EVOLUTION OF THE HELP DESK SERVICE IN A MEXICAN ORGANIZATION: A CASE STUDY

DOCTORAL DISSERTATION

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EVOLUTION OF THE HELP DESK SERVICE IN A MEXICAN ORGANIZATION:

A CASE STUDY

by

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EVOLUTION OF THE HELP DESK SERVICE IN A MEXICAN ORGANIZATION:

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to Leo
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ABSTRACT OF DISSERTATION

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Title: EVOLUTION OF THE HELP DESK SERVICE IN A MEXICAN ORGANIZATION: A CASE STUDY

The Help Desk service has been a useful way to fulfill the immediate needs of MIS users when they interrupt their work due to a misfunction of technology or simply when they have some question about the hardware or software.
The Help Desk formal service is hardly comming to existence in a planned way, it has rather evolved because of the users's needs demanding a fast solution in order to maintain the operation up. That's why the gathering of information about the problems solved is not properly used. In the ideal situation, this information should be delivered and used by the decision-makers for generating knowledge, and therefore having an impact on the organization's technological strategy. Due to the hurry for solving problems and the little emphasis for generating knowledge, the research in this area has been almost completely in the hands of practitioners. Consequently, it is important to deal with two issues: the formal research for Help Desk and the study of its evolution since its formalization.

This thesis shows the concepts related to the Help Desk service and also its descriptors and the way in which its structure and function are influenced by several organizational factors. The objective is to propose a theoretical model for the evolution of this service inside an organization. A case study is carried out in a Mexican organization in order to evaluate the validity of such model. This evolution is defined from the possible ways in which an organization uses the information technology, according to the IT strategic grid proposed by Cash (Cash 1992). The results of the research confirm the usefulness of the proposed model.
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CHAPTER I. INTRODUCTION

1.1 General concepts about the Help Desk and its role in the organizations

Help desk (HD) is the generic name (Verghis 2000) typically associated with the single and more visible point (Marcella and Middleton 1996 2) (Sorkin 1993) (Polilli 1992) of interactive contact for end user support by phone and other media like e-mail, voice mail, fax or interactive software. This support is mainly related to the operation of computer systems that users use as part of their responsibilities. The HD staff advises, solves problems or coordinates solutions (Molloy 1995) (Muns 1993). This is about users' questions and complaints related with the software and hardware they use as part of the service received from the organization's IS (information systems) unit, directly or indirectly. These users may be employees of the organization (internal), customers (external) or suppliers (external). The HD acts as the highest-level interface between the users and the IS unit, because it functions as the first and closest contact.

Organizations create the HD function (as a department, area, center, etc.) commonly when they find themselves in a problem cycle: rapid innovations in technology accompanied by expanding business requirements can lead to
changes that dramatically increase the complexity of the technological environment (Sirius3 1996). Typical examples of this situation are the shift from mainframe-only to PC’s network or the shift from traditional local-area networks to some special intranet software.

The function of the HD exists in every organization, with different levels of formality and possibly with different names (Verghis 2000), for example:

- Computer support center
- Customer support center
- Information center
- IT solutions center
- Resource center
- Technical support center

There are cases where the HD staff is composed by advanced users, in other cases the staff is the same people programming the systems, there are also cases with specialized people but not full time for that function and finally the formal case, where there is a specialized staff assigned to help users exclusively. Although the HD applies to the solution of problems, it also functions as a diagnostic and predictive tool (Marcella and Middleton, 1996 1) (Muns 1993) because through it, it is possible to watch what problem or problems are arising.
The success of an information system can be evaluated through the information system utility approach (Kendal and Kendal 1995). In this approach the system's utility is seen by its:

- **Form.** What kind of output is delivered to the decision-makers
- **Time.** When the information is delivered
- **Place.** Where the information is delivered
- **Possession.** Who should receive the output
- **Actualization.** How the information is introduced and used by the decision maker.
- **Goal.** Whether the output has value in helping the organization to achieve its objectives.

The HD has a critical role in all those ways to see the utility of an information system but mainly in the “actualization” one, because of the operation troubles during interactive sessions. Even if the users are well trained when a new system is going to be implemented, considerable learning also takes place during the actual use of the software (Bergeron, Rivard and De Serre 1990), not only because it is impossible to train users about all the potential situations but also because of the diversity in the users’ way of learning (Mirani and King 1994) (Molloy 1995) and many of them have little or no experience with computer systems that have to run 24 hours a day, seven days a week (Laub 1995). Once at work, employees are not productive if their computers aren't working, and customers are not satisfied if they are unable to use properly the products or services they purchase (Molloy 1995). Every hour of lost productivity due to a problem with computers is money
lost for the organization (Cohen 1995). Furthermore, products are used in undocumented and idiosyncratic ways and this situation can be out of control when the organization adopts a new version of hardware or software in use (Molloy 1995). Unfortunately, all the savings in training translate into needs for support and support costs (Sirius3-2 2000).

HD becomes a real solution for many people like the salespeople. In this case, without help desk support, investment in sales force automation may go to waste (Cohen 1995); and in the case of HD support for customers, each contact is an important opportunity to differentiate the organization from the competition (Simmons 1996).

The HD service is provided as part of the IS unit's responsibilities even though the service may be carried out by other units inside or outside the organization. The questions and complaints can be transmitted by phone or other media, and users typically expect to have a solution in a short time, for example from instant response to one day as a maximum. Help desk service can also be provided by another external unit, in the case of outsourcing.

Internal users are employees of the organization who are using some of the services provided by the IS unit of the organization, specifically computers, peripherals and application programs.
External users are not employees of the organization, for example customers, suppliers, partners, auditors and any other who use any kind of software or hardware provided by the IS unit and require some kind of support in the use of them. However, for the rest of the chapters of this thesis, the only HD users considered are the internal employees.

The principal objective of the organization in this sense is to provide a high quality service to the users through the HD. This means (Armstrong 1992) reducing the average amount of time spent per call, increasing the percentage of problems answered on the first call, reducing the number of calls made to the HD, focusing more effort on complex and unusual problems, raising the average level of expertise for HD staff, reducing training time for new employees, crossing training staff to answer questions outside their expertise and improving support during off hours. The effective service of the HD support has a positive impact on the performance of users and the use of their computer systems resources.

The HD function is reaching a critical point because of the growing complexity and diversity of hardware and software the organization’s people use (Moad 1994) (Filipczak 1995). The more complexity of these factors, the more demand of services for HD. This complexity comes mainly from the PC revolution (Tischler 1996). Incorrect manage of such complexity inhibits the long-term objective of the HD, which is to generate knowledge for internal and external use.
I.2 Thesis's objective

As it has been seen here, the variety of problems related to the HD can be large and they can come from a number of areas and all of them require formal research. However, this thesis attempts only to clarify the wide vision of the HD from the evolution point of view, because the majority of HD services, "have come into by evolution" (Marcella and Middleton, 1996 2). In other words, they have developed in reaction to the demands placed on them. So, the objective of this thesis is to respond to the research question: "How does a HD department evolve, as it attempts to match the evolving needs and structure of the organization to which it belongs?"

It is good to define at this moment the term "evolve"; it means: "to develop gradually" (Webster's new world, 1996). From the point of view of information systems, that development is related with the changes occurred in any of their components: people, hardware, software, telecommunications, procedures and databases (Stair, 1996). The way in which this research is accomplished is discussed in detail in chapter 5: Methodology.
I.3 Sequence of the thesis structure

The thesis is structured as follows:

Chapter 2 shows the components of the HD and its descriptors as well as the organizational factors that can have an impact on this service.

Chapter 3 explains the potential uses of the generated information; also, the current trends to render this service are mentioned.

Chapter 4 presents the IT strategic grid and its use for the study of the evolution of a HD. This grid is used as a model to analyze the type of use given to the information technology in the organization and its subsequent relationship with the HD.

Chapter 5 explains the methodology used to accomplish the proposed objective, shows the instruments used as well as the steps that were followed. This methodology is the case study approach. A theoretical evolution model is proposed as a starting point. This model was tested in order to verify its validity in a real case. The organization chosen to perform the case study is also described here and a set of propositions is presented.
Chapter 6 details the whole case study; in other words, it shows the evolution of a particular HD. It is discussed the fit between the proposed theoretical model and the evolution observed in the organization's HD. There is also a discussion about the other propositions. It is concluded that the theoretical model is a valid way to visualize the evolution of an organizational HD.

Chapter 7 shows the overall conclusions of the thesis, emphasizes the main contributions and describes the future research projects that would be a logical extension of this thesis.
CHAPTER II. THE ORGANIZATIONAL HELP DESK

II.1 Introduction

The purpose of this chapter is to provide a more profound knowledge about the HD and its organizational context of service. The second section of this chapter describes the way in which help desk (HD) service is offered and the possible variants for a formal service. In the third section the goals of HD are listed. Section four identifies and discusses facets of a HD such as structure, ownership and coordination descriptors. The fifth section focuses on the impact of certain organizational design factors on the design of a firm’s HD.

II.2 Help desk services

HD service is offered in both formal and informal ways. Informal help is by users among themselves and also by programmers or technicians who in different periods of time work close to the users and become their advisors. Formal HD is offered by specialized people who have support as their work. This service is often provided through the phone even though there are other media used, and
sometimes, physical site visits as well. The focus of this thesis is this second form: formal HD.

A HD is staffed by specialized people whose primary function is the support of the organization's information technology resources and applications. The first level of the help desk is comprised of a staff that responds to initial telephone calls and emails from users. This team is formed by people working in a special site (HD site) who have a working knowledge of the applications and the hardware that the users use. They are the first point of contact for a user and they try to solve or at least to clarify all the problems during the user's call. Typically, first level members speak to users only by phone (Marcella and Middleton 1996 2).

The second level is comprised of specialized staff such as programmers, technicians and technology experts. They support users whose problems could not be solved by the first level. Unlike the first level staff, they could be members of different departments and their main task is not the support. However, sometimes a specialized technician is assigned to solve user's problems on a full time basis. In this case, if users call this technician directly, he or she serves as the first level as well. Second level solutions imply an extra call or a personal visit to the user (Kirwin 1995). Depending on the problem, more than only one extra call or visit may be needed. Thus, second level members are the only members who do visit the user, but depending on the available technology, this visit could be a virtual visit.
A less common level is a third one. It is the third opportunity to solve a problem not solved by the first and second level. Most of the time this level is functionally but not organizationally part of the HD, since it is comprised of people from the suppliers of the software or hardware. People of the second level (the internal experts) are responsible to contact them for any problem.

These levels are transparent to the user and, ideally, they should be insensitive to the particular help desk resource person assisting them. However, the distribution of help desk resources across these three levels has significant cost and effectiveness implications to the organization.

II.3 Goals of a HD service

Formally, the major functions of the service are the following (Davis, Larson and Rhoades 1997) (Marcella and Middleton 1996 2):

- To identify the caller, the problem and its impact.
- To solve the problem at first call (if possible) or
- To get problem information in a consistent way to assist technical staff in resolution.
- To mediate between technical staff and the user (the caller).
- To track and report status of problems.
- To record information about the problem's solution.
To measure the level of service provided.

To generate management statistics.

According to the Help Desk Institute, those areas represent the following percentage in the HD effort (Muns 1992) (Davis, Larson and Rhoades 1997):

- Software: 35.2%
- Hardware: 22.6%
- Data communications: 15.4%
- Operating systems: 7.1%
- Databases: 3.4%
- Voice communications: 3.1%
- Other: 13.1% (Re-enable passwords, or questions of the type "when", "who", "where")

The last goal of a HD is to become part of the company's business in four different fronts (Galbreath 1997): corporate strategy, business process, technology infrastructure and people. So, companies with customer-focused strategies linked through all the processes and supported with the right technology and well-trained and motivated people, will be in better position to support the customers. In case of internal users, this situation will cause satisfied and more productive employees and for external users, loyal customers.
Today, the HD service is supported more and more with software tools that automate most of its processes. For example: knowledge bases, rule-based expert systems, neural networks, fuzzy logic and case-based reasoning. Even more, the World Wide Web is also used as a practical way for providing the service (Muller 1996) (Tischler 1996). All these types of efforts are approaches to overcome the reality that the capacity of human resources in the HD staff is usually very limited.

Making HD data bases available to the users also allows more problems to be solved without a support call or generating a trouble ticket. This kind of service is called "hands free support" (Filipczak 1995). The objectives of a service like this are: to standardize the responses, to discharge the staff and to deliver a faster response. Ideally, the HD is not only a help service for user's problems but it can be seen as the pivotal point in service automation (Tischler 1996), i.e., HD can deliver information for decision making about automation strategies.

II.4 Help desk descriptors

From diverse sources (internal and external) HD is motivated to change and it must take one or other shape in order to fit well into the organization and its specific context.
The way in which a HD varies depends on the way in which its descriptors
can vary. The descriptors are part of the propositions of this thesis and they are a
heterogeneous group of variables each one having a particular domain. These
descriptors, as a group, define the shape (structure and behavior) of the HD.
According to their nature, the descriptors can be classified in structure descriptors:
internal organization, degree of consolidation, media of communication and degree
of automation; ownership descriptors; and coordination descriptors: decision rights,
reward system and evaluation system.

Structure descriptors

Internal organization of the HD: Help desks can be very different from each
other. However, there are some generalities that allow seeing the HD as a group
formed by three levels or layers (not related with hierarchy, only with function).
Those layers, described in the beginning of this chapter, could be the more formal
structure. However, a number of intermediate organization’s shapes can be
possible. For example, variations can come from the number of levels itself, the
responsibility border among them and the level (first or second), which functions as
the pivotal of the service. These levels are transparent to the user. He or she only
calls and the service is an instant or later answer, or a visit of some specialist. It is
important to note that the higher the level, the more heterogeneous is the group.
Therefore we can set the internal organization as a descriptor of the HD.
Degree of centralization: a HD centralized is one with functions and decisions taken in a single point [Wallace 94] [Fine 94]. This is, there is a unique HD, if not, it is called a HD with low level of consolidation, but such case is not studied in this thesis.

