $135,000 per year. However, this cost savings is insignificant when compared to the cost of designing and building the system.

Daily Freightways are absorbing the development cost for Tradelink. It was decided to offer the software free of charge to customers which in effect meant that development costs would not be recovered directly. It was reasoned that more customers would be adopting the system if it was free and that thus in the long run revenue would be greater. Because NZ Cargo is part of a large company it was possible to cross-subsidise Tradelink in this way.

5 Summary

NZ Cargo developed its EDI application, Tradelink, in an attempt to gain a competitive edge over the opposition. Customers were involved at project definition in order to ensure that Tradelink would easily fit into customer operations. A considerable amount of money was invested in the system since NZ Cargo's internal system were rebuilt at the same time as designing the EDI application.

Tradelink has not been on the market for very long, but initial signs indicate that adoption is likely to be rapid. Daily Freightways Group hope to benefit from the NZ Cargo experience by over time extending the EDI network to include the other companies in the Group.

APPENDIX 9 - WITHIN CASE ANALYSIS: OTC

OTC are an office products wholesaler in New Zealand. There are many wholesalers in this industry but OTC is the only wholesaler with nationwide coverage.

In the late 1980s the then Financial Controller of OTC visited office supply wholesales in the US and found that customer there entered orders electronically. OTC already had an internal automated order processing system; allowing customers access to their system would not be a complicated or expensive development. Such a feature would show OTC to be an advanced, forward-looking company which was able to offer enhanced service to customers because of its use of technology. Since such an image might help to keep or gain customers OTC decided to go ahead and develop a customer access interface to their system.

Oscar was introduced at the end of 1987. Oscar provides customers with instant access to information and a quick and efficient method of ordering. Use of Oscar has thus allowed customers to change their internal system relating to ordering, purchasing and approving payment for stationery supplies. Oscar also enables customers to reduce levels of stock held at their premises.

The original Oscar was very simple and only had order entry facilities. Many enhancements have been added since its first introduction: enquiry screens, extra options, prompts for each field make Oscar more user-friendly. Oscar now supplies personalised price-lists and is able to generate customers' credit returns. OTC is at present considering whether to phase out Oscar and provide the same services on an EDI platform.

1 Data sources

Interviews were held with an OTC Branch Manager, with the Financial Controller and with a major customer. Documentation included Oscar pamphlets and company information supplied by the Marketing Director.

2 Research Question One

Organisational factors. Top management tends to get highly involved in projects. OTC is a national company in a profitable industry. It had the resources to put money into a project like Oscar. Development of Oscar did not take a long time as it only involved the building of a simple interface to enable customer access to files on OTC's mainframe.

Project related factors. The project was relatively structured. The information to be made available to customers already existed on OTC's mainframe. The project consisted of extending access to OTC's mainframe from just OTC staff to customers. The main development issue was one of security. "Our computer consultants set up a separate order entry screen which was basically a copy of our internal one; they took a few things out of that and put a few security aspects into it. It took a few days to set it up." (- Financial Controller, OTC).

Complexity of the Oscar development project was not great. The project did not take long to develop, it did not cost a lot. Development of the project was outsourced, like all OTC system development. The computer consultants had experience in screen design, communications and security issues.

OTC did not consider the extent of change that the system would bring to customers' operations. The system was developed to provide a service. OTC knew it could provide a means of locking in bigger customers, but Oscar was not introduced as part of a grand strategic plan to achieve this.

3 Research Question Two

Oscar was developed without customer participation. "I know we probably broke afl the rules... No, development was pretty much internally focused, initially..." (- Financial Controller, OTC). The project was initiated and defined by OTC; specifications were drawn up in conjunction with their computer consultants and the system itself was developed - all without customer involvement. A Branch Manager indicated that OTC consciously aim to complete a development without customer involvement: "We are very careful to make sure that any developments that we show our customers have been tested and are set up".

The initial system provided customers only with an order entry screen. The second stage of development turned Oscar into a more sophisticated system which included enquiry facilities and report options.

When developing enhancements, OTC was responding to feedback from customers who asked for extra features and suggested changes to existing facilities. Now, enhancements made to OTC's mainframe are, when appropriate, extended to Oscar as well.

4 Research Question Three

4.1 Adoption rate

Oscar was originally aimed at large customers. Those large customers were approached and offered a free terminal to enable customer ordering of products. This represented a cost to OTC of around $2,000 per site. Because of this cost, OTC was careful to only present terminals to customers who obviously needed electronic access or to customers whom OTC wanted to lock in. In the first two years about 10 or 12 customers were supplied with a terminal. Initially, therefore, adoption was controlled by OTC.

