DISINTERMEDIATING THE SUPPLY CHAIN OF

CONSUMER DURABLE GOODS.

by

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ABSTRACT.

This thesis investigates the multi-level impacts of Internet and Electronic-commerce on the supply chain of durable products. In particular, the research focuses the analysis on the supply chain of heating, ventilating and air conditioning (HVAC) equipment and discusses the concept and implications of disintermediating the distribution channel of HVAC. The data and information presented in the thesis have been primarily collected using questionnaires. A phone survey with eleven manufacturers of HVAC was conducted and the results have been used to investigate: 1. The structure of the distribution channel; 2. Activities performed on-line; 3. The potential and actual benefits of E-commerce; 4. The impact of E-commerce on distributors and intermediaries; 5. Barriers and problems in implementing E-commerce; 6. Drivers and facilitating factors in implementing E-commerce.

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1.0 INTRODUCTION.
This chapter provides an introduction to the concept of electronic commerce and marketing durable products over the Internet. Section 1.1 analyzes the strategic implications for producers of durable goods of moving part of their marketing processes on-line. Section 1.2 provides an introduction to the on-line marketing processes of durable products. Section 1.3 illustrates the fundamental characteristics of durable and consumer durable products. Section 1.4 illustrates the framework that will be used in this research.

1.1 THE VIRTUAL REVOLUTION: ELECTRONIC COMMERCE.
During the last decade, manufacturers of durable goods in the United States have been faced three major problems:\footnote{For a detailed analysis of the market of durable and consumer durable products, see Bayus and Metha, 1994.}

1. The demand for durables have been growing 10% slower than the preceding decade.
2. Competition from overseas producers has increased dramatically.
3. Marketing costs have continued to rise.

Producers of durable products in other markets and countries have faced similar problems. One consequence of these simultaneous pressures is that manufacturers of consumer durable products have experienced decreased profit margins. As a strategic response, many companies are rethinking their selling and distribution channels. The use of the most efficient channels has become a fundamental element if one is to be competitive in the market. As a result, cost has been the driving force behind the major changes in the sales channels of durable goods performed during the last years. The advent of Internet and electronic-commerce is now creating a second strategic force for channel restructuring: eliminating the barriers between the manufacturers and the final customers.

In an economy where 80% of the GNP is information related and more than half the workforce is classified as “knowledge workers” (Sterne, 1996), communication and marketing channels are critical. The transfer of information and knowledge is replacing traditional buying and selling of goods as the world’s principal economic activity\footnote{The Economist “Going Digital”, London, 1996.}. Almost two-thirds of the value added to buyers and users of physical products is now provided by related services (e.g., finding products on the shelf, information about how to use them, etc.). The twenty-first century will
be characterized by the digital economy, where the most important assets will be intellectual and not tangible (Negroponte, 1995).

In this scenario, the Internet is the most dynamic technology and communication channel that is expected to facilitate the advent of the digital economy. The Internet is a network of networks through which millions of individuals, companies, governments, organizations and educational institutions around the world can instantly access and exchange information and process business transactions. By reaching millions of individuals and thousands of organizations on all continents, the Internet is increasingly becoming the "space" to meet people, exchange information, products, services and currencies and process business transactions. An Intranet refers to the environment inside an organization or among different companies, made up of network, internal web, e-mail, newsgroups, mail lists, and other communication tools and technologies.

Rayport and Sviokla illustrate three fundamental differences in terms of business transaction between the physical world and the Internet:

- The *content* of the transaction is now represented by information rather than physical products.
- The *context* in which the transaction take place has changed from a face-to-face model to an electronic one (computer-to-computer).
- The *infrastructure* that support the transaction is different: computers and communication lines replace stores and malls.

Sviokla and Rayport believe that the main implication of these changes is that companies now are required to compete in two dimensions: a physical one, the old marketplace, and an electronic, virtual dimension, that they call the "marketspace". In the marketspace, products and services and bought and sold and transactions are performed using electronic means and infrastructures.

The term "electronic-commerce" defines a series of activities and processes that are directed to advertise and market products and services using electronic means (e.g., the World Wide Web). Electronic-commerce gives companies the possibility of creating a direct and efficient sales channels that does not rely on the old distribution network. Electronic-commerce seems to eliminate or, at least, reduce the need for intermediaries and distributors. The process of bypassing the

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middleman or selling directly to final customers without the intervention of intermediaries (e.g., agents, wholesalers, retailers, etc.) has been defined as “disintermediation”. Figure 1 illustrates the concept of disintermediation: producers bypass intermediaries and interact directly with final customers. Information and products can move directly from manufacturers to customers. Major industry and channel restructuring are expected as consequence of disintermediation.

![Disintermediation Diagram]

Figure 1. The Concept of Disintermediation.

However, as will be seen in section 2.3 many elements suggest that the disintermediation of the supply chain of consumer durable products is just one of the possible outcomes and effects of e-commerce. Manufacturers will face many difficulties and barriers in marketing their products directly to final customers. To overcome these barriers, many producers could be forced to rely on new types of intermediaries (e.g., virtual resellers, electronic malls, intelligent agents, etc. -see section 4.4 for a detailed analysis of these new forms of intermediaries). As a result, many channels of distribution will face a re-intermediation. The term “re-intermediation” refers to the reorganization of intermediaries and distributors in the virtual supply chain of consumer durable goods. It is the creation of new value by new types of intermediaries between producers and consumers.
To determine which intermediaries will survive the industry and channels restructuring, it will be necessary to analyze the process of value creation for the final customers. Customers are discovering that movements of products from one type of distributor to another do not necessarily add value to the product, while adding additional costs. Electronic-commerce requires that only the steps and movements that add value or information to a product have to be taken. A profound rationalization of supply chains is the direct consequence of this new approach. A number of forces (e.g., customers' needs, competitive moves and pressures, industry structures,) will determine how far a manufacturer can go in the direction of disintermediating the supply chain (see chapter 2).

From a producers point of view the electronic-commerce represents an incentive for a strategic change toward less concentration on their products and more on their customers. Companies have to redefine the business they are in more in terms of customers' needs which, of course, affects the decision about sales channels. Manufacturers that decide to move part of their operations on-line will face a completely new set of problems. Compared with traditional support and sales activities, those required for e-commerce are very different and require different skills and knowledge. The point is not just putting a home page on the World Wide Web but, instead, creating a new process for marketing and delivering products directly to final customers. The new process has to be integrated with all other processes and activities in the organization and with the overall marketing strategy.

Before analyzing in detail the concept and implications of marketing durable goods over the Internet, it is necessary to define and explain the notion of consumer durable products. This is important how manufacturers of durable products should move their operations on-line and compete in the marketspace.

1.2 A DEFINITION OF CONSUMER DURABLE PRODUCTS.
Products can be classified in different ways, and one way is to distinguish by the purchaser of goods. Using this classification method, it is possible to distinguish between:

- **Capital Goods.** Those intended for the production of other goods.

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A supply chain can be defined as a series of activities and processes, performed within a single company or among different companies, that move materials, products, information and money between suppliers, manufacturers, distributors and final customers.
• **Consumer Goods.** Those intended to be used by the ultimate customer.

A second way to classify products takes into account the durability of the goods among consumer products. In this case, it is possible to distinguish between:

• **Consumer Durable Goods.**
  • **Consumer Non-Durable Goods.**

The most significant characteristics of consumer durable goods, if compared to non-durable products, are:

1. They are purchased less frequently.
2. They tend to represent significant dollar outlays.
3. They are intended to last for a period of many years.