A HD service often begins informally in distributed way, with some expert users and programmers supporting some applications in their working area through the whole organization. When formalization starts, administration makes one or more HD services and they could have different degree of centralization.

There is a trend to centralize the service at the same time it is formalized [LaPlante 92] [Fine 94] [Wallace 94]. This fact is a response to the necessity for standardization and cost cutting. The decentralization of the service, on the other hand, is a result of the necessity for serving to two or more groups of users when these groups are clearly different, for example about the working place (internal or external), about organizational level (operational or strategic), about priority (client service systems or low priority management systems), about technology used or any other difference where some benefits [Brickley 95] could occur, such as a better use of local knowledge, smaller staffs easier to administrate and better contact with specialists that know how users use applications.

A HD service not only can be centralized or decentralized but also it can be a mix. In this mix there is a centralized HD service and also a number of local
services closer to users of the same kind but with functional dependence of the central office. It is important to note that while there is a trend to decentralize the organizations, there is the trend to centralize the HD service. An explanation to this fact is the efficiency in the use of communications, so experts can be available to users wherever they are. Other one is the cost. William Sheehan’s research [Wallace 94] showed that a centralized HD can answer the same number of calls with less staff than a group of separate help desks. Because of all the implications and possible benefits, degree of centralization is a descriptor of the HD.

Communication Media: HD services mainly use the telephone. However, there are available other media increasing their use among the users, like e-mail and interactive programs. Using the phone implies a physical central staff receiving the calls and answering or forwarding them (immediately or via memoranda) to the right places. The telephone is absolutely necessary in most of the services of this kind. E-mail implies a more sophisticated communications structure and it needs a friendly user interface in order to guarantee a tool, which doesn’t need support, otherwise, user would need a support for the support. It is important to note that users will use e-mail if their problem is not so critical, because of the “no instant response” of this way of communication and even here, they do not expect a slow service.

Interactive programs for HD can be used embedded in the programs provided for users by the IS unit or also they can be available via web. In this case it is said
there is a "hands free support" [Filipczak 95]. This is a very first interface of the HD service to the users. Users access the program (or the page) and interact with it [King 92] [Muller 96] classifying their problem and finding a solution. Naturally, if the program cannot provide a solution, it must include the way to communicate to the next level, both by e-mail and phone. Next level (really first level) is people answering the phone. Note that the real difference among several media is whether the user can solve his or her problem by the same media where the problem is and in instant way. Note that media of communication is an essential part of the service itself and therefore, another descriptor of the HD.

Degree of automation: A HD service, as it is described here, has the same objectives independently of its degree of automation. Certainly people do problem resolution without automation all the time, but the problem is that it is less efficient, less accurate and less consistent [Harding 94]. This fact begins to be true as complexity and demand of the service increases. In some organizations, the number of support calls is rising as much as 20% to 40% per year and a survey by the Help Desk Institute finds ratios of between 500 and 1000 users per technical representative in large organizations [Armstrong 92].

What really differentiates one HD from another is what happens to the information once the operator logs it in [King 92]. For example, at a typical automated help desk, when a call comes in, an operator logs the name of the caller and records the kind of equipment he is using and the exact nature of the problem.
This information is automatically stored in a database or logging system [King 92].
Also it is common for the user to have a first contact not with a staff member but
specialized software, which can guide him to get the solution without the
intervention of any person. This is called “hands free support” [Filipczak 95]. As the
complexity increases, this option is seen as mandatory by some managers
[Harding 94].

Typical systems for automation of the HD include: call dispatch systems, call
tracking systems, problem management systems, a configuration database, and a
technical information database [Armstrong 92]. With some kind of technical help
as a case database, it is also possible to facilitate the learning of the new staff
members and the distribution of the knowledge. This distribution of knowledge
helps the staff provide consistent service, increase coverage, and reduce the
amount of time per call [Armstrong 92]. Due to the influence the automation has on
the service offered, it is also a factor in the structure of the HD.
Ownership descriptors

Even though the HD here described is a responsibility of the IS unit, this task can be done directly or indirectly. Direct support implies a specific department (HD department) providing the service, which is a subunit of the IS unit. Indirect support means that the service is provided not by an internal subunit, but by an external unit specialized on the task: this is outsourcing.

In this way the ownership of the service can be internal, external or even a mix. It has been seen that as technology becomes more complicated and IS staffs shrink, many companies look to off-load at least some of their end-user support. Early in a 1996 survey of the Help Desk Institute, 456 of 1000 companies said they currently outsource help desk support, and another 221 plan to do so this year [Kay 96]. New research from Gartner, shows that in the next five years more than 50 percent of each new IT investment dollar will serve business processes outside the back office, at least in HD and e-mail services [April 2000]. Also, Meta Group Inc. of Stamford, CT, reports similar trends where findings were that by 2001, more than 75 percent of large companies will outsource some functions of their help desks [Fister 1999].

Reasons for outsourcing may include resources shortages, budget cuts, hiring freezes and downsizing, gaps in the knowledge of current staff, forced conversions or systems changes with little time to respond and redeploying the
staff in new areas while maintaining the performance levels of the critical systems [Kelly 1998]. However, outsourcing the HD not necessarily means the organization wants to know nothing about it; most of the companies retain the first level of the HD support internally to keep their hands on the pulse of their organization [Kay 96].

The possible ways for offering the service can vary from a very simple internal and unique HD to a very complex mix of internal and external HD serving different departments or strategic business units. The figure 2.1 describes the possible ways for getting the service. In all the cases, it is possible to follow the two or three ways that leave any rectangle. It means for example, that the service can be partially both internal and outsourced.
Coordination descriptors

Decision rights: A decision right is the power of decision given from the superior authority for deciding what to do and how to do it. From the point of interest of this study it is possible to focus the decision rights relating them to the organizational internal levels of the HD service (manager, first, second and third level). Thus, a manager’s decision rights may include decision right for planning the internal organization, the hardware and software infrastructure, the people to be hired, the way for reward the staff and even more, the ownership of the service.
The first level member's decision rights may include decision rights for forwarding the call to the next level, to store the given solution as part of the knowledge base for reuse and to inform the user beyond the HD responsibilities (about suppliers, computer associations, etc.).

The second level member's decision rights may include decision rights not only from the HD management because even when they have responsibilities in the user support, they are not HD people. So their decision rights may include decision right for rejecting the service due to a higher priority task.

Third level members are not inside the organization and therefore their decision rights are those set as part of the contract as suppliers or consultants that link them to the organization. It is clear that differences in the decision rights can influence the service of the HD.

Reward system: This is the way in which a HD staff member is rewarded in order to keep him/her doing the work in the best way and with satisfaction. It is a need to invest in the training and compensation required to ensure to have a staff who are proactive, communicate well and are committed to the organization's mission, objectives and services [SIRIUS3-1 96].
It is clear that salaries are an important part in the motivation. Unfortunately, a survey about salaries of Computerworld in 1995 [Shlosberg 95] shows that the salaries of HD operators are low in average: $29,486.00. However, specifically in the HD service there are other ways to reward people. One of them is training, and not only in technical issues but also in stress management and communicating with challenging users. Some organizations are worried about this problem and hire HD operators by interviewing them by phone, as an effort to hire the right people.

Additional ways for reward include the empowerment of the staff by decision rights, not asking people to overwork (this work is very demanding and hard), acknowledging and rewarding good performance, including creative solutions that solve the real root of problems, and finally flexibility, for example by allowing support staff to work partially from home [Armitage 97].

Evaluation system: It refers to the indicators and the way in which HD service is measured. Its importance as a descriptor in the HD structure comes from the phrase as it is said: if you can't measure it, you can't improve it.

A HD can be evaluated using several indicators, the most common are rate of problems solved, resolution time, time per call, number of calls per problem and friendliness of the service. These indicators are collected mainly by direct measuring, user satisfaction survey and user acknowledge per service. What is really important is whether there is an evaluation system. If not, not only can users
be supported inadequately (and therefore IS resources are used in sub optimal way) but also some trends can be dangerously ignored, like the increasing or decreasing of the number of calls [SIRIUS3-1 96]. Unfortunately, in a survey of the Help Desk Institute [Schlosberg 95], only 13% of respondents said they conduct customer satisfaction surveys on a daily, weekly or monthly basis and nearly 40% said they don't conduct any survey; response and repair times are tracked by only 38%.

II.5 Organizational characteristics that can impact the IT HD

The internal structure of the HD for providing the service can vary based on several organizational factors which impact in different ways both its structure and its functions. The following are some of the important factors:

Degree of concentration: This factor refers to the centralization or decentralization of the management inside the organization. It can be observed through the extent of authority of each person under the CEO and the concentration of decision power. In a highly centralized context there are a relatively small number of power centers, and just the opposite in the decentralized context [Holsapple 96].
Degree of end-user computing: With the proliferation of low cost hardware technology and off-the-shelf software packages combined with ever more sophisticated business managers, traditional “end users” are now developing computer based information systems to solve their own problems [Cash 92].

Technology strategy: IT plays very different strategic roles in different companies. These strategic roles significantly influence both the structure of the planning process and its interconnection to the corporate strategy and formulation processes. Where new developments are critical to the introduction of new products or services, or speeded-up competitive response times, firms must devote significantly more senior management time to this direction setting than in firms where this is not the case [Cash 92].

Organizational Architecture: This factor includes the organizational controls and structures with which an organization governs its subunits. In an organization should be a precise coordination among decision rights, reward system and evaluation system. These three determine the organization structure [Brickley 95].

Source of users supported: There is an important difference in the support offered to internal vs. external users. This difference comes from the fact that internal users have some responsibilities such as:
- To understand the scope of the activity of support.
- To participate in training activities.
- To provide input as requirements in objectives and user interfaces of the systems.
- To participate in the development and maintenance of an IT plan that sets new technology priorities.

Diversity of technologies supported: Another organizational issue is the diversity of technologies (computers, peripherals, software, procedures) to be supported. The typical help desk supports hundreds of hardware products, software, and peripheral devices [Molloy 95]. Users vary widely in expertise and training, products are used in undocumented and idiosyncratic ways and the entire picture is altered when the organization adopts a new version of an important hardware or software asset [Molloy 95].

Number of users supported: Finally there is another complexity factor: the number of users. This factor can alter many of the recommendations based on any other factor. For example, an organization with a large number of users could justify resources not justifiable if it had only a few users.

11.6 Conclusion

Beside the organizational factor's impact, the HD service must match the key characteristics of the organization's values: the organizational culture. This fact is
important because of the personal voice communications involved, which in most of the cases are the main way for communicating in both directions.

So, there are very different challenges for the HD, its potential problems can come from a number of sources. A typical change consists of new and more technology, more users to be supported but no increase in the budget for such support. Unfortunately, cuts in user trainings translate them into increased support costs.

Moreover, managers have been changing their expectations about IT and the trend is that IT be closer to the organization's strategy, for which (among many other actions) it is needed to be closer to the point where the problems (or incidents) occur. With the HD, problems (doubts, hardware and software failures, etc.) may be solved sooner, restoring the operation and identifying opportunity areas.

Unfortunately, economical benefits of HD are not clear for managers who never before have invested in it. This is because if there is no HD service, no one is monitoring the damage of the interruptions and other incidents.

Solving the problems and keeping the operation up, is only a partial function of the HD. The other is to deliver meaningful information for decision-making. In the ideal situation, this information must be dense enough to allow top managers to
decide and respond taking opportune actions focused to the root of the problems or, even better, actions for avoiding such problems.

HD, staying close to the daily operation, captures a large number of incidents of any kind. Those can or cannot become quality information and knowledge for supporting decision-making. Initially, HD is rather a limited service (in resources, people to serve and relevance of its output) and its evolution obeys to two sources: changes coming from inside (proactive way) and changes coming from outside (reactive or adjusting way).
CHAPTER III. TRENDS AND THE POTENTIAL VALUE OF HELP DESK SERVICES

III.1 Main concerns about Help Desk service

For years, one of the concerns in the implementation of Help Desk (HD) systems has been to align the service with the organization's strategy (Marcella and Middleton 1996 2). The alignment efforts have come from mainly two directions. The first one is centered on how to help users in a better way; issues here include the opportunity of the service, its accuracy and its cost. The second one is related to what to do with the HD reports: how should this information impact the strategic decisions in information technology (IT)? It is important to say that the second one can occur only if the first one has been achieved. In other words, the positive impact of the HD services on the strategic decisions about IT occurs only if HD service is identifying the real user problems and reaching a practical solution for them.

It is known that ideally, the HD services have evolved to its alignment with the strategy of the organization, and not only for improving the answering time and
There are several factors influencing the service of a HD department. Specifically in the Mexican context, the following facts are known because of the research done by Jorge Furber, who did a study considering 22 middle and large organizations in the cities of Monterrey and Mexico using questionnaires and interviews (Furber 2000). His main findings were:

- Top management did not always participate in the definition of the HD service. Top management participation happened in only about one third of the organizations.
- Only 42% of the organizations with some formal HD services had a full time manager for the HD.
- Only one fourth of the formal HD in organizations had its own budget, the rest shared it with other units such as the IT department.
- Roughly one third of organizations with formal HD lacked a formal periodical evaluation of the policies and processes.

Also, there are some variables whose relevance is often minimized when designing the HD such as: turnover rate, future requirements and the lack of experience of top management for good decision making in this area (Furber
2000). That is part of the explanation for the limited support from the HD, which usually considers only the daily incidents with the direct users.

### III.2 Trends in HD services

One important trend in the way in which the HD services are provided is the adoption of self-service IT support, also called "hands-free" support. It consists of several tools that allow the user help himself without staff intervention. For example, embedded help in the software, databases for self-consulting, etc.

Self-service tools play a very important and necessary role in the newest HD implementations because of the large demand and support challenges facing the IT industry (Bucci 2002). Self-service helps the HD to have a better orientation to its highest role: to have an impact on the IT strategic decisions.