Later the Oscar facility was advertised in the OTC catalogue and access was opened up to anyone with a PC and modem. Two kinds of customers then took up Oscar. Enhancements to the product enabled users of Oscar to keep track of purchasing of more than one department in an organisation. Oscar thus became particularly attractive to large customers with multiple sites or multiple departments. The second type of customer adopting Oscar was the smaller, but technologically aware customer; those customers realised electronic ordering could give the efficiency benefits and enjoyed using computers.

Recently, adoption has slowed. OTC see a need to keep up with customer requirements for integration of Oscar with customer purchasing systems. Now customers are increasingly using purchasing systems for stationery orders. For those customers, use of Oscar would involve double-entry and re-keying of data that is already held on their internal purchasing system. Instead of using Oscar those customers print out their orders and send them by fax or post to OTC. These customers could be served with EDI access to OTC's mainframe. This need has been growing over the past 18 months but OTC has been involved in other projects and has not addressed the EDI issue till now. OTC is aware of the need to enhance Oscar and to offer EDI access to its ordering facilities; the company is at present investigating how to become EDI capable.

OTC is investigating EDI options and hopes that adoption of Oscar will increase again once the EDI facility is available. At present OTC estimate that about 250 customers out of their active customer base of 5,000 have access to and use Oscar.

4.2 Adoption factors

Expressed need. Initially there was no customer expressed need for a system like Oscar; no market research was carried out to gauge potential interest in the system. Oscar was developed because the then MD had seen successful systems like it in the US. OTC management perceived such a system as a means of setting the company apart from competitors and to provide a competitive edge. This alternative means of ordering would enhance efficiency and convenience to the customer and would therefore be perceived as an added service offered by the company.

After its first introduction several enhancements and extra facilities were added to the system. Several of those were added specifically in response to customer requests.

Latent need. Stationery ordering is a conservative business. Although many organisations may spend a large proportion of their budgets on office supplies, the ordering of the products is a low priority area of many businesses. Improvements in the order process are not actively sought by OTC customers. However, Oscar enables customers to save time and money. Time can be saved as customers do not need to phone OTC or to wait for sales representatives to call in order to check on information and/or to place an order. Oscar helps organisations become more efficient in their operations: it allows customers to run a stock-less system, to maintain central control and to supply stationery to various departments and locations within 6 hours of an order being placed.

Marketing. Initially Oscar was aimed at very large customers. Those customers were offered a free terminal. Later, when Oscar was offered to any interested customer, brochures were printed, Oscar was advertised in the catalogue, branch managers and sales representatives were shown how to "sell" Oscar and a manual was developed.

Recently OTC has paid very little attention to marketing of Oscar. Their Oscar brochure has not been updated during the last 2 or 3 years. Due to a recent merger of OTC with GP Stationery other aspects of the business have taken priority. Also, capacity and slight security problems are holding OTC back from fully promoting Oscar. Thirdly, the change in customer facilities and a likely impending move to EDI are making OTC reluctant to actively promote Oscar for the time being.

Cost. Several very large customers were supplied with free terminals so the customer only incurred telecommunications costs when using Oscar. Later customers began to use Oscar through their own PC and modem. Those customers are responsible for their own hardware and communications software costs. However, as businesses are increasingly using PC-based systems and modems for communications outside their organisations, hardware and communications software are usually available on customer premises. Accessing OTC through Oscar therefore presents a negligible cost to the customer.

Technical awareness. When first offering Oscar to customer, OTC targeted just a few large organisations. At the time hardly any company had computerised their purchasing facilities; computerised purchasing may have been available for the core business, but not for stationery ordering. Stationery ordering was usually done by a single person who co-ordinated paper-based orders from all departments in an organisation. Orders would be collated, sent off to the wholesaler and large stocks were kept on customer premises. Stationery was considered to be a cost centre.

It was not always easy to convince the early customers to accept and use Oscar.

> "Most of them were unfamiliar even with using a computer or keyboard, let alone having one that was using a modem and going over the telephone line. It was a major thing for them. It was the level of familiarisation that people had initially that made it quite difficult to support" - Financial Controller, OTC.

Recently, services like stationery have been incorporated in organisations' internal computerised systems.

> "As time has gone on, you know, everyone now knows what a keyboard is and most people know what a modem is. Therefore, the acceptance of Oscar is not a low higher and a low easier." - Financial Controller, OTC.

4.3 Impact on OTC

Oscar provides one of several ordering options for customers. OTC does not keep records but estimates that less than 10% of orders are generated by Oscar; between 55 and 60% of orders come through by telephone, the remainder are placed through sales representatives or by fax.