Non-durable consumer goods (e.g., groceries, diary products, fuel, gas, cleansing agents, etc.) are reduced to nothing during the consumption process. Durable goods, on the other hand, can be applied and used several times (or at least more than once) before being destroyed or consumed. Durable products are also considered generally more expensive than non-durable products. Another characteristic of durable goods is that there is usually an extensive period from the moment the consumer is aware of her need of possessing a product from the final decision of purchasing it. This is especially true when the product is sufficiently expensive (e.g., furniture, refrigerators, washing machines, air conditioning equipment, cars).

The total demand for consumer durables can be conveniently divided between initial and replacement demand. This distinction is somewhat related to the differences in purchasing behavior between owners and non-owners. As a matter of fact, the decision to purchase a consumer durable good by non-owners is preceded by a period of weighing the positive and negative qualities of the product. On the other hand, an individual that has to replace a product compares only brands and types. For that reason the purchasing decision process for an initial purchase generally lasts longer and requires more information than for a replacement purchase. This distinction is important because there are differences in the marketing strategy to cater for initial and replacement demand.
Consumer durable goods with long lifetime and high value are usually considered an important example of informationally complex products. These are products that consumers need a lot of information about before making a purchase decision. The quantity and the type of information necessary to make a purchasing decision of an informationally complex product, therefore, is much wider than that involved in a purchasing decision of a non-complex product, like food.

For a matter of definition, we can consider informationally complex products those products that (Gibbs, 1997):

1. Require the consumer to do information search.
2. Are relatively expensive.
3. Have a high risk factor\(^5\) associated.
4. Include terms and operating conditions the average consumer may not be familiar with.

Another characteristic of informationally complex products is that they are usually products that are accompanied with operational terms that the average consumer may not be familiar with. The installment of an air conditioning equipment require information that many people could find hard to understand. Many consumers may seek additional sources of information such as magazines, books, phone calls to understand how these products work.

Finally, informationally complex products usually have many features or options that the consumer must choose from. Many times, informationally complex products are either associated with high technology or they include technologically advanced features or options. Consumers want and need to understand these features and details before they purchase them.

1.3 THE ROLE OF INFORMATION IN THE PURCHASING DECISION PROCESS OF CONSUMER DURABLE GOODS.

E-commerce can help consumers to understand a product’s features, how the product can help them, and why they should buy product A versus product B. E-commerce allows producers to create a direct and efficient mean of communication with final customers that can be used to target specific niches of customers better than traditional marketing and distribution channels (Emery, 1996).

\(^5\) The high risk factor associated with the purchasing of durable goods and informationally complex products refers to an economic risk (e.g., purchasing a product that do not satisfy the buyer’s needs).
This is the reason why the Internet is expected to become an important marketing channel for informationally complex products and consumer durable goods over the next few years. Traditional marketing creates limitations for both the manufacturer and the consumer.

With e-commerce, companies are able to transcend the limitations of traditional marketing by describing and explaining complex products through the use of animation, video, layering information in a way that accommodates different audiences and needs. Producers can help consumers purchase their products by using e-commerce and digital interaction to help explain and showcase their products. Many good products have failed because producers did not market them in a way that explained the product’s benefits. E-commerce can now help companies to showcase their products by allowing consumers to gather information that they need in a way that is direct and inexpensive.

In recent years, the importance of establishing a dialogue between a firm and its customers has received increased attention. Packaged goods and services firms have started database marketing⁶ and targeted direct marketing as a way to communicate with customers and halt the erosion of brand loyalty. Manufacturers have initiated various “club” programs to strengthen brand loyalty, learn more from customers and develop leads for potential customers. Airlines and hotels have had frequent flyers/stayer award programs for several years. Supermarket chains offer frequent buyer/shopper programs and have targeted coupon delivery systems. Database and direct marketing principles have also been used for consumer durables such as automobiles, appliances, housewares, and consumer electronic items.

Because of the intrinsic characteristics of consumer durables (i.e., high prices and long lifetime. See also section 1.2) it is important that companies identify the potential customer. Brand loyalty is critical since a customer is usually out of the market for several years once a purchase is completed. Manufacturers must also be concerned about extending brand loyalty within their product lines (e.g., kitchen appliances such as stove, refrigerator, dishwasher; stereo components such as receiver, turntable, tape deck, compact disk player) and trade-up buyers (e.g., buying new appliances with more features and thus higher price tags).

---

⁶ The importance of learning from customers created a new form of marketing which consists in gathering, synthesizing and organizing customer information in databases. A database of transaction histories can be a primary marketing resource to launch new products and services.
As a result, industry interest in identifying and communicating with potential buyers of durables has risen (Gonier, 1990). In this scenario, the advent of the Internet and e-commerce represents a possible source of differentiation and competitive advantage. The Internet is expected to modify the "evoked set" of many consumers of durable products.

The "evoked set" or "consideration set" refers to a group of brands that a consumer actually considers for purchase and is usually only a subset of the brands the consumer is aware of. This concept, connected with the capability of the Internet, has an intuitive appeal for marketers because it offers producers a potential strategic target for the development of marketing programs. If a brand is not in a consumer's evoked set, the chances for purchase are very low.

The initial size of the consumer's evoked set has been found to be a major influence on the total amount of information search a consumer undertakes: those with smaller consideration sets search less and are likely to choose a brand from the set quickly.

Up until now, producers have used the traditional marketing weapons (i.e., the so called "4P": product, price, place and promotion) in order to be present in the evoked set of the target markets. Now producers can use the Internet and on-line marketing to raise the chances that their brands are present in the evoked sets of their targeted customers.

An active presence on the WEB is also economically justified by another key concept related to the purchase decision process of consumer durable products: surrogate attributes. Research suggests (Baker, Wilkie 1993) that consumers rely on surrogate attributes to reduce their search behavior and to drive their purchase decisions. As opposed to objective information about a product (style, performance, etc.) a surrogate attribute provide no actual information about the product, but is used by consumers as though it does. Price, brand name, manufacturer reputation are traditional and common surrogate attributes.

Now an active presence on the Internet can be considered a significant surrogate attribute for many manufacturers of consumer durable products. As a result, producers are initiating use of the Internet to develop programs for image cultivation, availability of information, and segmentation based on target market knowledge and experience.

A cost-benefit perspective is useful to understand consumer information search of consumer durable products. Search costs include factors such
As delay in acquiring the product, the value of a consumer’s time, the frustration involved in dealing with traffic, salespersons, etc. as well as dollar costs for shopping. The benefits include finding a better price, increasing one’s satisfaction level, and psychological gratification from making a better purchase. The Internet can decrease search costs and may increase benefits. The cost/benefit framework has implications for producers of durable products attempting to either increase benefits and/or decrease costs to encourage a consumer to make an immediate on-line purchase rather than continue to search.

To understand how to market durable products over the Internet it is necessary to know how consumers purchase products. It is important to understand the psychology behind consumer purchasing decisions, even before they buy products. It is also important to remember that the basic principle in marketing is the sharing of information. One of the key times consumers seek out information is when they are ready to purchase a product. How this search is done and how successful it is, is crucial to the purchasing of durable goods.

The buyer-decision process (Gibbs, 1996; Kotler and Armstrong, 1993), illustrated in figure 2, can be divided in five different components:

1) Problem recognition.
2) Information search.
3) Evaluation of alternatives.
4) Purchase Decision.
5) Postpurchase behavior.

![The Buyer-Decision Process](image)

Figure 2: The Buyer-Decision Process [Source: adapted from Gibbs, 1997].
In each stage, companies have the possibility to add and create value for their customers using the Internet.

In the problem recognition stage, the consumer realizes that he/she has a need for a product or a service. The role of information in this instance is to convince the consumer that he has a need for a certain product/service. This is the first step in which the producers can add value for the consumers and can create a direct channel of communication with them.