The clues for the success of self-service functions are repetition and volume. With self-service tools it is easier to improve the service with solutions that can use economies of scale and therefore, justify large and new investments. This is reflected in a US study by Al Bucci, which found the following (Bucci 2002).

The highest cost is for on site help services, an average of $100 per call. The largest amount of offered services fall on the second lower cost, the one of first call
resolution, an average of $20. For the specific case of self-service, a "call" can take a number of forms, the most common are: the use of an on line knowledge base, web-based FAQs and e-learning tools (serving as an extension of the official training course).

Self-service, taking large quantities of potential calls, can bring down costs to less than average of $4 per call. Now, one of the problems is how to move a significant number of calls from the actual $20 towards the self-service cost of $4. Obviously, this implies resources in hardware/software, training and a deep knowledge of the HD as a socio-technical process. That kind of savings surely will bring more research into the area, although it is not known how these costs differs from those in Mexico.

Industry estimates show potential self-service resolution rates of between 20% and 35%. On the other hand, various forecasts project that average call volume will double to a rate of three calls per user per month by 2003. A typical help desk in two years could look like this: (data gathered by Al Bucci in USA industry) (Bucci 2002):

Today's monthly call volume 3,000
Projected 2003' monthly call volume 6,000
Self service volume 2,000
(Assume 33% resolution rate)
Remaining agent handled calls 4,000
Net increase in agent call volume 1,000

It is clear that even with the best projections for the self-service HD, there will be an increment in agent handled call volumes. Also it is almost sure that once a HD includes self-service, the remaining incidents could be complex, causing longer call times. This is due to the fact that if the user has not been able to find the answer using the self-service facilities, his or her question is surely complex. Such complexity comes mainly from the number of technologies available to the same user that need to be supported such as mainframe applications, PC applications, communications; and more complex hardware, in other words, more potential barriers for his or her good performance (Brandt 2002) (Middlemiss 2002) (Gilhooly 1999). Also two important factors must be noted: the change from expert-service to self-service is not only a technical change but also a cultural one that needs some time to be accepted (Scase 1999), and a good implementation of self-service is only possible if the HD is able to capture and apply at least the most basic knowledge about the incidents.

It should be noted that effective self-service also requires follow-up measures to ensure that the user has indeed solved the problem (and also not introduced new ones). In other words, problem resolution processes need to be specified in greater detail and more comprehensively than in support documentation intended for technical personnel.
If the HD is supported by technology-based processes for example for offering self-service to users, it will be in a better position to provide more and better strategic information to the top managers (Bucci 2002) (Furber 2000). If some workload can be done by self-service, the staff and HD people could be planning and doing some less mundane activities.

Besides the problems related to moving more of the calls to the self-service modules, another concern is about the way in which the user is attended when not using self-service. For instance, one possible strategy is to attend most of the incidents on the first call, and another one is that first call serves only as an intermediary to the right instance (Innovative management solutions 2002).

In many cases, the service center functions only for routing the customer's question to another resource, a process that is often misclassified as escalation. “Routing” is the process of getting a service request into the hands of the group or department responsible for delivering that specific type of service. However, after a specified period of time (perhaps defined by service level agreement), if the problem has not been resolved, then the incident should be “escalated”.

On the other hand, escalation is the process of bringing management's attention to a particular service incident. This kind of procedure is essential for the single-point-of-contact service model in order to succeed, particularly for those
organizations with multiple management levels (Innovative management solutions 2002).

III.3 The potential value of the HD information

The other concern is about what to do with the information provided by the HD in order to align the HD strategy with the organization's strategy. Most of Mexican organizations with formal HD, recognize that the HD service do contribute to the organization's objectives (Furber 2000); however, such contribution falls more in the operational level and it is not seen as a support for the decision making at the strategic level. Two possible explanations are as follows. First, the rather low level assigned to the HD in the management hierarchy and its limited independence; and second, even with handy information, according to Davenport, it is hard to administrate the "know how" that comes from solving complex incidents of service (Davenport, 1999) with the purpose of translating this information into useful knowledge for decision making. The knowledge coming from HD has particular characteristics that make it different from other forms of knowledge. For instance, this knowledge comes from multiple different sources (incidents about procedures, software, hardware, communications, facilities, and others), from several media (such as phone, e-mail and personal contact) and it can be applied with many different purposes (such as training, human resources planning, technology planning and self-improvement of the HD) (Davenport 1998).
The HD can provide service in two ways: reactive, when it provides solutions to the customers' request; and proactive, when it goes beyond, organizing and representing the problems and experiences of the users to top management with a clear intention of providing useful information for the decision making process. In this way, top management must always be seen as the second implicit customer for any HD service (Innovative management solutions 2002).

In the worst case, the common failure or inability to report truly significant performance data to management is where a dangerous cycle begins. So, reactive HD is only able to provide management with the most elementary customer service performance measurements. If the HD is only generating basic performance data, this does not necessarily mean that it is not working properly although that may appear to be the case (Innovative management solutions 2002).

If there is a capacity for doing something more with the information, organizing it and translating it into reports oriented to top management; that would be called knowledge management. HD is a very important source of knowledge. Such knowledge includes customer problems and solutions which have a direct impact on the HD performance, for example (Davenport 1998): improving quality of solutions delivered, establishing consistency, reducing cost per call, reducing the number of calls and increasing first-call resolutions. Ideally, each problem reported by users is a problem that should not have happened. The organization should
learn from each problem and take actions, either improving the quality of the systems, the infrastructure, the training or documentation in such a way that the problem does not present itself again.

If an organization does not promote the capture and reuse of this knowledge then the only available knowledge is in the mind of the expert, the HD staff member who is in charge of giving an answer to the customers, however, it is not easy to hire and to train many experts and, on the other hand, such cost is high.

As discussed above, there is no easy way to achieve the knowledge, starting with all that operative information. Davenport establishes that a possible way is to apply the four ecological attributes model (Davenport 1999). These attributes are: the integration of the several types of information, the recognition of the evolutionary change, the emphasis on observation and description and the focus on the people’s and information’s behavior. About this last attribute, it is also known that even though an organization may be using the same knowledge for supporting itself worldwide, there are local customizations because of local cultural and business variations making global knowledge management more difficult (Davenport 199).

Ultimately, it’s this kind of knowledge management that may have the greatest proactive impact on the user experience. In fact, no other department surpasses the HD in representing user’s problems to management, providing them
with information for knowledge-based decisions making (Innovative management solutions 2002); but it is a reality that this impact is very limited. In Mexican organizations with formal HD, that impact is only present in roughly in 30% of those organizations included in the sample of Furber's study (Furber 2000).

HD, as it is currently defined, assumes the creation of a SLA (service level agreement) as its objective and scope. However, the new HD:
- The one oriented to both its users and top management,
- The one that captures and applies knowledge for improving the solutions to the customer's incidents,
- The one that is able to generate useful knowledge for supporting the strategic decisions,

needs to consider and formalize the HD reports in more appropriate documents, for example an SLA and also a KGLA (knowledge generation level agreement). Research in this area is now starting (Furber 2000).

III.4 Conclusion

Through its evolution, one of the principal objectives of HD continues to be able to align itself with the organization's strategy. This is the only way that it will be able to help strategic decision-making. This goal has been difficult to achieve
due to different factors such as: the perception that HD is only an operational support entity and the lack of an adequate service strategy.

Initially, the responsibilities of service of a HD are established through a SLA. However the HD evolves, although not at the same pace or in the same direction as the organization it serves. In a positive sense, the HD develops towards an improvement in the service, for example making use of the knowledge acquired which permits the use of self-service or generating information that may be useful to the decision makers at a more advanced level. However, its evolution can also be in a negative sense, for example, when its priority of service is not compatible with the most relevant problems the users expose in their calls, or simply when the HD is not capable of keeping up with the commitments established by the SLA.

That mismatch of the HD occurs because the organization has grown and evolved beyond the capacities of the HD with respect of response time, availability of the service, costs and utility of the reports that are generated.

Ideally, the HD evolves towards the concepts presented in this chapter: the capacity to capture knowledge and apply it in performance improvement, and its ability to generate knowledge useful to those making the strategic decisions, through an optimal use of human, technological and financial resources. This evolution may happen in many different forms, starting from the idea that at an initial moment there is no knowledge and it must be acquired through the operation. Therefore, it is necessary to know which is the natural way in which a
HD evolves with the purpose of knowing the situations in which it would be necessary to perform corrective measures in this process.
CHAPTER IV. THE IT STRATEGIC GRID AND THE HELP DESK

IV.1 Introduction

The purpose of this chapter is to show the utility of the IT strategic grid for the study of the organizational Help Desk (HD) and its evolution. The second section of this chapter describes IT strategic grid and its utility for identifying the organization's position related to its IT use. In the third section, there is a discussion about the link between the grid and the HD desired characteristics for each quadrant. Finally, section four is a conclusion.

IV.2 Analysis of the Information Technology relevance inside the organization.

The objective of the HD is to support users in their problems with software and hardware among other resources. So, it is important to know the characteristics of the applications and their strategic impact in order to describe the desired approach for the HD in a specific organization. The "information technology
For organizations in the "support" quadrant IT limitations are not critical to corporate success. Underachievement of IT unit performance does not significantly impact the organization's performance (Cash 1992). The IT unit is mainly formed by technicians, operators, data entry clerks; programmers work more in maintenance than development, software packages for basic operations are present (payroll, accounting, inventory) and there is no concern about the lack of technology. Users use the systems on a more relatively predictable basis.

Organizations in the "factory" quadrant do not require a critical setting of strategic goals for IT; however, an uninterrupted service is expected from IT. The
organization needs IT services to work and users of all operational levels are familiar with some kind of software and hardware, in fact, many of them have long daily sessions with some system. The IT unit work force rests mainly on operators, communications technicians and analysts. Programmer's team is more heterogeneous because of the variety of services, from payroll to communications software. Software packages for cross-functional operations are present in order to automate important "factory" links, for example inventory and sales or manufacturing and purchases.

For organizations in the "turnaround" quadrant, IT plans need to be very close to corporate planning. Successful implementation of the actual applications under development is absolutely vital for reaching the strategic objectives (Cash 1992), however there is not a critical dependency on uninterrupted IT service. This quadrant implies a growing dependency on specific applications in order to support new services and users, or a strategic expansion of the organization. Programmers, analysts and very specialized technicians should form the backbone of the IT unit. Software, in the near future, could include new custom systems and packages with different characteristics from those currently supported.

For organizations in the "strategic" quadrant, the dependency on IT function is critical. In this case the IT planning is completely integrated with the corporate planning. Systems include many of the called "strategic" systems supporting the core competencies of the organization, like system for customer service in a
company of sales by catalog or a system for allocating funds in a bank. Highly
specialized programmers and analysts that could be needed on a 24 hours basis,
form the work force of IT unit. Communications technicians become a critical
resource because of the need for integration. Users are a very heterogeneous

group in all levels and functions.

IV.3 Desired characteristics of the HD according to the information
technology strategic grid

Once the organization has been analyzed through the strategic grid, it is
possible to understand the desired characteristics of the HD, based on the specific
situation of each quadrant.

For organizations in the support role of the model, the HD must deal with
users mainly in the operational level using systems as part of their structured
functions. The first level of the HD should be able to solve most of the questions,
because most of the questions will be about software and hardware operation and
not software development. In the simplest case when systems are operating in
stable form, the second level is not required. The size of the HD staff will depend
on the number of users and the time per call. Also the number of users will depend
on the embedded help included inside the software packages. The staff members
need a good knowledge about few tools of software and hardware. In this kind of
role of IT, it is also possible to have a HD using e-mail as a second option. If some problems are not solved immediately, the user does not typically have to stop his or her activities. For example a printer out of order could imply that a report that uses department X for tomorrow, will not be printed this morning but in the afternoon.

Organizations with IS in the factory role, need a HD to support more than only operational systems. What is important to consider is the "uninterrupted" requirement of the systems. This implies that even with an efficient first level of the HD, a second level could be critical. The second level becomes more critical than in the previous role also due to the diversity of technologies supported. The objective is not to depend on a third level service, because it means a longer time to provide a solution. Under this scheme, it is not practical to have e-mail as an option for a quick service. Also an embedded HD (where some kind of help can be gotten from the software being used) is expected, mainly for those users operating systems outside the organization, like sales clerks doing an invoice in the customer's office, or customers using some banking software from home. The HD's response must accomplish the requirement of uninterrupted service.

The turnaround strategic role could include changes in the IS unit due to bigger changes inside the organization, i.e. changes in the IS unit as a result of larger changes in corporate strategy. The HD service must be able to support new users using new systems and new hardware. Success of new applications is
critical to achieve new objectives, and that success includes the service support. Therefore, HD needs flexibility in its function. Maybe, logical internal partitions of the HD will be needed, for example by users type or by organizational areas. Very well trained first level resources are required. However, a strong second level must fill the possible holes in the first level due to the lack of training in new technologies. New systems should include embedded help in order to not increase so much the number of calls from new users. These new users will be using HD not only for software or hardware questions, but also for questions and complaints not concerned to IT services, for example questions about computer furniture or energy supply. The HD must be prepared for growth in its resources (personnel, computers, phone lines, software, storage capacity) and including at least basic training about those new resources. Another need for the turnaround strategic role is the growing dependency on third level HD, because of the new technologies introduced.

Organizations with IT unit in a strategic role, require a HD supporting a variety of hardware equipment and software applications whose operation is critical for reaching the strategic goals. A detailed coordination between functions, based on IT and communications, makes more complex the environment for the support of users interacting with each other by heterogeneous systems running on different platforms. On this basis, a three level HD is required, with very specialized technicians in the second level. Maybe a full time interdisciplinary team as a direct support of the first level, simply because users cannot wait. The first level must
minimize the possibility that a user dials and no line is available, independent of any effort on including embedded help. Similar to the turnaround role, the first level staff must be able to provide orientation about any question not necessarily related with the function of hardware and software. Particularly in this role of IT, service reports of HD become information for strategic decisions, because of the importance of a fast corrective action if any software or hardware is source of troubles.