Market share. Oscar offers OTC customers a facility and service which they can not get from another stationer. Oscar gave OTC a competitive edge when first introduced. The convenience and savings in terms of cost and time have locked in customers. Oscar has enabled OTC to gain some business: the extra service offered by Oscar has swayed some customers to use OTC rather than another stationery supplier.

Internal operations. Provision of Oscar facilities has meant extra work for OTC. There are access and security problems which regularly surface. In terms of access initially only one line was available; now there are 4 lines, but his is not always enough. By not having access available when a customer wants it, the customer may be discouraged from using Oscar and revert back to using the phone. This has indeed happened with some customers.

A system needs to be developed and maintained and that is an area where OTC are not sure how to progress. It is recognised that a project like Oscar benefits from being passed to one particular person to take responsibility for development and promotion. Within Oscar this has not (yet) been done. Support is given on an ad-hoc basis by sales representatives or by the Financial Controller. Very few people even within OTC are familiar enough with Oscar to provide adequate support to customers. OTC would like to provide full service of Oscar as a service to customers, but they feel torn as IT service provision is not their core business.

Costs. Orders coming in on Oscar save OTC the keying-in of data: telephone, fax and sales representative orders all have to be manually entered into the order processing system. OTC are not monitoring the savings brought about by use of Oscar by customers, but management are convinced that Oscar does translate into cost-savings.

> "Whatever sales come through Oscar are sales we have not had to manually work ourselves. So it is saving us money, for sure... And it is not just orders, but also queries: even though we supply price-lists, [customers] still tend to ring up and ask for prices. Oscar users obtain that information from the system." - Branch Manager, OTC.

Customer satisfaction. Oscar provides a value-added service to customers. Large customers can keep central control and can authorise orders for stationery from a single point in the organisation but do not have to keep and distribute stock: OTC deliver stock within 6 hours of the order being placed to the sites or departments identified in the order. OTC try to promote a stock-less system for customers and thus enhance customer satisfaction: if the customer does not need to hold stock, money can be saved on out-of-date stock, on inventory and on distribution of stock.

5 Summary

OTC built their Oscar system as an extra customer service feature after having seen similar systems in the US. Alterations were made to their mainframe in order to enable access by customers. Originally OTC specifically targeted potential Oscar users and gave them a terminal with modem; after 2 years Oscar was made available to any customer who could and wanted to order electronically.

Adoption of Oscar has been slow. OTC have found that customers either have no computerised purchasing at all or want to use integrated purchasing systems. The customers who are technologically unaware would benefit from education in the use of technology - something which a good marketing effort would provide. However, OTC are not in the business of IT provision and have not set aside the resources for a major marketing campaign. The customers who use integrated purchasing systems are interested in EDI trading. OTC is seriously investigating this avenue.

APPENDIX 10 - WITHIN CASE ANALYSIS: STEVENS

Stevens Pharmaceuticals is a pharmaceutical wholesaler in New Zealand. Since the mid 1980s Stevens has been wholly owned by a Swiss multi-national (Zuellich) and is not one of the two major, national wholesalers of pharmaceutical products.

Wholesalers attempt to be a one-stop-shop for their customers and supply not only prescription drugs and over-the-counter products, but also computer systems which help increase pharmacy efficiency. Stevens has offered computerised systems for the non-dispensary part of a pharmacy since 1985. In the late 1980s the technology on which these systems were based, became obsolete and Stevens had to decide whether to design a new system or to withdraw from the market providing computerised systems for pharmacists.

It was decided to design a new, point-of-sale (POS) system encompassing inventory, electronic ordering, sales and marketing facilities for pharmacists. The system was named Shopmaster and was first offered to customers in August 1991. The first version of Shopmaster had many features which competitors' systems had missed out. Further enhancements have since been added.

1 Data sources

Interviews were conducted with the MIS manager of Stevens and with the Manager of Foundation Systems. Foundation Systems is a subsidiary of Stevens which markets the Shopmaster systems for pharmacies; Stevens' MIS department maintains the internal order processing system and supports Shopmaster. Documentation on the case included Annual Reports, promotional literature on the company and on Shopmaster.

2 Research Question One

Organisational factors. Top management was involved in Shopmaster development in decision-making capacity only; their priority is the main business of wholesaling and distribution.

Project-related factors. Foundation had experience of developing systems and usually employ contract programmers for special projects. They had no experience with the particular technology use (relational databases).