The next stage in the buyer-decision process is the information search. This is where on-line marketing can play a role in helping producers to reach consumers who are ready to buy. Once the consumer realizes that he needs a particular product, it is time for him to gather information concerning it. The role of information in this stage is crucial because this determine what product the customers will ultimately buy.

In this stage the on-line marketing creates awareness of the product/brand for the customer, decreasing his costs of gathering information and increasing his benefits, especially in terms of the number of products included in the evoked set. Information search in purchasing an automobile may require several trips to dealerships, reading several issues of specialized magazines and maybe a trip or two to the bank to discuss financing options. By consolidating all the information necessary in one medium (i.e., the World Wide Web), the consumer has an easier time on getting to and obtaining the information. Producers who make information about their products easy to obtain (i.e., the so called “one stop shop”) on the Internet will create value for consumers.

Having information available to consumers is as important as having the product they are shopping for. This is especially true for durable products. If a company product is near at hand when the consumer is ready to purchase, he is more likely to buy it. The Internet extend the concept of “near at hand”: the product could be just one “touch of the mouse away”. Therefore, the way the information is designed is also important in this stage of the buyer-decision process. Information design can help users to sort through information and may keep them coming back for more.

The third stage in the buyer-decision process is the evaluation of alternatives. This is where the consumer uses the information he has gathered in his search to evaluate or make decisions about certain
products. Companies can help with this evaluation process by helping the consumer in the on-line information search. By assisting the consumer in the information search, a company not only helps the consumer but also helps itself by giving the consumer functions and features to consider, which may in turn help the consumer to choose that company.

The purchase decision stage is when the consumer actually purchase the product. Obviously, the consumer will purchase the product he prefers over the other products. Companies who use on-line marketing can positively influence the consumer during the purchasing decision stage if (Gibbs, 1997; Hills, 1996):

- Competing products have similar features and are easily comparable on-line.
- Competing products are in the same class or price range.
- On-line Information is readily available to the consumer.
- On-line information is designed in a way to prevent information overload.
- The content of on-line information is clear and relevant to the consumer.

One of the advantage of moving the purchase decision stage on-line would be that the consumer can buy the product and complete the transaction directly from his workstation. On-line application forms and tables, as well as purchase buttons, give consumers the possibility to complete the process directly on-line and to have the product shipped or delivered to them by a logistics organization.

The last stage in the buyer decision process is the postpurchase behavior. When consumers buy durable products they often have second thoughts about the purchase. This is known as “post-purchase conflict” (Bayus & Metha, 1994). With post-purchase conflict, the purchaser begins to have feelings of discomfort concerning the purchase. Using on-line customer service, producers could reduce dissonance. Thus they can manage consumer’s discomfort in a much direct way. Up until now, distributors and retailers have had the responsibility of managing the bulk of post-purchase behavior. Producers that will have a on-line site, could use it to allow customers to record their satisfaction or dissatisfaction with a company’s product. Consumers can visit the site and send messages to company executives, that will have the possibility of learning from their mistakes directly from customers. Consumers can also update information concerning the product or future products, modify or
change services, suggest and illustrate solutions. Therefore, the on-line marketing not only provides a direct channel of communication for producers but also introduces interactivity and a possibility of dialogue between a company and its customers.

1.4 FRAMEWORK FOR ELECTRONIC-COMMERCE ANALYSIS.

The advent of Internet and the diffusion of electronic-commerce represent for many companies, at the same time, an opportunity to exploit and a threat to confront. The consequences and the levels of impact of e-commerce on manufacturers of durable products still need to be analyzed and discussed. However, it seems clear that e-commerce will require changes in the way in which these companies market their products and services.

The framework developed here attempts to consider the basic categories of issues that need to be taken into account for such changes. The framework in figure 3 divides the analysis of the impact of disintermediation on the supply chain of consumer durable products in five basic areas.

The first area addresses the concept and implications of disintermediation: the impact of e-commerce on transaction costs, the role and functions of intermediaries, the birth of new types of intermediaries and the concept of re-intermediation. The second area analyzes strategic issues, such as strategic goals and choices.

The third area addresses process restructuring, considering the activities that producers are performing or are planning to perform electronically. The fourth area discusses the system of opportunities, threats and barriers that producers need to consider. The fifth and last area addresses the system of implementation enablers for e-commerce.

These framework areas will be described and investigated in five chapters. The first chapter provides an introduction to the concept of e-commerce and marketing durable products over the Internet. The second chapter discusses the concept and implications of intermediation and disintermediation.

Chapter 2 also introduces the case of heating, ventilating and air conditioning (HVAC) equipment that will be the base throughout the rest of the study. Chapter 3 discusses a series of potential scenarios for the
supply chain of HVAC. Chapter 4 investigates barriers and facilitating factors towards the implementation of e-commerce in the supply chain of HVAC. Chapter 5 provides a summary of key findings and a conclusion.

<table>
<thead>
<tr>
<th>Framework Area</th>
<th>Addresses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Strategic Issues</td>
<td>• Strategic opportunities: Develop new businesses, products services; Enhance Sales and Mktg; Improve productivity; Transform the organization.</td>
</tr>
<tr>
<td></td>
<td>• Strategic moves: core competencies, inter-company operating ties.</td>
</tr>
<tr>
<td>2. Disintermediation</td>
<td>The process of bypassing distributors and intermediaries in the supply chain of durable goods. Focus on:</td>
</tr>
<tr>
<td></td>
<td>• Impact of e-commerce on transaction costs</td>
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<tr>
<td></td>
<td>• The functions and roles of intermediaries</td>
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<td></td>
<td>• The birth of new types of intermediaries</td>
</tr>
<tr>
<td>3. Business Process Re-engineering</td>
<td>What activities, if any, producers of durable goods are performing or planning to perform electronically:</td>
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<tr>
<td></td>
<td>• Customer focused activities</td>
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<td></td>
<td>• Internal activities</td>
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<td></td>
<td>• Strategic activities</td>
</tr>
<tr>
<td>4. Opportunities and Threats</td>
<td>Potential advantages and anticipated barriers to e-commerce operations.</td>
</tr>
<tr>
<td>5. Implementation Enablers</td>
<td>The most relevant drivers and enablers to implementing e-commerce operations.</td>
</tr>
</tbody>
</table>

Figure 3. Framework for analyzing the impact of e-commerce on producers of durable goods [Scheme adapted from M. Franciose, 1995].
2.0 INTERMEDIATION AND DISINTERMEDIATION.
This chapter provides an analysis of the concept and implications of intermediation and disintermediation in the supply chain of durable goods. Section 2.1 discusses the concept of intermediation in the supply chain of durable goods. Section 2.2 illustrates the concept of disintermediation. Section 2.3 analyses the structure of the distribution channel and the roles and functions of distributors and intermediaries in a specific case: the supply chain of heating, ventilating and air conditioning (HVAC).

2.1 AN INTRODUCTION TO THE CONCEPT OF INTERMEDIATION.
The need of intermediaries in the distribution channel of durable products arises from the fact that the market is not perfectly efficient. Intermediaries provide basic services both to buyers and sellers that decrease or eliminate these inefficiencies. In return, they take a percentage of the transaction amount, not always proportioned to the value that they add to that transaction. As an example, in the selling and distribution channel of air conditioning and heating products, agents are said to add little value to the flow of products and information (see section 2.3 for a detailed analysis).

Intermediaries and distributors provide several explicit and implicit functions and services. Intermediaries of durable goods provide several functions that benefit consumers (Bendiek, Laws, Hoehler, 1996):

- Assistance in search and evaluation.
- Needs assessment and product matching.
- Economic Risk reduction.
- Product distribution/delivery.
- Product installment and maintenance.