Once the “photograph” or static situation about the desired features of HD has been described under the strategic grid model, it is now time for analyzing the transition of the HD service across the axis of this frame; this is the “film” or the way in which it moves.

Take first the axis of strategic impact of existing operating systems (vertical axis). Under this dimension systems differentiate more in degree of spread inside the organization’s functions, since users use systems as a work tool. The organization is more or less operationally dependent on IT. On the other hand, for the axis of impact of application development portfolio (horizontal axis), systems differentiate more in kind of applications and kind of users. The organization has several growing functions that demand changes not just in quantity but also in skills and specialization.
Due to those differences between the changes along the axis, HD also must have different approaches in its service. Along the vertical axis, HD must evolve more in quantitative terms, for instance a bigger staff, more computers, more phones, a larger DB (if HD is using a response DB for FAQ), more automated mechanisms for tracking and measurement. Along the horizontal axis, HD must evolve more in qualitative terms, such as new staff’s skills (for supporting a bigger variety of applications and dealing with a bigger variety of users) and maybe new ways to provide the service, for example with a stronger second level working closer to the first level.

From the previous section, it can be said that HD evolution is a function of the impact of the organizational factors (as an external source) and the own strategy of the HD administrator (as an internal source).

Both sources have an impact on the HD descriptors. On the other hand, the evolution of the organizational factors can be seen (for the purposes of this thesis) through the "information technology strategic grid". In the ideal situation, HD evolution coincides with the organizational evolution, but this does not always happen. The best reference for the concordance between HD and the organization is the achievement of the goals defined in the SLA (service level agreement) document. The SLA is normally a result of a HD contract.
The organization, seen through the organizational factors, and the HD, seen through the help desk descriptors, evolve, each one following two possible way options. Again, using the "information technology strategic grid", the transition way can be represented as follows in figure 4.2:

![Figure 4.2 Possible paths the organizational factors and the HD descriptors in the IT strategic grid](image)

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Ideally, they coincide following the same way, however, in the typical case, they two do not coincide, even if they evolve across the same quadrant. Differences could be in a number of facts, like priorities, time for adjusting to new context and vision. Thus, a gap is created as a result of those differences.

It is also important to say that the more viable paths are the first and the fourth. The second and third are really strange and not usual. In the same way, not common paths are those with N form, for example from "support" to "factory" and then to "turnaround".
IV.4 Conclusion

The IT strategic grid provides a base for define an adequate set of characteristics for the HD according to the organization's position. Moreover, it is known that in normal circumstances such position is not static but dynamic. Therefore, it also provides a base for analyzing the evolution of the HD, because, as it is said before, the HD should be always following the organization's evolution.

On chapter 5, the grid is taken as a base for the propositions of this thesis and the findings are also partially interpreted using the same grid.
CHAPTER V. METHODOLOGY

V.1 Introduction

The goal of this chapter is to present a description of the methodology and processes used to perform the research. First, the case study method is presented, as the approach for this research. The decisions and reasons to select this method are described in order to show why this approach is right for this research. As a second step, an overall view of the enterprise selected for this research, is described. After giving a general explanation of the specific case that will be used in this research, the components of a case study are specified and exemplified in the specific case presented in this investigation. As a last step, the implementation of the case-study method is described in order to validate the proposal.

V.2 Case study method

The methodology adequate for this kind of problem is the case study method and justification for using it is as follows (Yin, 1994).
- The purpose of the thesis is to analyze in detail and historically the subject (for this case, the evolution of a HD department) in its real-life context.
- The boundaries between phenomenon and context are not clearly evident.
- Multiple sources of evidence must be used.

Also, it is important to say that a case study, as a qualitative research method, serves to help researchers to understand people and the socio-cultural context in which they work and live (Meyers, 1997); this is what is proposed in this thesis. In the organization where the case study will be carried out, the HD service includes a large quantity of people. The interrelationships between users and HD staff, between HD managers and top managers and between top managers and outsourcers, form a complex context that justifies a research based on a behavioral focus. Moreover, a case study is the most appropriate method specifically when little is know about the subject and in consequence, there is not much literature available. (Gill and Jonson 1997).

A case study research can be positivist, interpretative or critical (Meyers, 1997). According to Meyers, positivists assume that reality is given and it is independent of the observer and his or her instruments for measuring. Objective is generally to test theory. The definition of Orlikowski and Baroudi, cited by Meyers, is that "a research is positivist if there was evidence about formal propositions, quantifiable measures of variables, hypothesis testing and drawing of inferences
about a phenomenon from the sample to a stated population". For the case of this study, there is not theory to be tested, actually, the objective is to set a theory.

Using the interpretative way, the study attempts to understand the phenomena through the meanings that people assign to them, leading the researcher to a better understanding of the context and the process whereby the subject influences and is influenced by the context. In this case, the subject is the HD department evolution and the context is the organization to which it belongs. In the critical approach, the case study assumes that social reality is historically constituted and that it is produced and reproduced by people. That's just the context for this case. All the factors of the present state of the organization are directly related to the acting and decision making of people. For this thesis, the case study considers the interpretative and critical approaches and it will fall just in the boundary between them.

As Benbasat, cited by Meyers (Meyers, 1997), says: "the case study research method is particularly well-suited to IS research, since the object of our discipline is the study of information systems in organizations, and the interest has shifted to organizational rather than technical issues". The focus of attention is in the decisions people make for the HD service strategy, improving or worsening the integration of the service to the firm's strategy (Yin 1994). The case study applies because little is known about the phenomenon (HD evolution) or it cannot be
explained based on previous literature (Eisenhardt 1989) and also because the unknown leads mostly to questions of type "how" and "why" (Yin 1994).

According to what is said above, it's not possible to reach this thesis's objective by implementing an experiment (Figure 5.1). There is not a context in which subjects and behavior could be observed outside of its workplace under researcher's control. The time dimension could not be observed through an experiment (Yin 1994). An experiment consists in observing the effect of a set of variables (independent variables) on a special group of subjects called the experimental group. Observation occurs through another set of variables called dependent variables. Also, it must have a second group of subjects called the control group, in which is observed the same set of variables but this second group of subjects doesn't have the effect of the independent variables (Marcos 1998).

Figure 5.1 Research via experiment
It is clear that there is no chance for doing an experiment in a study where it is important to observe subject behavior, decision-making and these ones, during a period of time. It is almost impossible to duplicate such conditions in a lab because of the quantity and complexity of the independent variables.

In the same way, this study could not be carried out using a survey. Typically a survey is used when there is some knowledge about the subject; something that is ready to be tested and that allows having a specific questionnaire. With a survey the findings could be wider but not deeper than with a case study (Yin 1994) (Alreck and Settle 1995).

Also, when using a survey, there is a limit about data gathering; the predefined questions establish such limit. It could be less but no more information, depending on how well the survey is managed. Therefore, when using a survey, it is implicitly known that those questions are the right questions and it is only necessary the answers in order to test some theory. In a survey it is not necessary to know the people who answers neither their impressions about a topic or any further information he or she wanted to share. The strengths of a survey rest on the questionnaire itself and the designation of the sample (Marcos 1998). Therefore if there is not a theory to test and it is very significant the information about decision-making, worries and personal perceptions, becomes critic to get such information
directly from the people and using their own words and other evidences. Such information can't be gathering with a survey.

A case study may involve one simple case or multiple cases as well as many levels of analysis (Eisenhardt 1989)

V.3 The organization

ALFA is a Mexican corporation involved in key markets through the following five business groups (ALFA 1998):
- Alpek (synthetic fibers and petrochemicals)
- Hylsamex (steel),
- Sigma (food)
- Nemak (auto components)
- Onexa (telecommunications).

The company has a leadership position in the majority of the markets it serves. In 1999, it reported revenues of $40,345 million pesos (USD$ 4,056 million), exports of USD $ 957 million, assets of $67,642 million pesos (USD$ 7,104 million) and 35,615 employees. The corporation has alliances with 21 companies from the United States, Japan, Europe, South America and Mexico,
which are leaders in their fields. ALFA's shares and those of its subsidiaries Hylsamex and Sigma are quoted on the Mexican Stock Exchange" (ALFA 1998).

HYLSAMEX, Alfa's iron and steel branch, is composed of business units: Flat Products Division, Bar and Rod Division, Galvacer, HYL and Acerex. It also encompasses support subsidiaries in the mining, scrap metal processing, transportation, and steel marketing fields. It is a leader in most of the markets that it serves such as: construction, automotive, domestic appliances, steel technology and others (Hylsamex 2003).

HYLSAMEX has an important tradition in the Mexican steel industry. It has kept in the national leading position because of its innovative processes: "Our formula will always be: cutting edge technology, the very best processes and services with an excellent human team. What for? To become the steel producer with the highest margin in North America" (Hylsamex 2003).

In 1957, after years of research, HYL commissioned the world's first commercial scale direct reduction (DR) plant. The use of direct reduced iron has since become the preferred method for incorporating virgin iron units to the EAF steel making process, diluting the residual effects of scrap steel contaminants. The HYL Process continues to be the most advanced and flexible DR technology on the market.
As the only direct reduction technology supplier that is also part of a steel making company, HYL has also developed significant expertise in EAF steel making. Technologies and service for minimill steel making, including Hands-on Training, are provided by HYL to companies worldwide (Hylsamex 2003).

Now, about IT, HYLSAMEX can be classified as a large manufacturing industry that has recently adopted the international standards by the extensive use of automated processes for most of the production and administration functions. For HYLSAMEX, the link between the information planning and the long term corporate planning is stronger everyday. That could be known by the interviews to the top managers.

Also important to mention is that although HYLSAMEX has several business units, all of them follow the same standards about IT, and the HD service that they receive up today is strongly centralized. That's why HYLSAMEX, about IT terms, can be considered as a whole with just little differences among its business units.

In this thesis Hylsamex’s HD service is studied. This HD service gives support to members of the different divisions of the organization. Originally it was created only as a service with limited reach in the amount of clients who could make use of it. It is currently a service divided in two parts, which for the interests of this research are each taken as a unit of analysis.
V.4 Components of the case study

A case study usually combines several methods of collecting data such as the revision of documents, interviews and observations; the evidence may be of a qualitative or quantitative nature. All this has one of three possible purposes: describing a fact, proving a theory or generating one. (Eisenhardt 1989).

A case study has six steps according to Yin (Yin 1994):

- Determine and define the research questions

- Select the cases and determine data-gathering and analysis techniques

- Prepare to collect the data

- Collect data in the field

- Evaluate and analyze the data

- Prepare the report

1. TO DETERMINE AND DEFINE THE RESEARCH QUESTIONS. The purpose of this step of the case study is to determine what one wants to find out, and for which questions the literature in the field gives little or no answers. For this
study, the research question is: "How does the help desk service evolve in a Mexican organization? ".

2. THE PROPOSITIONS (if any). The following three propositions are established:

1. The increment in the number of users is the main cause of the drive to formalize the HD.

2. The decrement of the quality in the offered service or the incapacity for improving this quality is the main cause of the potential decision about outsourcing.

3. It is only possible to consider the strategic use of the information provided by the HD if this HD has reached stability and it is able to improve the service using the knowledge that is generated during its operation.

And also as a proposition, it is suggested that there is a link between the HD and the IT strategic grid. In chapter 4 there is a description about the characteristics of the HD according to the position of the organization in the grid; however, what it is proposed here is not about the position but about the transition or evolution of the HD through the grid in order to match the organization's evolution. Figure 5.2 shows the dimensions on which the HD characteristics should change according to the horizontal or vertical movement on the grid.
What is implicit on this figure is that as the organization moves on the vertical dimension (from support to factory or from turnaround to strategic) the HD should add formalization to its structure and specialization to its functions. In the same way, as the organization moves on the horizontal dimension (from support to turnaround or from factory to strategic) the HD should add flexibility to its structure and generalization to its functions.

Specifically on the HD, formalization refers to the presence of policies and rules about the internal organization and about the service processes. The less these rules exist, the more flexible the HD structure is. In a similar way, specialization refers to how specific is the knowledge of the HD staff. The less specific, the more flexible the HD function is.
Finally, for the evolution of the HD in a Mexican organization's context, according to the current literature about the theme (which was the topic of the previous two chapters) and the goals that are widely accepted for the HD, the evolution model shown in figure 5.3 is proposed.

In figure 5.3, the model represents four stages or states for the HD. The characteristics of each state are those located inside each circle. The first of them is represented with a smaller circle to emphasize that such stage exists when there...
is not yet an HD that requires decisions about it. The natural evolution is from left
to right, however there is no determined time of permanence within each state. It is
also emphasized that the change of stage is due to one or several of the “triggers”
and also this change of stage is not hard but soft and thus exists an overlap
between the stages.

The last stage represents a HD that has achieved all the objectives, however,
starting from here, it is still possible to continue through a path that leads to one of
the other previous stages. This fact can occurs under some special circumstances
that are detailed here.

In this model for the HD, the following considerations are included: It is
assumed in the first state that there is no formal structure for the HD and that the
service is performed through the means and resources available for other
activities. That is, the users call the programmers or maintenance personnel and
receive help from them in an informal fashion and using resources (time and
equipment) not mainly destined to this activity. Even so, within informality, enough
flexibility is required in order to meet the demand. In most of the cases, these
considerations escape the managers because the support service or HD is
something that still does not exist in their decisions. The stability in this stage is
broken and it is forced to the next stage through changes, either technological
(complexity) or in the users (number or level). Thus, when the demand changes
and grows, it is necessary to respond from an organizational point of view through some type of formalization for the service.