The order entry component of Shopmaster was structured, since product ordering is standard and had already been automated. The other functions offered by Shopmaster (inventory control, sales, marketing databases) were in themselves structured tasks, but were not close to the wholesalers business. Shopmaster was a system designed to ease and improve a number of operations on the customers' premises; Shopmaster was not designed merely to improve the interface between pharmacy and wholesaler.

3 Research Question Two

Shopmaster was developed with the input of pharmacists. Once the decision was taken to go ahead with the development of a new POS system. Stevens contacted key customers to participate in development of the new system.

Initial definition. Several group meetings were held to discuss the look and feel of the system. Customers were asked to list requirements of the system. This resulted in Shopmaster containing several features that were not available in competitive products. Shopmaster, for instance, brought in pull-down menus and contained integrated marketing systems.

The manager of Foundation Systems, who was in charge of the development of Shopmaster is himself a pharmacist. He was aware of pharmacists' requirements but admits that one really needs to be a *practising* pharmacist to really be able to identify requirements. He felt that, being a pharmacist, enabled him to speak on a level with pharmacists during interviews which enabled him to elicit requirements from them.

The pharmacists who asked to participate in development of Shopmaster were successful businesses; some of the pharmacists had an OTC computer, others were not computerised; all were interested in POS systems. A requirement document was written and sent out to a dozen pharmacists for comment. The document was then modified according to their comments.

Design. A professional software company designed the screen lay-outs and decided on the language in which to write the product. Work on the system was started in October 1990.

Build. The software was built by contract programmers.

Installation. In May 1991 a small pharmacy with one till became a test site. The system was then tested in a multi-user site with 5 tills. Testing and refining of Shopmaster was not properly completed. Due to customer demand for early release of the product, Shopmaster was launched before Stevens were 100% satisfied with it. At the time of launch the system was not very stable, was not properly de-bugged and did not operate fast enough.

Further developments. Since initial development users have regularly come up with requests for enhancements or extra features. List of requests are compiled and individual suggestions are prioritised. Due to constraints on time and money available for development the suggestions which are likely to offer substantial benefits to pharmacists at large are accorded first priority. These developments are customer-driven in that they are responses to customer requests for change.

4 Research Question Three

4.1 Adoption factors

Need. Pharmacies' profitability is dropping and pharmacists are consciously looking for ways to run their businesses more effectively. A POS system makes them more efficient, controls stock, helps them target customers. Shopmaster fulfils a need perceived by pharmacies.

> "Many pharmacists were already convinced that computerising OTC (over-the-counter) was the right way to go...; some of them believe they don't need a system and they can run the business from the seat of their pants, because that is how they have always run it." - Manager, Foundation Systems

Cost. Shopmaster software costs about $5,000. Adding together the cost of software plus a PC, that means that a pharmacist can install a very good POS system for less than $8,000. Apart from the initial cost of setting up a POS system, pharmacists pay a monthly support fee which provides for training, on-going support, customised reports, software upgrades.

There are pharmacists who consider investment in a POS system as a substantial cost and who use cost as an excuse for not obtaining one. The cost of acquiring a POS system may be substantial, but off-set against this should be the potential benefits. Stevens estimate that a pharmacy can reduce stock by $20-25,000 in 6 to 9 months. One of their customers was able to reduce purchases by $7,000 per month within 5 months of installing Shopmaster.

Marketing. Shopmaster was launched at a pharmacists' conference and was advertised in pharmacy journals, mail shots were sent out, some cold calls were made. Now the system markets itself: pharmacists hear about it, see it in use by a colleague and find out about the system informally.

Stevens have realised that marketing of Shopmaster does not only involve trying to sell the product, but also includes selling the use of the system and the impact of it on the pharmacy's internal operations. Pharmacists must understand the amount of work required and must be aware of changes required of staff members.

There is an education process that wholesalers have to go through with the pharmacist before putting in a site. A lot of pharmacists are not prepared for change, but they have to change their way of operating when they start working with a POS system. That education and preparation "can be the make or break of a site, really" (- IS Manager, Stevens).

Stevens feel that they could achieve higher adoption rates if they had more resources to market the product. There are at present 5 people involved with Shopmaster sale and support. Stevens top management consider this a large resource - in their view the thrust of the business is in wholesaling, not in IT. They are therefore reluctant to commit more resources to Shopmaster.

Technological awareness. It is very hard to make many pharmacists understand that their operations have to change when they implement a computer system. A POS system runs the business which means that stock must be booked in when it arrives, prices must be updated when new prices come out, end-of-day processing must be completed daily.