Intermediaries of durable products perform functions that help the overcoming of asymmetric information\(^7\) about products and services and also about the parties to the transaction. A fraction of the additional fee (i.e., mark-up) that consumers are paying is related to the specific expertise that the intermediary is adding to that transaction. Consumers rely on this expertise that they consider superior to their own expertise.

Consumers simply don’t want to invest the time to become knowledgeable about a specific family of products or a certain brand.

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\(^7\) The notion of asymmetric information arises when a buyer and a seller have different information about a transaction (Pindyck, Rubinfeld, 1995).
The intermediary's expertise provides value to consumers because they no longer need to know everything about a washing machine to get a good washing machine. They can trust the judgment formulated by Sears (or any other distributor) about the brands they are finding in that store.

The consumer implicitly delegates some of the product search process to the retail intermediary. Searching information for durable goods can be particularly time consuming because, as section 1.3 pointed out.

Intermediaries also provide quality control and product evaluation. Purchasing consumer durables include a certain amount of economic risk related to the relative high price usually charged for them. Intermediaries and distributors help consumer in their evaluation process primarily by reducing the number of products and brands available.

In many cases consumers do not have a well defined knowledge of their needs even when buying a durable good. Intermediaries usually help consumers to assess their needs and to identify the product and/or brand that better satisfy those needs.

Therefore, by providing information about the product, the usefulness of the product, and its producers, distributors intervene actively in four of the five steps of the buyer-decision process of a consumer durable good (i.e., problem recognition, information search, evaluation of alternatives, purchase decision - see section 1.3 for a detailed description of the role of information in the buyer-decision process).

When buying a durable good, consumers usually base their judgment on their knowledge and trust of a specific brand (i.e., brand loyalty) or of a certain distributor (i.e., store loyalty). In this way, the intermediary may represent a trustful partner in the transaction whenever there is not enough information about a product or its producers.

Consumers do not always have perfect information and they may purchase products that do not meet their needs completely. In any transaction, buyers face a certain amount of economic risk (Bayus & Metha, 1994; Kotler 1991). In the case of durable goods, the economic risk is even higher due to the relative high price of the product and the more difficult replacement of the product (Baker & Wilkie, 1992). This economic risk can result from consumer need uncertainty or communication failure regarding the characteristic of the product.
Intermediaries also provide a place for buyers and sellers to meet and conclude transactions. In economic terms, it is the “market making” or “place utility” function provided by intermediaries. Intermediaries bring together buyers and sellers, demand and supply. In most cases, demand and supply of products are represented by individuals and companies in locations that are distant from one another. Intermediaries provide a physical location (e.g., the shelf of a supermarket) where buyers and sellers of that product are likely to come together. Intermediaries of durable products play also an important role in the phases of packaging, distribution, installment and maintenance of goods. In choosing marketing channels, producers choose the bundle of services provided by the intermediaries involved.

In the value chain of durable goods, intermediaries not only perform functions that benefit the consumers, but they also provide some functions and services that benefit the producers. It is important to note that these are the services that producers will have to integrate or eliminate if disintermediation is going to happen. Among these functions the most significant are:

- Creating and disseminating product information and product awareness.
- Influencing consumer purchase.
- Providing customer information.
- Reducing exposure to risk.

Producers are not only interested in providing information for consumers. They are ultimately interested in selling products. In addition to information services, manufacturers of durable products consider with favor services directed to influencing consumer purchase choices. Intermediaries and distributors have several different ways to influence consumers’ purchasing behavior: shelf space and product placement, special discounts, explicit advises, etc.

Not only do intermediaries provide consumer information about products and brands available, but they also give producers certain feedback about customers and their needs. The physical distance of producers of durable goods from consumers has always been a significant barrier for learning consumer’s behavior and including their preferences in research and development programs. The importance of distributors

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8 The concept of reduced economic and commercial risk is well analyzed by Baker & Wilkie, 1992.
in the value chain of durable goods and their market power are direct function of having valuable information about the demand side.

Producers of durable products, as well as consumers, face a certain amount of risk in any transaction. Intermediaries provide services that enable producers to reduce or minimize this commercial risk. The extent of the risk sharing between producers and intermediaries depends on their contractual agreement, that is usually a direct expression of their market and negotiating power. When intermediaries and distributors buy products from producers and then resell them to other customers (it can be end users or different firms operating in the value chain) they alleviate the risk of unsold products for producers (and also reduce their inventory and logistic costs).

To be profitable, the selling and distribution of durable goods need certain economies of scale in terms of operations. Moreover, selling and distributing these kind of products usually requires competencies and skills that are completely different from those required to produce them. Intermediaries possess these competencies and can count on a degree of scale economies that facilitate the distribution of durable goods. The specialization of functions and tasks allow intermediaries to gain economies of scale in the provision of certain transaction services.

Finally, intermediaries in the distribution channel of durable products provide installment and maintenance services.

In the supply chain of durable products, not all type of intermediaries will be able to justify their presence and their profit margins after e-commerce is common and established (see chapter 3-coming). Some type of intermediaries no longer provide value-added activities and functions.

It is, therefore, relevant to analyze which activities and functions just considered in this section can still be heeded as "value-added". Those activities that are no longer add value for the end customer are expected to be bypassed by more efficient channel players. The process of bypassing or eliminating intermediaries and distributors in the distribution network is defined as "disintermediation". Section 2.2 provides an introduction to the concept and implications of disintermediation.
2.2 AN INTRODUCTION TO THE CONCEPT OF DISINTERMEDIATION.

The ability of electronic networks to reduce transaction costs is the theoretical foundation on which many researchers (Benjamin & Wigand, 1995; Rockart & Scott Morton, 1993; Rangan, Menezes & Maier, 1992; Malone, Yates & Benjamin, 1989; Porter & Millar, 1985; Williamson, 1975) have predicted that one effect of electronic markets will be the bypassing of intermediaries in the supply chain of most products and services.

Sarkar, Butler and Steinfeld (1995), on the other hand, suggest that “not only is it likely that widely available information infrastructure will reinforce the position of traditional intermediaries, but that networks will also promote the growth of a new generation of intermediaries. These new players, which we terms “Cybermediaries”, are organizations that perform the mediating tasks in the world of electronic commerce”.

This section analyzes what disintermediation means in the supply chain of durable goods and how a possible disintermediation would impact producers of consumer durables. Figure 4 illustrates the concept of disintermediation in different industries and contexts.

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>CONTENT</th>
<th>FUNCTIONS DISINTERMEDIATED</th>
<th>DESTINATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sales &amp; Marketing</td>
<td>• Products</td>
<td>• Retail Store</td>
<td>• Customer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mail Order Co.</td>
<td></td>
</tr>
<tr>
<td>• Customer Support</td>
<td>• Information</td>
<td>• Customer Reps</td>
<td>• End Users</td>
</tr>
<tr>
<td>• Information Management</td>
<td>• Knowledge</td>
<td>• Middle Managers</td>
<td>• Employees</td>
</tr>
<tr>
<td></td>
<td>• Job Posting</td>
<td>• Librarians</td>
<td>• Students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Newspapers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Employment Ag.</td>
<td>• Applicants</td>
</tr>
</tbody>
</table>

Figure 4. The Potential Effects of Disintermediation in different industries and contexts. [Source: Adapted from Gemini Consulting].
It is possible that more, rather than fewer intermediaries will play a role in the future of e-commerce and in the value chain of durable goods. However, it is necessary to consider that disintermediation could result in some radical changes in the value chain of durable goods:

- the changes in the economics of marketing channels.
- the changes in the organizational structure of distribution.
- the redefinition of industry value systems.