In the stage 2, the HD has already a formal organization that can be in diverse degree. That is, there could already be people or technological resources or operation rules or an SLA. However it is assumed that the position of the HD is still low within the general organizational chart and thus its position of influence is also low in the strategic decision making process. The HD continues its evolution towards stability. This evolution could be the opportunity to evaluate the possibility of outsourcing in some of its multiple forms. It is also possible that a low-level crisis situation precedes this stage and could provoke as a response the assignment of resources and finally some type of formalization. However, given that this is a growth and adjustment stage to new demands, it is important that the HD is maintained flexible in order to adjust its growth in the right direction, in other words, to follow closely the organization's evolution. The HD could remain in this stage while the service is being formalized, and this situation is broken when a sudden demand occurs for which it could be necessary to take measures not planned.

In the stage 3, the HD has already a stability that allows it to gain efficiency in the operation. It is also the opportunity to become more mature in the outsourcing service currently present or starting. This state could be also preceded by a crisis situation, now in a totally applicable fashion to the current HD, contrasting with the previous crisis in which there was no HD to face it. An important characteristic of
this stage is the beginning of the internal use of knowledge generated during the operation. This type of knowledge is used for demand forecasts, internal resources planning and the decision making process about the use of technology. The HD continues its evolution through stability towards the perfection of the already reached maturity. The stability gained in this state is removed in a soft fashion when from the top management the HD is perceived as much more potential contributor. In this way, an increased and diversified use of knowledge generated internally is demanded.

In the stage 4, the HD has already a formal consolidated structure reached in previous states. The HD continues its evolution now within a maturity situation. The maturity reached allows it to generate knowledge not only for internal use but also for support of the strategic decisions exceeding the user support's vision; that is, in the top management, encompassing more than only the use of technology. In this stage, the HD has been adjusted to the organization's stable demands and that can be faced through more specialized resources which allow it to possess high efficiency with respect to the current SLA. Given the accumulated experience, the HD in this stage has the characteristic of being able to grow through the use of economies of scale, and thus adjust itself to new planned demands. In this state the HD could have a position of greater relevance in the organization, probably outside and independently from the systems area in which it originated. This stage only in a certain way can be seen as a "final" stage, given the fact that certain
drastic movements in the organization could cause the change towards other state. Examples of this type of movements could be:

- A drastic budget cut on all levels.
- Integration with other organizations having different practices in their use of IT.
- The need to assimilate in a massive and quick fashion some radically different technology.

This possible change or setback is something that could be given with a greater probability in the stages 3 and 4 just because the HD, in its search for adapting itself, has lost flexibility and may not be ready to respond to situations like the ones just described.

Another possibility is that the HD would not have to go to a previous stage completely, which is only possible if the HD is segmented into various units. Thus, some of these units may have to begin again an adaptation period while another unit remains mature and making extensive use of the knowledge generated.

Based on this model and taking into account the previous proposition about the functional and structural rigidity levels, some of the following observations can be made:

In the initial stages, being informal or recently formalized (that is, coming to existence as such) the HD should remain flexible and ready to supply support in an
ample fashion, that is, more general. This is because for a recently formed HD, its priority definition is the service as well as the search for the best practices as part of its internal processes. It could be a mistake to pretend a perfectly rigid HD from the outset, because in order to gain experience and finally stability, it is necessary that firstly sufficient liberty exist in order to adjust to the needs of the organization. This coincides with the stages one and two and also with a movement that could be given from "support" towards "turnaround" or from "factory" towards "strategic" on the grid. One of the possible solutions to handle this period of adjustment is the outsourcing evaluation but when the HD has some degree of formalization.

For the following two stages (3 and 4), the emphasis is given more to the consolidation of the formalization and to increase the efficiency through more specialized services. This implies an ample experience of the HD regarding its users, the internal processes and what the top management expects of this service. Thus, the emphasis is now focused on the consolidation of the formalization as well as to provide the specialized services for a more predictable demand that could be called as "under control". This scenario coincides with a movement from "support" towards "factory" or from "turnaround" towards "strategic" on the grid.

3. THE UNITS OF ANALYSIS. The unit of analysis is defined as the HD services department. The evolution that has to be observed is the one occurring in
this unit, regardless of whether the cause of the changes is coming from inside or outside.

4. THE LOGIC LINKING THE DATA TO THE PROPOSITION. In the theory about the case study method, there is no exact definition for carrying out this step, but a good approach is to relate several pieces of information to the same theory proposition. This linking will take place during the analysis phase and therefore will be reported in the next chapter.

5. THE CRITERIA FOR INTERPRETING THE FINDINGS. The relation of the reality with the proposition must be explained by the findings. Those findings will be reported and discussed in the next chapter.

V.5 Design of the case study

Another formal source for the process definition about a case study is the one described by Kathleen Eisenhardt. In such description the formal steps of the method are the following (Eisenhardt 1989):

1. GETTING STARTED. In this step the proposition is defined, as it is in figure 5.2.
2. SELECTING CASES. The case selection was not random. The selected case was chosen based on the following characteristics:

- Having several years of operation
- Having more than one unit of analysis
- Having strong differences from its beginning to now.
- Having plans for future changes

The HD service has been in operation for 9 years since its formal conception. Today, it has two analysis units, one of them is operated using outsourcing services and the management has new plans for both units to be implemented in the near future.

In figure 5.4, the basic types for a case study are identified (Yin 1994). On the left side it is observed that it is possible to study a case with only one unit of analysis or a case with multiple units, as in types 1 and 2. On the right side it is possible to observe that the study can also include one case or multiple cases as in types 3 and 4. This thesis concerns type 2, that is, there is only one case and it includes two units of analysis providing the HD service.
3. CRAFTING INSTRUMENTS AND PROTOCOLS. Next, the set of variables, needed for the observation of the HD evolution, have to be defined. The importance of each one of these variables has been described in the previous two chapters, actually their name has been "descriptors". In figure 5.5 the descriptors are shown on the left side and, in the same figure is shown the instrument used for data gathering.
Now it is possible to rewrite the previous definition for "evolve" appearing in chapter 1 considering the HD context: it is the change, through the time, in any of the descriptors defined for the HD when it attempts to adjust to the structure and changes of the organization.
Triangulation strengthens the validity of a research (Eisenhardt 1989) and it is one of the strong parts of a case study. Although in the previous figure, one of the instruments is only defined as an "interview", it represent rather three types of interviews, those are:

- Interviews for the managers of the HD service
- Interviews for the staff members
- Interviews for the top managers

These interviews are carrying out individually in the work place of the people.

The documents for data gathering and integrating in the analysis stage include:

- Organizational charts (past, present and future)
- Change proposals coming from outside the help desk department
- Change proposals coming from inside the help desk department
- Memoranda related to the service (changes, new services, etc.)
- Service policies
- Utility reports of the service

On the other side, direct observation is used for the following cases (maybe two or three sessions):

- Phone service staff
- Meetings where help desk service is the main issue
The previous definition about the instruments for data gathering must be adjusted to the graphic design description (Yin 1994) shown in the figure 5.6. It illustrates the two possible facts, in which the unit of analysis for the case study is different from the unit used as a source for data collection. Both sources (individual and organizational) can be needed. However it is important that the final findings match the unit of analysis defined for the case study.

<table>
<thead>
<tr>
<th>DATA COLLECTION SOURCE</th>
<th>STUDY CONCLUSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>From an individual</td>
<td>From an organization</td>
</tr>
<tr>
<td>About an Individual</td>
<td>Individual behavior</td>
</tr>
<tr>
<td></td>
<td>Individual attitudes</td>
</tr>
<tr>
<td></td>
<td>Individual perceptions</td>
</tr>
<tr>
<td>About an organization</td>
<td>How organization works</td>
</tr>
<tr>
<td></td>
<td>Why organization works</td>
</tr>
</tbody>
</table>

Figure 5.6 Data sources according to the case design

4. ENTERING THE FIELD. It implies that possible points of overlap among the data gathering methods should be considered in order to have several point of view for comparing and contrasting such differences. Any overlap is shown in chapter 6

5. ANALYZING WITHIN-CASE DATA. The initial data set could have more information than necessary, and because of that an analysis is needed during the
process in order to filter and integrate that information and also maybe in order to
give a new direction to the data gathering process.

Having defined the information required (about the descriptors and their
evolution) and the instruments to be used, the data-gathering plan is as shown in
figure 5.7.

![Data gathering plan diagram]

Figure 5.7 Data gathering plan

Figure 5.7 shows that the data-gathering plan starts with both interviews and
observation/document analysis at the same time. Also during collection, the
analysis of data is carried out, as it is normal in a case study approach. If there is
any conflict among data or a suspicious of incorrect data, then further interviews or
observation is needed. When data from different sources match correctly, is the
time for preparing the final integration and description of the fact.

6. SHAPING HYPOTHESES. This point is for defining the relationships and emerging concepts and its comparison to the original proposition. Also the "why" or "why not" about a relationship between the evidence and the proposition are defined. This point is also part of the findings reported in the next chapter.

7. ENFOLDING LITERATURE. Next, if possible, a comparison to the current literature is carried out. There are only a few references about the way a HD service evolves after its formal implementation inside an organization. Two changes are seen as part of its natural evolution: the first one refers to the increase use of technological knowledge based tools (Tischler 1996) as a natural way of evolution looking for improving the efficiency when dealing with a increasing number of users. The second one refers to the decision about the union or separation of the HD and the training department (Masie 1998). Considering the same point, as a contact for both supporting and training, is a trend that is capturing the attention among the business units. In this way HD and training would be closer from each other.

Brent Ballard, in a different study, observed the changes that occurred in the call center of the Sarasota Memorial Hospital (Ballard 1997). Ballard did not start
with a model. He limits his study to the description of the main changes, which in chronological order are:

- Due to the origin of the calls that must be attended, it was decided to split the service in two branches and to publish two phone numbers; at the same time emphasis was given for the cross training of the staff.
- It was observed that a decrement in the publicity efforts caused a decrement in the number of calls.
- The management does not want to hire more personal for the staff unless there was an increment of the number of calls. On the other hand, the marketing department did not want to promote the new services unless it was an adequate service for the coming calls. This fact finally caused a decision for hiring outsourcing services
- A user survey was implemented.
- A wider coverage for the services was implemented. Now, calls came from a larger region of the Florida state.
- The service grows, now serving a group of hospitals.
- There was a need for using a new technology, allowing keeping the service centralized.
- More specialized personal was included for answering the calls, it was made by routing the original calls.

All of these changes are useful for understanding the similar evolution of the HD, however two things must be considered: there is no model and a call center is
strongly linked to the marketing efforts. The first point makes evident the need of a case study specifically for a HD and the second one shows that a call center could have an evolution model rather different from that one for a HD.

Other references to the HD evolution are even more indirect. For example, Andrew L. Friedman carried out a study for analyzing the evolution of the information technology (Friedman 1999). Although his study touches some organizational concerns, it focuses mainly on the existent models for the technology evolution inside an organization. It analyzed this evolution considering two main models: the one of Richard Nolan and the one called Life Cycle, both cited by Friedman.

The study of Andrew Friedman can be useful for analyzing the evolution of the technology used as part of the HD, but the HD evolution should be seen from a wider point of view covering also decision making and those organizational factors that have some impact on the HD, such those considered in the previous chapter.

Another study is the one of Erhard Bruderer and Jitendra Singh (Bruderer and Singh 1996). This is a theoretic study about the evolution of the organizations during a long period of time, allowing in this way, to observe the born and perish of many of them. This study was done by simulation using a genetic-algorithm-based model. The computational model of the organizational evolution is used to study
whether the organizational learning can speed up the discovery of new organizational forms able to survive.

The findings support this proposition. Another finding of the same study is that changes occur faster when the organization is younger. However, after that changes occur less and less often producing a "structural inertia". This study can be useful as a starting point for an analysis organization's evolution in a wide way. However, it does not consider any of the particular aspects of the HD. On the other hand, it can be seen as a not so deep study than covers a very large period of time. Therefore it is still necessary a more specific HD study, deeper although limited in time covering.

8. REACHING CLOSURE. This point is reached when new data do not contribute in a meaningful way.

VALIDITY. To talk about a quality judgment for a case study is something very specific due to the characteristics of this type of research. Robert Yin define the following criteria, adjusted to a case study (Yin 1994):

Construct validity: an adequate operational form to measure the propositions is set. The proposition (figure 5.1) is based on the set of variables to be observed (figure 5.3). These variables have been taken from the set of descriptors for a HD.
Those descriptors were analyzed in detail in the chapter 2, where a domain is implicitly set for each of them.

Internal validity: although internal validity applies only for case study of the type causal or explanatory (Yin 1994), there is also a way for adjust it in a case study of the exploratory or descriptive type. An adequate strategy is to use the pattern-matching logic. This logic compares the empiric pattern to the predicted one. If the patterns coincide then the internal validity is strengthened.

External validity: it is true that with only one case it is hard to generalize. However, talking about cases, it is not possible to take them in the same way as the experiments or surveys. The real problem is just that: generalization, but not to other cases, in study cases generalization must be to a theory (Yin 1994). If this theory becomes a good way for analyzing other cases, then the external validity is accomplished.

The next chapter shows the findings of this case study, according to the HD of HYLSAMEX organization and following the steps described in this chapter.
CHAPTER VI. FINDINGS

VI.1 Introduction

The following case study is developed in the steel manufacturing company named HYLSA, specifically in the organization's Help desk (HD) department. Currently, this service is divided in two services, an internal service and the other under the outsourcing scheme. That is the reason why this study considers two units of analysis, though this was not the case since the beginning.

In the preceding chapter, the model is specified for the evolution of a HD (Fig. 5.2), as well as the way in which the case must be studied (Fig. 5.4).

VI.2 Position of HYLSA in the information technology strategic grid.

In order to characterize the current HD at HYLSA, it is useful to examine the organization's position within the IT Strategic grid (shown as figure 6.1).
HYLSA is currently in the “factory” quadrant regarding the use of information technology. This is concluded based on the following characteristics (Cash 1992):

- There is no critical relation between IT planning and strategic global planning.
- The short term detailed planning for IT is critical.
- HYLSA, given its core manufacturing activity in the steel sector, precisely falls in the quadrant that the theory points out for this type of organizations (Cash 1992).