Some pharmacists still have a fear of computing. They may have a dispensary computer which assists pharmacists in their own area of expertise, but they are worried about use of a computer in the OTC area. In order to use the computer effectively pharmacists have to change their way of operating their OTC area and many are afraid that they may be ruled by the computer.

> "A lot of it is fear for the unknown. I will give you an example: we sold a POS system in November last year and installed in May of this year. The pharmacist delayed and delayed, because he was frightened of installing this computer. But he could see that the man across the road had one, so he thought it was the right thing to do. He rebuilt his shop, built new counters - but, no, he was going on holiday or Christmas was coming up or something else had come up. We were getting quite nervous because he had paid for it! He was frightened; he said "how can I cope with this ordering system ' I have always done it my own way..." - IS Manager, Stevens

4.2 Adoption rate

Stevens had loyal sites which had purchased the old OTC system and which would upgrade to the new system when it was available. The first 10 sites or so adopted Shopmaster before Stevens had to actually start "selling" the system. Shopmaster was launched in August 1991; by December 1991 15 sites were using the system. Six of these sites were pharmacies who had been involved in the development of Shopmaster, the others were new sites.

Now, nearly 2 years after launch there are about 40 sites using Shopmaster, some of those are multi-user sites. Stevens are pleased with the present rate of adoption. Early in 1993 they had to delay installations because they did not have the time and resources to cope with demand.

The initial target was 3 installation per month, but this was not achieved. Stevens feel that more staff members would have been required to sell and support the product for that target to be realistic. Sites must not only be installed but also need to be trained and supported - without the latter,a site becomes disillusioned, provides extra work and can easily lead to bad publicity about the product. It is therefore considered to be better to have a small number of good sites than a large number of bad ones.

About 75-80% of Stevens' orders are received electronically. About 25% of orders come in from dispensary systems or retail management systems; the vast majority of pharmacists order by Portable Data Entry (PDE). The older generation of pharmacists tend to prefer using the telephone and they will still call in with 250-line orders.

It is interesting to note that there are significant regional variations in the proportion of pharmacists ordering electronically. The Christchurch region, for example, has only about 40% of orders coming in electronically; in the North Island nearly all pharmacists place orders electronically.

4.3 Impact on Stevens

Cost and efficiency. With 75-80% of orders being received electronically Stevens has been able to realise big savings in terms of numbers of order clerks who have to take calls and key in orders.

However, only a small proportion of the electronic orders is generated from POS systems; the majority of electronic orders originate from PDEs or dispensary computers. At the same time, support of POS is expensive and time-consuming. There is a high cost associated with electronic ordering. A group of customer services staff has had to be set up to support pharmacists in their use of the POS systems.

Stevens top management are considering ways of containing the cost associated with POS support. One option which is being seriously considered is out-sourcing this support to a professional third party. This would allow Stevens to concentrate on their core business of pharmaceutical wholesaling.

Cost of support is considerable with few tangible benefits. There is, however, the intangible benefit of keeping up with the competition in offering POS systems for pharmacies and providing a one-stop-shop service to customers.

Profit from system sales. There is a profit-component built into the POS price, but prices of POS systems in the industry are very low. Compared to other industries the cost of a POS system for pharmacies is very low. The reasons for these low costs are related to the highly competitive nature of the pharmaceutical wholesaling industry. In attempts to woo pharmacies, wholesalers have set very high standards in terms of service and support. This now means that individual pharmacists expect superior service at very little or no cost. Prices remain low and profits from Shopmaster sales are only marginal.

New customers. Shopmaster has been used as a bargaining tool when trying to gain business from a new pharmacy. On few occasions pharmacists have been offered a free POS system in return for the bulk of their custom for line-orders. In this way Shopmaster has helped to gain a few new customers.

5 Summary

Stevens developed Shopmaster in order to provide a similar range of products and services as their major competitor. Being able to provide prescription drugs, OTC products as well as computer systems for pharmacists is considered to be a strategic necessity for being a national pharmaceutical wholesaler in New Zealand.

Customer participation was sought not only in project definition but particularly in the design stage of Shopmaster. Pharmacists drew up and checked the requirements document which then became the basis for full-scale development of the POS system.

Adoption of the system has been slow due to lack of resources put into marketing and support and, secondly, because of the high cost to the customer.

The direction of Shopmaster is unclear. Since June 1993 Stevens has taken over its major competitor, Community Pharmacy Ltd (the pilot case for this study). Stevens now have a number of options concerning the supply and support of POS systems. In terms of the number of systems on the market, they can offer both CPL's and their own POS system or they could phase out either of the pharmacist systems.

In terms of supporting POS systems, they can support systems separately, combine support of the two systems or can outsource the support function.

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