The e-commerce holds the promise of a restructuring of the processes and organizations that connect producers and consumers of durable products. Information technology has transformed the way organizations produce and market products and services. Companies are changing the way they operate due to significant reductions in the cost of gathering, organizing, selecting and distributing information (Sviokla & Rayport, 1995; Malone, Yates & Benjamin, 1987 - see also section 1.3). The strategic relevance of information in the purchasing process of durable products is, in fact, the reason why information links and electronic networks make possible radical changes in marketing and sales processes of consumer durables, which in turn affect market structures and firm configurations.

The basic concept related to the changes in the economics of the marketing channels of durable goods is that e-commerce is decreasing substantially the costs of coordination, which in turn leads to a process of disintermediation, because intermediaries are no longer required. Basically, the price a durable good is sold for consists of three elements:

- Production Costs.
- Coordination Costs.
- Profit Margin.

Production costs include the physical or other primary processes necessary to create and distribute the products. Coordination costs (Malone et al., 1987) include the transaction or governance costs of all the information processing necessary to coordinate the work of people and machines that perform the primary processes. For example, coordination costs include the costs of determining the design, price, quantity and delivery schedule for a durable good transferred between adjacent steps on the value chain.

If e-commerce will provide cost performance improvement (e.g., reducing coordination costs), producers will find incentives to coordinate their
activities electronically. Utilizing efficient coordinate transactions means, ultimately, creating a direct sales channels from producers to consumers. The impact on the cost structure of producers is foreseeable: by reducing coordination costs they would be able to offer consumers the same products at a lower price. In this scenario, consumer's welfare and utility and producers' profit margin would increase, leaving some type of intermediaries and distributors as the losing part of the game. However, this is just one of the possible effects of e-commerce on the supply chain of consumer durable products.

E-commerce and an extensive use of information technology in marketing durable goods can also determine an evolution of the industry value chain, because they impact not only the way activities are performed, but also the nature of the linkages between activities and processes. The potential transformation of the value system mainly relies on the technology that enable producers to market part of their products directly to final customers. Producers of durable goods need to solve a clear trade-off between the services and functions provided by intermediaries and the redistribution of profits and surplus value if these functions and activities are internalized.

In other industries, the re-organization of the distribution network provoked by the adoption of e-commerce is expected to determine a profit redistribution, as well. As an example, Benjamin and Wigand (1995) report that in the high-quality shirts market, the retail price could be cut down by almost 62% if manufacturers could sell directly to final customers without the intermediation of wholesalers and retailers. In the travel business, costs of distribution represent the 24% of the total price paid by a customer to a travel agent for an airline ticket. Some estimates of distribution costs of air tickets sold over the Internet point out that costs are going down to 3% of the final price.

A crucial point is that, in order to cut distribution costs down and to market products directly to final customers producers have to internalize or eliminate activities that have been traditionally performed by intermediaries.

Producers that will be able to internalize part of the activities previously performed by intermediaries will provoke a redistribution of the value in the supply chain. The most efficient channel players and those who add value for the end customers are expected to capture a margin to the expense of less efficient intermediaries. In this new structure of the supply chain, less efficient intermediaries may disappear or, at least,
they are expected to reduce their market power and profit margins to
the benefit of both manufacturers and consumers. Producers may retain
a higher portion of surplus value or profits that are generated from a
direct transaction. Consumers may buy products at a lower price and
may also benefit from a much larger choice of products.

This section provided an introduction to the concept of
disintermediation and an preliminary analysis of the potential
implications in the supply chain of durable products. However, not all
durable products are bought and sold in the same fashion and in the
same distribution channels.

It is, therefore, important to investigate the concept of intermediation
and disintermediation in a specific case. Section 2.3 introduces the case
of heating, ventilating and air conditioning (HVAC) equipment that will
be the base for the analysis throughout the rest of the study. The
industry of HVAC is analyzed: the structure of the selling and
distribution channel, the role and functions of the channel player, the
economics of the channel (i.e., the cost structure of each player).

2.3 THE STRUCTURE OF THE DISTRIBUTION CHANNEL. THE CASE
OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT.
In the past decade, American manufacturers in the heating, ventilating
and air conditioning (HVAC) industry has experienced trends and
problems very similar to those experienced by producers of other type of
durable goods in the United States (see section 1.1). In particular,
manufacturers of HVAC have faced two major problems (Shimizu, 1995):

- Competition from overseas producers has increased dramatically.
- Marketing and distribution costs have continued to rise rapidly.

A positive aspect for producers of HVAC systems is represented by the
trend in market demand. While the demand for durable products has
been growing 10% slower than the preceding decade, in fact, the demand
for HVAC has increased by 20% during the same period. Global demand
for new HVAC equipment is approximately $24 billion and it is expected
to grow by more than 65%, to about $40 billion, by the year 2000. While
Japan and North America are the two largest markets for HVAC
equipment, the remaining geographic areas represent the industry’s
greatest growth opportunities. Asia Pacific is one of the fastest growing
regions, but significant growth opportunities also exist in China, South
Korea, India, Indonesia, Thailand (Shimizu, 1995).
The HVAC represents a category or a family of different products\(^9\). The purpose of these products is to control the temperature, humidity, purity and movement of air in order to maintain a comfortable internal atmospheric environment within a building, irrespective of the outside conditions. Modern air conditioning is largely based on the work of Carrier in the early 1900s. HVAC are used now extensively and can be found in industrial, commercial and residential buildings worldwide.

The structure of the selling and distribution channel of HVAC is illustrated in figure 5. The channel structure consists of four entities (manufacturers, distributors and/or dealers, contractors and final customers) that are dependent on each other for the performance of mutually beneficial tasks\(^10\). The manufacturer/producer depends on distributors/dealers to convey the product to regional and local markets and ultimately to sell it and thereby provide returns. The final customer depend primarily on the contractor that provides installment and maintenance services.

Slight variants and modifications to the channel structure illustrated in figure 5 can be found. A first variation concern the use of an extensive network of producers' direct sales force. In this case (adopted by some large manufacturers in the industry), salespeople interact not only with agents/dealers but also with contractors and end customers.

A second variation to the base case is represented by self-installing products. In this case, a second channel structure is activated beside the first one: products are sold through the basic distribution channel of consumer durable goods (from manufacturers to wholesalers, and through retailers to end customers). Figure 6 illustrates both cases of variation from the base case. In the base case, the channel players (producers, distributors/dealers and installers) need to manage three major flows:

- A unidirectional (from producers to end customers) flow of products and parts.
- A unidirectional flow of money.
- A bi-directional flow of information.

---

\(^9\) In this family or category of products are also included: boilers, coils, furnaces, heat pumps, humidifiers, and refrigerants.

\(^10\) As chapter 3 will demonstrate, interdependencies and linkages among channel players in the HVAC industry may be dramatically modified and altered once e-commerce is common and established.
THE STRUCTURE OF THE DISTRIBUTION CHANNEL OF HVAC.

Figure 5. The Structure of the Selling and Distribution Channel of HVAC.

In the recent past, many producers in the HVAC industry have faced significant problems in managing the flow of information. In particular, they have faced lack or incomplete information about: inventories in the system, sales volumes and prices, costs, discounts and promotions, area sales coverage, consumers' preferences. This flow of market information has strategic importance for producers of HVAC because:

- It can increase awareness of the needs in the target markets.
- It can indicate what products and services meet these needs.