Based on the current location of HYLSA in the IT strategic grid, it is possible to understand the desirable characteristics of an HD service corresponding to this location.
Based on these characteristics as defined in Chapter 2, in the case of HYLSA in effect, an uninterrupted systems operation is required. In order to match this kind of operation, a first level is now split into two groups looking for a mayor specialization. In both service groups (both HD), the second level of service is critical. In the first level there is a set of persons to whom an incident is assigned immediately after the first level so requires. In the other service group, the second level is available through the contact with external experts and the access to specialized databases.

This is part of the current situation in the HD. However in the following sections the evolution will be analyzed from its origin until today. The actual position of HYLSA in the IT strategic grid has also evolved and that evolution has had an impact on the HD.

VI.3 Evolution of HYLSA's HD

The evolution of HYLSA's HD within the organization should be analyzed through the proper identification of the phases through which it has passed. Such phases are quite specific to the organization and represent an evolution that combines the impact both of external factors (alien to the HD area) as well as internal factors.
The phases considered for HYLSA's HD evolution are the following:

1. Informal HD service
2. Formalization of the HD service
3. Service growth due to the shift towards PCs.
4. HD service partitioning
5. Integration (in gestation)

It has been concluded that these are the evolution phases based on the interviews performed, mainly with the HD managers and the top managers. In order to analyze these phases, the set of HD descriptors defined in chapter 3 are considered for each of them. These descriptors are:

- Internal organization
- Degree of centralization
- Communication media
- Degree of automation
- Ownership
- Coordination (decision, reward and evaluation)

In addition, two other factors are considered in order to examine the impact of the HD on the organization:
- Performance
- Position and impact on the organization

Note: in the following sections, the textual references about what was said on the interviews will appear as follows:

TMA - from an interview with a top manager
HDM - from an interview with a HD manager
OUT - from an interview with a staff member of the outsourcing HD
STA - from an interview with a staff member of the internal HD
USR - from an interview with a HD user

The interviews were carried out to the five job positions above, as it was planned in the previous chapter. The number of interviews was as follows:

TMA, 4. All of them close to the HD because of their function, or having a representative number of users who use constantly the HD service. The objective of this type of interviews was to gather information about HD evolution as a strategic support unit, and also the expectation about the ideal situation on the long-term future.

HDM, 3. They were the whole group. One of them is the general manager and he is the boss of the other two, that administrate the own and the outsourced HD respectively. The objective of this type of interviews was to gather information
about the evolution of the service in terms of its descriptors. Also another objective was to know the support that the HD function has deserved from top managers, and personal points of view about the future requirements.

OUT, 5. They are roughly the 80% of the staff. They alternate themselves in the first and second level positions, this is, answering the phone and visiting users when needed.

STA, 2. They are the whole group. They two cover both schedules over the day: morning and afternoon. The objective of these two types of interviews (OUT and STA) was to gather information about the daily operation, the main operative problems for delivering a good service to the users, and also the evolution of those problems and solutions.

USR, 3. It was just a sample for having their point of view. During the process it was observed that it was no necessary to interview more users because the gathering data for the evolution analysis were consistent. The objective of this type of interviews was to know the users’ perception about the efficiency of the service and the changes that they have seen about it.

Just as mentioned in chapter 5, the HD evolution has a special significance within the transition of an organization from one quadrant to another or even by the tendency with which the organization moves within the same quadrant. In this
way, HD continues an evolution for which it has a model has been proposed, but at the same time that evolution has a correspondence with the way in which the organization moves within the grid.

This correspondence is based in two dimensions: on one part the structural rigidity and on the other, the functional rigidity for example regarding abilities, levels and resources. These dimensions were shown in chapter 4, and they appear here in figure 6.2. They also provide another way to see each phase of the evolution.

![Figure 6.2 Dimensions of the HD evolution on the IT strategic grid](image)
VI.4 First phase: HD informal service ( - 1993)

At this phase, HYLSA as a whole organization was located in the "support" quadrant of the IT strategic grid. This position explains partially the absence of a formal HD. However, the firm was starting a shift in a vertical movement, towards the "factory" quadrant in the same grid.

Internal organization: In this phase, as it is indicated, the support service to users was not formalized under the Help Desk name. Users were supported mainly with problems dealing with communications. There was no internal organization that had a goal of rendering appropriate support to users.

Degree of centralization: In a sense, it is possible to say that the service was decentralized due to the fact that users relied specifically on some systems' staff employee belonging to their corresponding unit or division. "It was just a support service" (HDM).

Communication media: The systems personnel, who every once in a while were contacted by phone to give some help did not have any official workload designated to "support". They did it only because they were the only ones capable of solving the problem and to ensure that the systems were operating, complying with an "integral" service towards the users. The users, when facing a problem, had two options: the first was to ask to the closest peer or the colleague next door;
the second was to call some systems employee that they knew personally and who in a sense was for them a trustworthy person.

Degree of automation: Of course, there was no control related to the problems detected neither by the users nor about the service support quality offered. There was no software that helped in this need that informally was lent to the users. Back then not all the users had a terminal in their desk for personal use and the terminals that existed were “dumb” terminals.

Coordination: For the very same reason that there was no formal service, there was also no coordination mechanism. The member of the systems staff, who was called, decided in a personal way, which was the best way to help the user to solve his or her problem. Naturally, there was no evaluation about any support in particular. At the most, there was an evaluation in a general fashion where this type of informal help or support was only one more factor in the systems service rendered.

Performance: Likewise, there was no metric about performance on this kind of help. It was only part of an integral service “package” which implicitly the users hoped for. “The register was manual, not by electronic means” (HDM), “there used to be support by part time personnel which were not always available” (OUT).
Position and impact on the organization: In these years, it is not possible to talk about a position for the HD within an organization neither of an impact that this could have. There was no strategic impact. There was an impact in the production but not associated to the support service in particular, given that this was just one more component of a broader service.

In this phase, the users did not have yet a "systems culture". The majority of them did not receive training in this area during their professional development, so that they had many basic questions and their learning period was longer than the current. Effectively, there were no full time people for support, nor rules for providing IT support.

After an unstable period regarding the group of companies that conformed the industrial conglomerate, the situation improved over the last 13 years. "ALFA used to be much more larger with many divisions which were sold, thus the number of users decreased, we kept with what is now HYLSA, which has endured much more stable regarding its number of users" (HDM). In this time "there could be about 800 users" (HDM).

The transition to the next phase was a logical step due to the need of offering a more coordinated service and at the same time it was possible to optimize the few resources available to support the users. Figure 6.3 shows the evolution in this phase.
Figure 6.3 Evolution of the organization and the HD in the first phase

In this figure, the organization is shown in the first quadrant and the HD also (still informally). For a case like this, both HD dimensions (the structural and functional rigidity) present low intensity characteristics. So, in this phase there is not formalization and it is not possible to speak about flexibility, because the service does not exist officially. In the same way, there is no specialization or generalization because the staff does not exist.

The evidence for showing that HYLSAMEX was in "support" quadrant, at this phase, is that IT was used only for automation of basic operation processes. There was no support for the organization's strategy and the IT planning was no directly linked to the organization's planning. Also, there is evidence that HYLSA with all its units were together in the same position, mainly because the IT planning was centralized about resources and processes. Minor differences in the operation
details were present but the strategy was the same. This status of the organization in the "support" quadrant was constant for this one and the following phase.


This second phase is characterized by the formalization of the support service to users though with unspecialized personnel and means. "We needed to know which problems existed, if you did not measure what you give, you can not improve it. A register of what is occurring must be made" (HDM). Nowadays, "there is control and metrics about the calls" (HDM), "what was sought for was that everybody had the best productivity" (HDM). Furthermore, "the users required only one contact point" (TMA). In HYLSA, the formalization covered both, people were assigned full time and rules were set for the support service. This is, during this phase the people and the processes changed.

Internal organization: The internal organization consisted of a supervisor and 3 or 4 staff members assigned to answer the telephone. None of them assigned full time for these functions. Moreover, there was a second level of service formed by people from other departments to whom the incidents not resolved by telephone by the first level, were assigned.
Degree of centralization: The formal service was born in a centralized fashion. Encompassing the set of business units dependent on this systems center.

Communication media: The users communicated to HD by telephone but a strong orientation persisted towards the contact with a person in particular: “the habit of calling specific persons persisted” (OUT). The problems attended were for their most part related to telecommunications and the users still operated dumb terminals. “Only telecommunications problems were considered first” (HDM).

Degree of automation: For the first time, a software tool for the register of incidents was used “it was something crude but already formal, with some statistics” (HDM). IBM supplied this tool. However, its reach was very limited. It only was useful to register the incidents. There was no way of monitoring and giving follow up to measure the service’s effectiveness, though this need started to surface rapidly: “as you advance, you need more tools” (HDM).

Ownership: The service was totally owned by HYLSA. In this phase, the outsourcing option was not even considered.

Coordination: The decision rights were very limited. The HD service was only a small part of the systems department and all the decisions were made by the director, for whom HD was just a new area that required being operational. By the same reason, there was no rewarding system although there was a crude
evaluation system. The evaluation was made based on the number of open and attended incidents.

Performance: The service performance in this phase was measured under inappropriate criteria of a formal HD. For example the number of incidents attended was measured and comparisons were made against the previous weekly or monthly data. There was neither feedback from the users about the service. The greater part of the service was given exclusively by telephone but there was also the possibility of going to the users place for any reason required, this in a centralized fashion “that way it was not necessary to have too much people distributed close to the users” (HDM). However, when SAP started to operate, it was more difficult to give support due to the knowledge required by the staff.

Position and impact on the organization: The HD position within the organization was low. It was simply an area within the systems department and with no link to the department's strategic planning. However, the support was given: “Always, since the beginning, the top systems executive has rendered support” (HDM).

The change from the previous phase towards this phase, had as a goal to have some sort of control over the support service as well as to support the users with better human and technological means. The users now are conscious that they are more productive using technology and “their demand is that technology
would not render them unproductive” (HDM). “The users do not express it a lot but there are fewer complaints” (HDM). Figure 6.4 shows the evolution in this phase.

Figure 6.4 Evolution of the organization and the HD in the second phase

The figure shows a transition tendency of the organization towards the superior quadrant (from “support” towards “factory”). It is also noted that the HD follows this tendency but not at the same pace, but with a lag. When a movement towards the superior quadrant occurs, like here, the HD should advance in the specialization dimension. However, even though an advance was made towards formalization, there is a lag with respect to the level achieved up to that time. The result is this lag that could increase or decrease in the subsequent phase.
VI.6 Third phase: Change in the service due to the shift towards PC's (1996 - 1997)

"With the PC's it is different compared to the terminals, it is much more work. The service increased significantly and the service could not be centralized, this boosted the number of incidents" (HDM). "With the coming of the PC's, everything increased" (HDM).

Internal organization: The organization continued in a similar fashion to the preceding phase but with a greater effort in the on site support to users. There are more people assigned to the tasks of visiting users. This has implied a much more overwhelming work for the staff. However, while there is progress in the personal computers technology, the equipment tends to have much less failures, which allowed the reduction of engineering and teleprocess people.

Degree of centralization: The service remains centralized, especially by the staff that responds to the telephone calls. The visitors are not completely centralized and this causes some inconsistencies in the service.

Communication media: The communications means is still the telephone exclusively and "there were about 300 calls daily" (OUT).
Degree of automation: The control tool operates from the preceding phase, however it is more and more limited to satisfy the increasing need of so many incidents.

Ownership: The service is totally owned, but here is when the possibility of outsourcing the service, especially working efficiently with large volumes, is being considered. At least the part of the service related with commercial software. It is known beforehand that the company’s systems or those considered more strategic would be difficult to give them support through an external firm.

Coordination: Under the current situation of a major workload, it was necessary to provide a greater authority to make decisions and speed up the service. The coordination mechanisms remain the same and this accelerates the search of other options to offer a better service.

Performance: The decrease in the service performance is starting to become notorious. From one moment to another, the users reported much more flaws or doubts over their personal computers and the basic software “now everybody has a computer and there are more requirements” (USR). As long as the number of PC’s assigned to users is increased, the service demand problem intensifies. “There were more requirements but there was no formal control and with deficit of people” (HDM). “One of the most important problems faced is the adoption of new technologies, and likewise the training of personnel” (HDM). “The bureaucracy is
excessive for the purchase of a part, more authorizations are required due to the economic situation" (HDM). "We used to have all the necessary parts to replace, because there was more standard, but when the PC's arrived, there was much diversity and that made it more difficult" (HDM).

Position and impact on the organization: Officially, the HD position has not changed within the organization, however it is known that the work done by the staff is even more influential and decisive. It is even more and more dependent on a service that has to be increased in hours and in the staff's professionalism; and the managers feel that it is difficult to have control of everything "another problem was that I did not have the information" (HDM).

This was one of the most transcendent phases in the evolution of the HD. Up until now, it was considered a smaller area and without much relevance for the users operation and efficiency. When having a greater demand, it is necessary to listen more attentively to the diverse business unit's requirements, "each division contributes and can originate a new project" (HDM).

There is no surprise for the transcendence of this phase if it is known that it is here when HYSLA starts the shift from the "support" towards the "factory" quadrant in the IT strategic grid. That's why, more and more users (even those not even reached by the HD) of almost any production and administrative area were provided with a personal computer. Figure 6.5 shows the evolution in this phase.
This figure shows that due to the PC's proliferation strategy, the organization enters already into the "factory" quadrant. The HD lag is also shown as becoming larger. This is the cause of the service crisis present in this phase. The specialization required (according to the proper needs of this quadrant) of HD has been reached only partially and on the other hand the organization has difficulties for taking corrective actions.