A number of bottlenecks has impeded an efficient flow of information from end customers to manufacturers in the selling and distribution channel of HVAC. Two major problems have caused these bottlenecks in the system:

1. Channel distortions and duplications with respect to the role of the players.
2. Competing and antagonistic behavior among channel players.
Exception 1: Large manufacturers that can sell through a wide network of direct sales force.

```
M -> DSF -> D/D -> CN -> C
```

Exception 2: Self-installing HVAC equipment.

```
M -> WH -> RETAILER -> CUSTOMER
```

WHERE:

M: Manufacturer
DSF: Direct sales Force
D/D: Distributor/Dealer
CN: Contractor
C: Customer
WH: Wholesaler

Figure 6. Two variations from the base case of channel structure in the HVAC industry.

The first problem deals with confusions and duplications in the roles, functions and activities performed by distributors/dealers and installers. As figure 7 illustrates, each player in the distribution channel of HVAC is theoretically expected to perform certain roles, functions and activities in the system.

It is not infrequent, however, that distributors and dealers also provide installment and maintenance services and that contractors create their own small warehouse of products. The duplication and confusion that arise from such opportunistic behaviors creates barriers for the flow information.

The second problem is a direct consequence of the lack of long term relationships, incentives and convergent goals among players in the channel. Distributors and dealers are often not committed in an exclusive relationship with a single manufacturer. Thus, they tend to "push" in the channel the brand on which they can obtain the highest margins or the products on which manufacturers have provided discounts. The same type of behavior is frequently observable among contractors. As a result, each player in the channel tend not to share and participate all the information available.
The roles, functions and activities performed by each channel player varies depending on their relative size, contractual or informal agreements, geographic locations, customers' requests and expectations, etc. However, it is still possible to distinguish some peculiar roles and functions for each player in the distribution channel of HVAC. Figure 7 illustrates these characterizing roles and activities.

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>DISTRIBUTORS</th>
<th>CONTRACTORS</th>
<th>END \ CUSTOMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Manufacturing</td>
<td>• Sales Activities</td>
<td>• Installing</td>
<td>• Information</td>
</tr>
<tr>
<td>• Sales Activities</td>
<td>• Warehousing &amp; Material Handling</td>
<td>• Maintenance</td>
<td>Search</td>
</tr>
<tr>
<td>• Marketing</td>
<td>• Promoting</td>
<td>• Assistance in search/valuation</td>
<td>Evaluating</td>
</tr>
<tr>
<td>• Distributing</td>
<td>• Delivery</td>
<td>• Needs assessment</td>
<td>alternatives</td>
</tr>
<tr>
<td>• Financing</td>
<td>• Financing</td>
<td></td>
<td>Purchasing</td>
</tr>
<tr>
<td></td>
<td>• After-sale service</td>
<td></td>
<td>Ordering</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Post-purchase</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>decisions</td>
</tr>
</tbody>
</table>

Figure 7. Roles, Functions and Activities of the player in the Distribution Channel of HVAC.

Manufacturers perform the basic functions of a value chain (design, production processes, sales and marketing, distribution); they also provide some forms of financial support for agents/dealers (e.g., volume discounts, long term payments, etc.). The distributors/dealers are probably the player in the channel that provide less value added for final customers. The only functions that need to be mentioned are the financing and after-sales services.

However, it must be considered that the first activity (i.e., financing) could be easily provided directly by manufacturers and that the second one (i.e., after-sale service) is also performed by contractors. These are in a very strong position in the channel because they interact directly with the end customers. They can assist and significantly affect customers' choice. They can gather information about customers preferences and needs as anyone else in the channel. Customers usually prefer to be guided and assisted in their search and evaluation process by a specialist (i.e., the contractor). Section 1.2 and 1.3 provide a detailed explanation of such a behavior.
This section provided an introduction to the structure of the selling and distribution channel of heating, ventilating and air conditioning (HVAC). The main characteristics and trends of the HVAC industry, the role and functions of intermediaries in that channel were also investigated.

The levels of impact of e-commerce on manufacturers of HVAC and their effect on the structure of the distribution channels cannot be easily anticipated and forecasted. A number of parameters and variables will determine the final outcome in the supply chain of HVAC:

- the market power of each player.
- the diffusion of PCs and modems among contractors.
- the reaction of those players threatened by disintermediation.
- the activities perceived as value-added by end customers
- the changes in the cost structures.

Even if the future cannot be predicted and anticipated, it is still possible to create a series of "if...then..." or "scenario" analysis for the selling and distribution channel of HVAC. Chapter 3 presents the results of a phone survey conducted with ninety six producers of HVAC and discusses four potential scenarios: the Communication Scenario, the "No-agents" scenario, the semi-direct scenario and the Direct scenario.
3.0 SCENARIO ANALYSIS.
This chapter discusses the implications of four potential scenarios in the selling and distribution channel of HVAC. Each of these scenarios represents a potential outline of the adoption and diffusion of e-commerce operations in the distribution channel of HVAC. Section 3.1 provides an introduction to the concept of scenario analysis. Section 3.2 illustrates the results of the phone surveys that was conducted with ninety six producers of HVAC. Section 3.3 illustrates the adoption of the Internet as a communication channel. Section 3.4 investigates the implications of creating a direct link with the contractor/installer. Section 3.5 discusses the implications of disintermediating the distributor/dealer without creating a direct link with contractor/installer. Section 3.6 analyzes the consequences of a complete disintermediation of the distribution channel of HVAC for plug-in and self-installing products. Finally, section 3.7 summarizes the chapter.

3.1 INTRODUCTION TO SCENARIO ANALYSIS.
In times of rapid changes in competitive markets, companies and managers are inclined to try to remain tied and anchored to systems and methods that worked efficiently in the past. However, this is a very risky way of facing the future because it completely avoids developing a strategy for the inevitable changes coming and misses the opportunity to anticipate and shape the future.

One very useful methodology that academics, practitioners and managers utilize to try to predict and forecast the impact of future changes in industries and markets is scenario analysis. As Michael Porter\textsuperscript{11} affirms: "The scenario tool is a framework for identifying the key uncertainties in the future of an industry. Constructing scenarios is a process of abstracting those elements of uncertainty that will drive strategic choices in the future. A scenario emerges as an internally consistent view of the future of the industry structure under one set of assumptions."

The choice of assumptions in the scenario technique is critical. The assumptions have to be broad enough to allow the appearance of different type of scenarios (Noriega, 1986). Sometimes it is important to reduce the number and the range of assumptions analyzed to arrive at no more than 3 or 4 probable scenarios (Porter, 1980).

There are three main objectives in defining different possible scenarios (Porter, 1980):

1. Determining future industry structure under each scenario.
2. Developing the implications of each scenario for industry structural attractiveness.
3. Identifying the implications of each scenario for the sources of competitive advantage.

The procedure suggested to define scenarios (Porter, 1980; Noriega, 1986) consists of establishing a base case that describes the current business situation and then for each scenario:

- Classifying the most relevant external factors that influence an industry (e.g., demand characteristics, competition, structure of the distribution channels).
- Classifying the most relevant internal factors that influence a company (e.g., product and process technology, skills and knowledge).
- Classifying internal and external factors by degree of importance.
- Anticipating competitive moves and strategic changes.
- Predicting the impacts and implications of these changes.
- Analyzing the system of opportunities and threats involved.

In this study, the base case is presented in section 2.3 where the selling and distribution channel of HVAC is illustrated. The lack of complete data with sufficient statistical validity makes it difficult to develop a rigorous and accurate scenario analysis. However, it is still possible to simulate a number of potential frameworks in the supply chain of HVAC. Therefore, the following sections try to predict the impacts of the adoption of the Internet in the HVAC industry, using simple scenarios as a framework of analysis.

The data presented in this and the succeeding chapters have been collected using phone surveys. Ninety six companies operating in the manufacturing and production phases of HVAC (both commercial and residential) were contacted. The results of the phone surveys are:

- 11 companies completed the phone survey.
- 10 companies affirmed that they are currently working on their Web site and are not able to answer questions on this subject, yet.
- 75 companies declined the invitation of participating in the
phone survey\footnote{The most common answers for rejecting the invitation were: 1. It is a company policy not to participate to phone surveys. 2. No time/not interested in surveys.}.

The data and information collected, probably, do not have a specific statistical validity because of the limited sample. However, data and information do have general validity and legitimacy since:

- The sample of companies is homogeneous in terms of characteristics of the operations (i.e., all companies operate in the same industry and in the same phases of the value chain).
- The sample of companies is homogeneous in terms of geographic scope (i.e., all companies operate in the U.S.).
- Most of the questions utilized in the questionnaire were open questions. Thus, the comments and answers reported have given, at least, an intuition of the expected impact of e-commerce on producers of HVAC.

The scenarios presented in this chapter were developed by the author in part using data collected from the phone surveys. The four scenarios analyzed are neither intended to exhaust all the possible future happenings in the HVAC industry nor to be mutually exclusive (i.e., more than one scenario can adopted by the same company). However, they consider the most significant strategic changes in the selling and distribution channel of HVAC following the adoption of e-commerce.

### 3.2 SURVEY RESULTS.

Before analyzing these scenarios in detail, it is useful to present the data collected during the phone surveys. The main objective in presenting these results is to assure data integrity and completeness. The survey was organized in five different sections:

- Company’s dimension.
- Distribution channel.
- Activities and benefits of E-commerce.
- Barriers towards the implementation of E-commerce.
- Drivers and enablers towards the implementation of E-commerce.

The first section tries to determine the relative size of the company in terms of number of employees, annual sales and market scope. The second section investigates the current structure of the distribution
channel, the future expected changes in this structure and the economic impact of e-commerce on the HVAC industry. The third section analyzes what activities and processes have been performed or planned to perform on-line by manufacturers of HVAC. The fourth section examines potential or current barriers and problems towards the implementation of e-commerce activities. Finally, the fifth section investigates the drivers and enablers that have been adopted in implementing e-commerce.

Data will be presented question by question (i.e., all the eleven answers to each questions will be presented): in this way it is possible to compare the answers to each question. Moreover, the answers to each question will be presented in a random order so that companies’ anonymity is guaranteed.

**A. Company’s Dimension.**

1. In which of the following range does your company belong in terms of number of employees?

   between 1 and 50 □  between 51 and 100 □  between 100 and 250 □
   between 250 and 500 □  more than 500 □

   **Answers:**
   1. Company has between 1 and 50 employees.
   1. Company has between 100 and 250 employees.
   2. Companies have between 250 and 500 employees.
   7. Companies have more than 500 employees.

2. How would you define the market of your business in terms of geographic scope?

   Local □  Regional □  National □  International □  Global □

   **Answers:**
   2. Companies have a Multi-regional market.
   4. Companies have a National market.
   3. Companies have a National and International Market.
   2. Companies have a global market.

3. In which of the following range does your company belong in terms of sales?
less than $1m  □  between $1m and $10m  □  between $10m and $50m  □  
between $50m - $200m  □  between $200m - $500m  □  
more than $500m  □

**Answers:**
4 Companies have between $10 and $50 million in annual sales.
3 Companies have between $50 and $200 million in annual sales.
4 Companies have more than $500 million in annual sales.

**B. Distribution Channel.**
1. How is your distribution channel organized from your company to end customers (i.e., distributors, dealers, contractors, retailers, etc.)?

**Answers:**
6 Companies use distributors/dealers and contractors.
1 Companies use independent representatives to reach distributors and dealers.
3 Companies use direct sales force and independent representatives to reach distributors/dealers, contractors and final customers.
1 Companies use direct sales to reach distributors and dealers.

3. How will your distribution channel change in five-to-ten years?

**Answers:**
4 Companies answered: “We don’t know.”
2 Companies answered: “It won’t change at all.”
1 Company answered: “The use of EDI, phone, fax and Internet will increase both for transactions and information in our channel.”
1 Company answered: “We expect to increase sales using alternative channels. The Internet could be one of these channels.”
1 Company answered: “More complex order system interface and potential for companies with strong brands.”
2 Companies answered: “Pressures on service requirements that will require an increased efficiency in the whole channel. Focus on customers much more than on channels.”

4. What do you think will be the economic impact of e-commerce initiatives on key players in your industry?
Answers:
6 Companies answered: "We don’t know."
2 Companies answered: “Small. The percentage of on-line transactions in the HVAC industry will be very small.”
1 Company answered: “Small impact for the moment. In the future, the impact could be substantial on distributors. There will be a process of concentration among distributors. Only the big distributors will survive.”
2 Companies answered: “The impact on both volume and profitability could be dramatic. We are receiving requests of product information from Australia, Finland and other countries in which our products are not currently present.”

5. What new type of channel players/intermediaries do you foresee once e-commerce is common and established?

Answers:
5 Companies answered: “We don’t know.”
2 Companies answered: “No need for new intermediaries.”
2 Company answered: “Only value-added intermediaries will survive.”
1 Company answered: “There will be place especially for contractors.”
1 Companies answered: “Some new type of intermediary could probably be necessary to sell over the Internet.”

6. What activities now performed by channel players do you expect to internalize/perform on your own using the Internet?

Answers:
4 Companies answered: “We don’t know.”
2 Companies answered: “No activity will be internalized.”
3 Company answered: “We could probably do more selling activities to final customers by ourselves.”
2 Company answered: “More selling and product advertising by ourselves.”

7. What activities now performed by different channel players do you expect will no longer be necessary once e-commerce is common and established?
Answers:
6 Companies answered: "We don’t know."
2 Companies answered: "Activities currently performed will still be necessary."
3 Company answered: "Distributors could reduce inventory and warehouse management."

C. Activities and Benefits of E-commerce.
1) What activities, if any, is your company conducting or planning to conduct in the next 18 months on the Internet?

Answers:
4 Companies answered: "Company, product and technical information."
3 Companies answered: "Company, product, technical information and on-line catalogs."
2 Companies answered: "Company, product, technical information, on-line catalogs and advertising."
2 Company answered: "Company, product, technical information, on-line catalogs, advertising, promotion of local distributors/dealers, communication, on-line customer service, interactive questionnaires."

2. What potential benefits/advantages does your company expect to obtain from electronic-commerce?

Answers:
5 Companies answered: "It is not clear. We are not sure how e-commerce can benefit our company."
2 Companies answered: "Smoothing and speeding the flow of information in the channel."
2 Company answered: "Smoothing and speeding the flow of information, increasing brand awareness, reducing distribution, printing and mailing, communication costs.
2 Companies answered: "Smoothing and speeding the flow of information, increasing brand awareness, reducing distribution, communication, labor costs and increasing sales, collecting customer information, increasing ability to target niches."

3. What do you think will be the economic impact (e.g., ROI) of e-commerce on your company?
4. What percentage of your total sales comes from e-commerce now and what percentage do you expect will come in three-five years?

**Answers:**
None of the 11 companies currently offer the possibility of concluding transactions on-line.
6 Companies answered: “It is not clear what percentage of sales in the future could come from on-line transactions.”
3 Company answered: “Small percentage, in the future.”
2 Companies answered: “Big percentages in the future: from 10 to 35%.”

5. What costs does your company expect to reduce using e-commerce and how?

**Answers:**
3 Companies answered: “We don’t know.”
2 Companies answered: “We don’t expect any cost reduction.”
2 Companies answered: “Communication costs in the channel.”
2 Company answered: “Distribution, communication, and labor costs (e.g., customer representatives costs).”
2 Companies answered: “Distribution, printing, mailing, and communication costs.”