The extensive automation of operation processes gave HYLSAMEX the opportunity for entering in the "factory" quadrant. Slowly but in constant way, the organization depends more and more of the uninterrupted service of the automated processes in the production and administrative areas. On the following phases, the concern of HYLSAMEX's IT was to consolidate this very fast entrance in the "factory" function.
VI.7 Fourth phase: Partitioning of the HD service (1997 - )

In this phase, a decision is made about an HD service: to split it. The decision occurs in the following way: first the feasibility of delegating to a specialized company some part or all the HD is analyzed; then a decision should be made about the outsourcer. The decision is that only for outsourcing purposes the service related to personal computers should be considered, due to the fact that it is much more easier and quick for an outsourcer to be in charge of this, "It had to be decided: inside or outside" (TMA). The rest of the HD service is the one given to the in-house systems run in the mainframe and SAP. This service was decided that it would continue to be offered in an internal fashion. "It was one of the divisions, specifically Flat Steel, which supported the idea of making an outsourcing contract" (HDM).

The outsourcing decision had two criteria: cost and efficiency, and it was the responsibility of a small team of top managers, including the informatics subdirector, who represents the highest IT position in the organization.

A joint agreed upon SLA was elaborated with the systems management and is the one that is currently operating with some amendments. This SLA is not modified or revised periodically but only as needed. Until now, there had been two
occasions in which an extension has been negotiated due to the need to attend new groups of users and their corresponding computers.

This phase can be seen as a response of the HD to the new need caused by the organizational shift in IT. The organization's position becomes clearer located in the "factory" quadrant.

Internal organization: The owned HD has two first level persons. These persons attend exclusively the task of answering the telephone and solving the incidents (one in the morning and one in the afternoon) and approximately 10 people in the second level, however the second level do not belong to the HD but to other departments, mainly in the development areas and only support the HD when required. The second level persons almost always can solve the incident through the telephone; in this staff "there is rotation, but not so much, unfortunately there are not that many opportunities" (HDM). Figure 6.6 shows the organizational chart for the internal HD.
The outsourcing HD has 3 first level people receiving the calls plus one supervisor. In the second level there are 3 more persons who visit the users when the incident requires it “If it is not solved by telephone then it is taken care of during a visit” (HDM), “before, we did not use to interchange tasks (telephone and visiting) but now that helps a lot to know the users, influences much, because later in the telephone we understand him or her better, after knowing him personally” (OUT).

The supervisor is the highest outsourcer authority present in HYLSA and the first and second level staff depend on him. This HD is the one with greater movement: “The heaviest is the office equipment HD, the calls from the other HD (the internal one) also usually are received here and then transferred” (HDM). The equipment remains in number but there is rotation: “indeed there is, but for us (HYLSA) is transparent” (HDM), however, “the responses are less efficient with the new ones (the new staff members contracted)” (USR). There are also two more persons that
functionally perform as part of this staff but on an organizational level, they depend on HYLSA, that is, they are not part of the outsourcing team. These people are the ones in charge of giving support to the users regarding hardware and telephone services. Figure 6.7 shows the organizational chart for the external, outsourcing HD.

Figure 6.7 Organizational chart of the outsourcing HD

Degree of centralization: The owned HD remains centralized as far as the first level is concerned (reception of calls) and decentralized in its second level given that it is formed by people of diverse departments, mainly from the systems
development department. It is there where the developers and experts are found who are contacted to solve some doubt that has not been possible to clear in the first level. "There is also an immediate escalating, though not used a lot, 2 or 3 in one day, and in others none" (OUT).

The outsourcing HD is centralized in its two levels. All depend on a central office that the outsourcer maintains in HYLSA. From here the visitors (second level) reach all of their users.

Communication media: The communications means is still the telephone for both services. As a matter of fact, if the incident requires a visit, at the moment of solving the problem the visitor calls the staff to announce the termination of the service process. In the internal HD most of the incidents are solved by phone "close to the 80%" (HDM). In the outsourcing HD, approximately 140 calls are handled daily; this is much less than what it used to be; "the users have learned to solve more problems themselves" (HDM).

Degree of automation: The internal HD uses its own tool to register and monitor the incidents. It is not a powerful tool but has complied with the objective of having control. It is until now that it is not sufficiently powerful and it would be desirable to have a tool that could elaborate better reports for the decision making process. This, more than anything else concerns the comparison done with the tool used by the outsourcing HD. "There is no such metric in the SAP, there is open
and closed status problems" (HDM). In this phase that the switchboard is in operation and which came to be a key part in the service metrics and statistics.

The outsourcing HD uses the Remedy specialized tool. This software allows having complete control of the incident, since the registration to the closing, taking into account the possible upgrading done and the visits that are necessary. Furthermore, it allows elaborating a great variety of reports to be delivered to the top management for the decision making process. The outsourcer selected this tool, and the organization has been satisfied with the service. "In the Remedy reports there used to be empty fields; now they are not and this was because of our initiative (outsourcer) to submit better reports" (OUT). However, regarding computer equipment, they report it somehow obsolete "the equipment we have is no good anymore; there is less modern than the one utilized by the users. This is something that restricts us" (OUT). And in the words of the users: "the machines are obsolete; the outsourcer staff are far from having the best equipment" (USR).

Ownership: In this phase two HD services are present for the first time, an owned HD and other by outsourcing. The owned HD serves approximately 2000 defined users from which 1000 are concurrent; it refers to those who work simultaneously distributed throughout HYLSA.

The outsourcing HD serves approximately 2700 potential users belonging to all of HYLSA. It has a contract and it has been renewed twice practically under the
same terms with IBM. These users are different from the users 10 years ago "they have more needs and are more demanding, they are more acquainted with their computers" (HDM).

Coordination: The coordination mechanisms in the case of the owned HD are the following. The decision rights are limited. It could be said for example about the service policies or about aspects which do not involve a large amount of cash, because by organization rule, all the expenses must be authorized by a superior authority, depending on such amount. There is no current reward system and the evaluation is done according with what was stipulated in the original agreement regarding the service levels.

For outsourcing HD, the decision power is totally owned (about hiring, layoffs, change of equipment, procedures, etc) and only must report or negotiate with HYLSA's HD management, any decision that impacts the SLA or the contracting of services.

The reward mechanisms are absolutely transparent from HYLSA's point of view and the evaluation system is directly linked to the SLA and also to the surveys, which are periodically made.

Performance: The owned HD is in a maturity phase such that the users report service satisfaction regarding its speed and quality "there has also been changes
also due to the switchboard, almost everything can be measured” (HDM). There is a standard set of steps to follow regarding the attention of incidents, as well as for the HD under outsourcing. The few negative performance aspects refer to the problem of having to differentiate when to call which of the two HD, due to the fact that practically all the internal HD users are at the same time outsourcing HD users. The owned HD does not produce all the detail reports that the executives are used to see about the HD performance under outsourcing. However, due to the fact that the number of users is not as large, the customer service quality remains as satisfactory. As a matter of fact, there is a meeting every day at the morning in order to discuss any incident that could not had been solved from the previous day. Furthermore, each week there is a meeting to discuss these same problems from a more global standpoint “a weekly meeting every Wednesday in the afternoon, more formal” (HDM). The open or closed problems report is evaluated on a monthly basis, “there are monthly reports but not precisely a SLA” (HDM). The staff is well prepared although “there is not much formal training, the SAP people is trained internally by us in the basics, then along the way they learn the rest” (HDM), “the great challenge is still to understand the user” (STA). The staff comments among themselves the way in which a critical case was solved and also this remains documented. This service is offered during business hours but also an incident may be reported during the nights or weekends. During busy days there could be between 50 to 60 calls on a daily basis from which one is solved an average of one minute, although in lighter days “there are approximately between 20 and 30 daily calls and this represents a good source of information as a monitoring device not
only of HD but also to know what problems are present” (HDM). “The service hours range from 7 am until 11 pm and this has not varied” (STA).

The outsourcing HD is running with the standards of this type of service. IBM has demonstrated to be an organization capable of rendering service to a large number of users, “the service was pertinent, given the increasing number of computer equipments” (TMA), “there are good results in quality, and there is a telephone survey that is done periodically” (OUT). Of particular importance is the attention given to the physical maintenance of the equipments. Currently there are 2700 potential users approximately during the normal business hours “although now the users no longer call for trivial issues, they are more conscious” (STA). “There was some mess among the users at the outset, but in just over a month and a half they got used to it, they saw there was always someone who was able to answer the telephone” (HDM). There is also the fact that “the number of incidents has increased in telephone solutions from a 25% to a 50%” (USR). There is a form to prioritize the attention given to the users, “there are priorities according to the level of users” (HDM), and this priority is identified directly by the staff member who receives the call. Also on the other side, from the users side, sometimes they organize in their departments in a more adequate fashion according to their tasks, for example “on occasions the users report the incident to another user which supports the area” (OUT), “I will not call you immediately, first I will deal with it myself” (USR). The great staff challenge is to have the necessary knowledge “the problem is to master it all, not necessarily is a challenge to deal with difficult
people” (OUT), “the interaction with the user is acquired with experience” (OUT). And also there is that “among users you find everything, some do not know anything and others with much disposition to learn” (OUT) and thus “one has to learn how to listen and talk” (OUT), “an area of opportunity is know how to better listen to the users, in a similar way as a physician does it, because the problems involve a lot of human communication” (OUT). The members of the staff learn much asking their colleagues and paying close attention to the incidents they attend and there are also meetings to discuss rare incidents.

Position and impact on the organization: The owned HD is still a dependent entity of the systems services and technical support management. The difference with the position it had previous to this phase is that the data now being provided is taken into account with greater consideration for the decision taking process at the highest level within the systems area “the HD would become critical if it falters” (HDM). On the other hand, it is desirable that these decisions are more and more supported by the HD service results. "The original structure has been maintained, in general terms, but it has been perfected. The outsourcing is an example of the strong changes that have been made” (HMD).

The HD under outsourcing is also dependent on the systems services and technical support management. The trend at the end of this phase is to be able to offer an integral HD service, regardless of the type of incident that a user is reporting.
This phase is the current in the HD of HYLSA. The service has reached a maturity degree, which has allowed the managers to take care of some aspects that used to be hard to attend in the near past. For example, about the use of information obtained with less operational and more strategic means; and also about the service optimization, although for the users it has been completely transparent. Figure 6.8 shows the evolution in this phase.

Figure 6.8 Evolution of the organization and the HD in the fourth phase

The figure shows both the organization as well as the HD totally within the “factory” quadrant. It also shows that the lag has been nullified. This is a direct cause of the effort made in this phase in order to comply with the basic requirement of the HD related to the “factory” position: the service partitioning has allowed gaining specialization.
On the other hand, the decision to hire outsourcing services fits perfectly in this phase, because it is much more viable to do it when a specialization is required. In this way, it is easier for the outsourcer to take charge of a job that can be specified with more clarity and with more precise rules. The fact of hiring the outsourcing services in this grid position has contributed for more rapidly closing the lag carried since the previous phase.

VI.8 Fifth phase: Integration (in gestation)

This phase is not yet a reality. What are presented here are the current concerns about the next phase in the evolution of HD within HYLSA. However it is evident that in the short or medium term, decisions will be made which materialize much of the ideas currently in the minds of both the executives as well as the HD managers.

On the one hand, the maturity level that the service has reached is appreciated and this is reflected in statements that in any previous phase it was not possible to listen:

"There has not been a spectacular change in the last three years" (USR),
"Much has been done, but the impression is that the users needs still are not met completely" (OUT). "The evolution has been smooth but in a positive sense"
"The HD has always been present in the organization's transcendent changes" (TMA).

On the other hand, it is desirable to have the internal HD better equipped, for example with diagnostic and virtual assistance tools; and there are also some desires to improve the service, but contrasting with the previous phases, there are not precisely complaints but requests made after a more reflexive analysis of the operation under a situation that reflects greater stability: "There has been a commitment by the top management" (HDM). "The company's development and the HD have gone hand in hand" (TMA). "If they (the staff) had greater knowledge (like SAP) people from the HD (under outsourcing) could help better" (USR), "maybe the HD responsibilities have not been updated" (USR). "The HD personnel (outsourcing) and the own should match their level of knowledge and thus solve any incident in the first call" (HDM). "There could be a more appropriate training process and improved statistics" (TMA). "One thing I would like to be implemented is Tivoli (virtual access to the control of the user's machine)" (TMA).

Within HYLSA's global systems strategy, it is assumed that new possible service integration could benefit. As a matter of fact that integration is desirable and it is said that it would have a greater impact. Of course, taking into account that this integration would be totally transparent for the users and keeping a warm and service-oriented human attention, characteristic which is perceived as indispensable. One of the reasons for the integration is that it would be easier to
have the complete vision of the users needs if all were controlled under one same authority and the resource requirement justification would be easier for "the whole". "The staff would require much more specialization but could be a better position to pursue a career" (HDM).

Assuming that the HD service integration could be given, the managers and executives evaluate the possibility of delivering the service to an outsourcer, being the current or some other. Nowadays, the organization count on the proper and outsourcing experience, thus it would be easier to decide. "Currently the HD needs to be improved in order to keep up with the HD standards" (TMA). "In a near future we thought that all of these could be external" (TMA).

However the idea also persists, not generalized though, of renewing the HD under the same current scheme, because of the specific an owned systems development could be: "For me the optimal HD is a hybrid (owned and outsourced), one owned that could know how to manage the outsourcing; it has to know the company thoroughly" (TMA).

The most important fact to notice in this phase, still in gestation, is that there is an intention for using information not only for operational purposes, but more strategic, at least internally, not yet outside the HD department. For example, the information about the hardware incidents is used to plan the maintenance program.
This would be the next step regarding the “use” of information. Furthermore, the service is seen more as strategic. “Yes, the information we get is also used to improve the service itself” (HDM). “As long as the users are attended more frequently, it becomes more strategic, though also, if it is only internal, it can not be so strategic” (TMA). “The service is important due to the high dependency on the computer systems” (TMA); “it is classified as a system that should not be interrupted, not exactly strategic” (TMA). “In the future the response time should be shortened” (TMA). “The users are now more demanding” (HDM), “it is strategic; if there were no service it would become a chaos” (TMA).

The new service could provide information more easily for the strategic decision making process. Though it is also known that “HD is only an element within a larger project” (HDM). This means that a possible path to follow is the HD integration, but the outsourcer could have control not only the HD but also many other systems areas and departments. This is a decision that would have to be taken in the short or medium term.

Also important to note is that this time HD is not in a reactive position, rather it is anticipating decisions and functions in order to be ready for the future. In IT terms, the future means a possible shift to the "strategic" quadrant in the grid. Figure 6.9 shows the evolution in this phase.
The figure shows full positioning both of the organization as well as the HD within the “factory” quadrant, but also shows a tendency of both towards the quadrant in the right: “strategic”. This tendency is only perceived from the ideas expressed by the HDM and the TMA, because there are still no tangible elements to demonstrate such tendency.

As long as the organization moves towards the “strategic” quadrant, there will be a need to pay attention and develop the other structural dimension of the HD: the flexibility. This flexibility should reflect in various forms, for example in an internal structure that allows rapid adjustments in order to adapt to new requirements. The need to increase the functional dimension towards the generalization should also be considered. Within the evidence found in this phase, it is noticeable that these movements are those that the HDM wish to promote for the future medium term.
VI.9 Fit with the proposed model

In this section, the proposed evolution model of a HD is analyzed against the reality observed in the HYLSA case study. The model is shown again in figure 6.10.

![Diagram of proposed model](image)

**Figure 6.10 Proposed model**
The support service always exists, even before having a formal area that can be called Help Desk, or of any other way that points out the same function. In this point, there is a match of the phase 1 of the case with the model stage 1.

The service formalization only occurs if the need for support is increased. It could be due to the increase in the number of users (or calls) or by a change in technology or any mix of them.

The proposed model establishes that the formalization could occur through a continuum, it could be low at the beginning and then increases continuously considering several degrees. The possible combination of several factors determines the degree of formalization needed. The factors are: assignment of the people (full or part time) and the set of rules (general or specific). That's why there is not a specific time for being in this model stage while HD formalizes more and more. In the HYLSA case, the formalization was done at once.

The formalization is the first organizational effort to manage an efficiency crisis, however, such crisis is rather a low impact one. The service standards definition only occurs when there are people assigned formally to this function, regardless if such assignment is part time. The internal organizational structure for the support function is inherent to the service formalization. It is in this point that the HD stability starts to occurs which has as its origin such formalization. To the first HD formalization corresponds a low influence position within the organization.
This fact is also present in both, the model and the case; and it represents a match between the phase 2 and the model stage 2.

As a consequence of a more formalized process, the HD reached a position more close to the stability, which allows it to make a more efficient use of the information. This reorganization could imply transcendent decisions such as outsourcing or giving the HD a more strategic position within the organization chart. Such decision can occurs as a response to an efficiency crisis or a service backlog, as it appears in the model. In this fact it is possible to see a match between the phase 3 and still model stage 2 because of the triggers related to this stage.

Only when the stability stage has been reached in an upper position, the HD service is ready to make a better use of the information. This use will benefit the service itself through the contribution of more knowledge for internal decisions related to the service. This fact represents a match between phase 4 and the model stage 3.

It is also important to point out that HYLSA still does not reach the last evolution stage (Mature, stage 4), but is now in the previous one (Stable) and initiating actions towards the transition to model stage 4, this can be seen through the facts present in phase 5. It is not concluding, but understandable the relation
between the HD position and the organization's position within the IT strategic grid. However, this relation requires of another more profound study.

VI.10 Conclusions about the model and propositions

In this section is analyzed the use that the proposed model could have in order to be able to observe the evolution of the organizational HD, and also the other propositions are discussed.

The proposed model is useful to visualize the HD evolution. It is possible to say that the similarities found between the model and the case study, justify that affirmation. The proposed model has demonstrated to be close to reality, at least the reality of a Mexican organization with the capability of assigning resources to a formal HD; although in the search of possible cases for analysis in this thesis, it was not possible to find organizations in Mexico which have reached the last stage of the evolution (knowledge generation for management).

It is important to note that two different organizations hardly advance at the same speed from one to another stage. This could be affirmed due to the fact that the factors which make the evolution advance through the stages are factors associated with external (to the HD department) decisions which can include for example: changes in technology, new people in the top management, partnership
with other companies and variations in the assignment of budgets. Likewise, each of these changes could at the same time trigger other changes, making it very complex the problem of defining standardized periods of change for the HD.

Other implicit conclusion in the model is that once the HD is formalized, on normal circumstances there is no possibility of going back to the preceding phase. This is due to the reasons to formalize the service, which were associated with organizations that have the possibility of assigning resources to the creation of a formal HD department. These reasons include growth in the number of users and the need to provide them an adequate support that would also allow having user productivity under control and the optimization of the HD resources.

From the HD manager point of view, it is important to consider that formalization must match the necessity of the moment. Further efforts in the same direction can help to reduce the gap between that need and the offered service. Also, an important consideration is to anticipate as soon as possible, any crisis. If a decision for outsourcing should be analyzed, so, it must be opportune. Only in that way the "shock" can be less harmful to users. As it was said in this case, when the support service reaches the customers, it becomes more strategic and, according to what was discussed in chapter 2, the service would be in a position hardly considered as a candidate for outsourcing.
The applicability of the model is related to the validity of itself. So if it was found in this case analysis that the model fits the reality about the past, now, it could be useful for knowing the future of the evolution of a HD service in similar circumstances.

The proposed model attempts to represent the HD evolution, however, it should be noted that if users were really "customers", the model could be different. The reasons are for example: the support function would start as a strategic one since the beginning, the organization could not obligate the users to attend training programs and the final goal would be to satisfy the customers and not to keep the employee's productivity. In practice, such HD for customers is rather called "call center".

As part of the propositions, besides the model, the following three propositions were made and now, the information allows confirming them.

1. The increment of the amount of users is the cause of the formalization of the HD.

   In the HYLSA case, as it was seen, that was the direct cause. Although also important was the necessity for metrics allowing the evaluation of the productivity and the staff efficiency. This fact was observed in the second phase.
2. The decrement of the quality in the offered service or the incapacity for improving this quality is the cause of the potential decision about outsourcing.

In the HYLSA case, the second crisis showed evidence about the difficult in attending a growing number of users with acceptable efficiency. In such decision certainly the non-strategic function of the considered systems was decisive. This fact was observed in the third and fourth phases.

3. It is only possible to consider the strategic use of the information provided by the HD if this HD has reach stability and it is able to improve the service using the knowledge that is generated during its operation.

As found in the case, the phases where there is a gap with the real need of support and the HD is not yet using properly the generated information for improving the service, hardly a strategic use of the information could occur outside the HD. This fact was observed throughout the case.

And about the proposition about the HD movement in the grid, considering the structural and functional rigidity dimensions, the conclusions are:

- The proposition certainly describes the “should be” of the HD according to the analyzed transitions in the case, that is from “support” to “factory” and from “factory” to “strategic” (even in gestation).
- The proposition supports the proposed evolution model. Throughout the case, both the proposed evolution model as well as this proposition, pointed in the same direction to evidence the need of the same actions.

- This proposition constitutes the most applicable part of this thesis. While the proposed evolution model is useful to explain such evolution in a theoretical fashion, this proposition represents a more direct way to know the possible actions that an HDM should consider.

This section has shown the conclusions about the utility of the model and propositions. On the next chapter conclusions are related to the whole study and what other studies should be done in order to have a better sight of the organizational HD evolution.
CHAPTER VII. CONCLUSIONS

VII.1 Introduction

This chapter summarizes all of the work presented and its use for researching on this discipline.

Evidently there is much more to say about the research on the evolution of the HD, however, this work limits itself to the objective description of an organizational HD and the proposal and test of a model to describe its evolution.

Some aspects have not been mentioned in detail, rather only in regard to their participation within the evolution of a HD, for example: types of users and their training, specialized computer systems for a HD, the construction of the SLA and the requirements for decision making at the strategic level.

Throughout this thesis, the study of the concepts related to HD was contemplated, as well as their function within an organization in order to render a solution to the research question: "How does a HD department evolve, as it attempts to match the needs and structure of the organization to which it belongs?" and also a definition of a theoretical model to explain such evolution.
VII.2 Brief summary of each chapter

This thesis presents the following development order:

In chapter 1, the HD is described in a generic fashion as well as the concepts involved. The need to know, in a more objective fashion, how it is and how a HD evolves within an organization to which it serves is explained. The thesis objective is established and the outline of the thesis is shown.

In chapter 2 the components of an HD are presented in detail, its descriptors as well as the organizational factors that can have an impact on this service.

In chapter 3 another aspect linked to the use of a HD is explained: the potential of use of information that is generated. Furthermore, the current trends to render this service are also mentioned.

In chapter 4 the IT strategic grid is explained as well as its use for the study of the evolution of a HD. This IT strategic grid is used as a form to see the type of use given to the information technology in the organization and its subsequent relationship with the HD.
In chapter 5, the methodology used to accomplish the proposed objective is explained in detail, the instruments used as well as the steps to be followed. This methodology is the case study. Likewise, a theoretical evolution model is proposed as a starting point. This model has to be tested in order to verify its validity in a real case. The organization chosen to perform the case study is also described here and a set of propositions is presented.

In chapter 6 the whole case study within the organization is described, that means, the evolution of this particular HD. At the end, it is discussed the fit of the proposed theoretical model with the reality of the case study as well as a conclusions about the other propositions. It is concluded that the theoretical model is a valid way to visualize the evolution of an organizational HD.

VII.3 Where are we now in the HD evolution study?

This thesis has analyzed in detail the evolution of an organizational HD, for which the IT strategic grid has been helpful. It has shown which are the most important factors that are influential in the HD evolution.

All of this evolution is based on an organization with some characteristics that are implicitly present on the model, for instance: organizations that are growing and in constant change. Some extreme cases would cause a dysfunction in the model,
and such cases are related to those assumptions mentioned. So, an organization extremely stable or an organization in the middle of a downsizing process could be not viable for applying the model. Another case can be an organization that is born with high technology for everything. In such case, the HD would be born with a high degree of evolution, although it is rather strange. That would be the case, for instance, of a software development enterprise born from another technology organization.

VII.4 Main contributions

In this thesis, a work oriented towards strengthening the research in the HD area has been performed, and in a particular way, about its evolution. In that way, at the end, the following four points are identified as the main contributions.

1. The definition of a theoretical model that explains the evolution of an organizational HD.

2. The study of a specific case, explaining its phases, as well as the problems found and the proposed solutions, with all of which the model has been validated.
3. The use of the IT strategic grid as the starting point and reference for identifying the relationship between the HD and the position of the organization within this grid, as well as the correspondence between the evolution of one and the other. Also, a contribution is the consideration of the three-level structure for the HD according to the organization's position in the grid.

4. The possibility of using the IT strategic grid as a reference for the analysis of the evolution of other services, for example, the evolution of a call center or the evolution of a systems development center.

VII.5 Further research suggested

It has been already explained which is the objective of this thesis and which has been its reach through the proposal of a theoretical evolution model. For that same reason, a set of investigations can be defined in order to help complement or extend the current investigation. Within these investigations, there are:

1. Strategic information requirements analysis by the top management and its relation with the HD capacity of generating knowledge. In other words, the creation of a KGLA document (knowledge generation level agreement) as an extension of the SLA.
2. The study of the evolution of a Call center. It could be said that a Call center (customer service similar to the HD) evolves from a similar model, however its differences with the HD could produce an evolution model quite different. It is good to know these differences as well as its evolution model, because this information could be very helpful for the managers who think in extending their HD. It could also be helpful for the managers of a Call center who think of also using it for taking care of their internal employees.

3. The users on the other hand, not only evolve but also the cultural factor could be an important difference in relation with the preferences about the service. Which is the relation between the users’ culture and the procedures and means used for a HD? Would they be all willing to receive an automatic service? How much difference does a service make in which there is always a cordial human voice and one in which there are only recorded messages?

4. A HD belonging to an organization with limited resources could never formalize the service completely. However, the objectives of the HD are always the same. Then a question emerges: How is the evolution of an HD in an organization that has significantly fewer resources and significantly less users?
VII.6 Overall conclusions

Through the research underlying this thesis we have discovered the value of a theoretical model that in the described circumstances is useful for visualizing the evolution of an organizational HD. The HD administrators can rely on it to identify the evolution phase in which it is currently found a specific HD. They could also count with it and in the propositions around the IT strategic grid to foresee which event is next to emerge according to its evolution and in that way be mindful to the problems associated to a certain phase.

It is not easy to conduct a case study. However, this thesis has managed to obtain the essence of the information related to the evolution of the organizational HD. The process has been long and also the filtration, comparative and integration phase of the data that comes from different sources and means. At the end, the use of the case study has been seen and also it has been proven that otherwise it would have been very complex to gather all the information, if not impossible.

Another benefit of having a theoretical evolution model is that currently a research can also be made using some other instrument, for example a survey. In that way, the generalization of the complete model could be broadened.

One of the things that became quite evident through the study was that the advance of the HD has been until today in the hands of the "practitioners", either
independent consultants or members of associations linked to this type of service. It has been seen that the daily operation usually is quite absorbing and therefore it becomes difficult for the organization to perform a self-diagnosis of the HD function and keeping clear the ultimate goal of the HD: to generate knowledge for the strategic decision making process. The HD that belongs to such organizations has little opportunity to work proactively and rather have as their objective to gain some stability, maybe without knowing that such stability is only the necessary platform to aspire to new goals.

Surely there will be in the medium term future some information technologies that will change the way in which until today we understand a HD. The most important issue is to understand the fact that a HD, as well as many other processes, only has its use when the users reach a greater productivity and this is associated with a working environment where people are the center of attention and the ultimate goal of all information technology.
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