6. How will you or do you customize your products and services on the Internet?

**Answers:**
7 Companies answered: “We don’t know.”
2 Companies answered: “We are considering some types of price and information customization.”
2 Companies answered: “We are considering customizing prices, information, products and services.”
7. What type of customer service is your company performing or planning to perform on-line?

Answers:
5 Companies answered: "We don't know."
3 Company answered: "Providing on-line assistance, answering customers' questions."
3 Company answered: "Providing on-line assistance, answering customers' questions, and assistance during the on-line order process."

D. Barriers to the implementation of E-commerce.
1. What are barriers/problems with the adoption of electronic commerce inside your company or in your distribution channel?

Answers:
1 Company faced no barrier or problem.
2 Companies answered: "Internet is still considered as a secondary, non important activity and senior management is not involved.
2 Companies answered: "There is no clear organizational task and responsibility related to Internet operations and senior management is not sufficiently involved."
2 Companies answered: "Lack of specific skills, knowledge and training."
2 Companies answered: "Lack of communication."

3. What do you think will be the implementation costs for e-commerce?

Answers:
5 Companies did not want to reveal the implementation costs.
3 Companies did not have a definite knowledge of implementation costs.
1 Company answered: "$50 per month paid to an external provider."
1 Company answered: "$20,000 salary excluded."
1 Company answered: "$30,000 salary excluded."

4. What type of skills or knowledge does your company need to implement e-commerce?
Answers:
4 Companies answered: "We would need to invest in training internal employees.
2 Companies answered: "There is no need for training internal employees, it is sufficient to outsource Internet operations to external providers."
2 Companies answered: "The I.S.D. has all the resources and the knowledge necessary to handle Internet operations now and in the future."
3 Companies answered: "We would need to hire new employees with specific skills, knowledge and experience."

5. What is senior management involvement in e-commerce initiatives?

Answers:
6 Companies answered: "Senior Management is not involved at all."
2 Companies answered: "Senior Management approve the budget for Internet operations when it exceeds a certain limit."
1 Companies answered: "Senior Management is committed to e-commerce."
2 Companies answered: "Senior Management and the CEO are committed and directly involved."

E. Drivers towards the implementation of E-commerce.
1. Is there a person or a team in your company that has responsibility for Internet operations?

Answers:
4 Companies answered: "Nobody in the company has a clear responsibility for Internet operations."
1 Company answered: "An Internet Specialist has responsibility for Internet operations."
2 Companies answered: "A Corporate Internet Officer has full responsibility for Internet operations. He coordinates the work of other people and her performance is measured based on results."
1 Companies answered: "A cross-functional team with the CEO, V.P. Marketing, V.P. Operations, V.P. Information System, coordinates Internet operations."
1 Company answered: "A cross-functional team with a representative of marketing, engineering, ISD, and senior management is responsible for e-commerce operations."
2. What are drivers/facilitating factors for implementing e-commerce?

**Answers:**
3 Company answered: "Better understanding of benefits and advantages of e-commerce."
3 Companies answered: "Better understanding of benefits and advantages of e-commerce, senior management involvement, pre-determining activities and tasks that have to be performed."
3 Companies answered: "The presence of a person or a group fully responsible for e-commerce.
2 Companies answered: "Starting with a product that can be sold on-line or with a market with a low risk impact."

3. What organizational changes is your company conducting or planning to conduct to implement e-commerce operations?

**Answers:**
4 Companies answered: "We don’t know."
1 Companies answered: "Developing a business plan."
3 Companies answered: "Investing in training and education to diffuse an Internet culture in the company."
2 Companies answered: "Investing in training and assigning e-commerce operations to a person or a team."
1 Company answered: "Creating a cross-functional team."

The limited number of companies that completed the survey does not allow to formulate specific statistical and quantitative analysis. However, it is still possible to draw a number of conclusions using survey results. Several findings emerge from the answers to the survey:

1. In the HVAC industry, the adoption of the Internet as a marketing channel is still at a very early stage of development. The companies contacted do not perform on-line transactions and primarily use the Internet to distribute company, product and technical information to distributors as well as to final customers.

2. As in many other industries, the HVAC industry seems to be characterized by the uncertainties associated with the advent and evolution of the Internet and e-commerce. In particular, the economic impact of e-commerce on companies, competitors, distributors and final customers seems to be not clear.
3. The potential benefits and advantages of managing operations over a distributed electronic network are not completely clear, understood and proven. This, in turn, seems to provoke a certain skepticism about e-commerce and its future potential in terms of generating sales, improving customer service and gathering valuable information from customers.

4. The majority of the firms contacted did not formulate a definite entry strategy or a concrete plan of action for e-commerce. They simply created a Web site and started moving part of their product and company information on-line. However, there are important exceptions: a small percentage of the companies contacted not only formulated an entry strategy but also integrated e-commerce operations into the overall marketing strategy.

5. The predicted impact of e-commerce on companies’ cost structure seems to divide companies in two groups. A first group of manufacturers does not expect cost reductions or significant modifications in the cost structure. A second group of companies is experiencing or expecting remarkable cost reductions (e.g., communication, distribution, printing and mailing and customer relations costs).

6. Producers of HVAC that are trying to implement e-commerce operations face a number of barriers and problems (see section 4.2 for a detailed analysis). They are experiencing both internal and external barriers. However, the most difficult and frequent barriers are internal to the company. The lack of a definite plan of action, the lack of senior management commitment, the insufficient definition of organizational responsibilities and the lack of specific skills and knowledge seem to be the most relevant barriers towards the implementation of e-commerce.

7. On the other hand, a better understanding of benefits and advantages of e-commerce, senior management commitment, predetermining activities and tasks to be performed, the presence of a process owner and the creation of a cross-functional team were cited as the most important drivers towards a successful implementation of e-commerce (see section 4.3 for a detailed analysis).

8. The level of commitment of senior management seems to be a good indicator of the relative importance assigned to e-commerce operations and also of the stage of development of e-commerce operations. The companies in which senior management were committed and involved in e-commerce operations are the ones that: performed the most
advanced on-line activities (e.g., on-line customers service), experienced cost reductions, did not experienced significant barriers, invested in training and education as well as in technological improvements, predicted on-line transactions and sales in the near future.

This section illustrated the results of the phone surveys that was used to collect data and information from producers of HVAC. The main objective in presenting these results was to assure data integrity and completeness. The results were presented question by question in order to give the possibility of comparing each answer and to assure, at the same time, companies’ anonymity.

The results of these surveys can be, in part, used to anticipate and predict the levels of impact of e-commerce on manufacturers of HVAC and on the structure of the distribution channels of the HVAC industry. However, a number of parameters and variables (e.g., the market power of each company, the reaction and retaliation of distributors threatened by disintermediation, the activities perceived as value-added by final customers) will determine the final outcome in the supply chain of HVAC.

Some of these variables were observed and data was collected from the surveys (e.g., drivers and barriers towards implementation of e-commerce). However, some other variables were not retrieved from the surveys. This is why the following sections, that discuss four potential scenarios/options for producers of HVAC, use only in part survey results. The remaining data and concepts are the results of author’s analysis and investigation.

3.3 THE COMMUNICATION SCENARIO.
The Communication Scenario consists in using the Internet as a business tool to communicate and interact primarily with end customers. The creation of a Web page and the process of managing on-line part of the information flow represent only a first step towards the adoption of the Communication Scenario, illustrated in figure 8.

In this scenario, manufacturers of HVAC start using the Internet to manage the flow of information in their selling and distribution channel. As section 2.3 indicated, one of the problems producers of HVAC are currently dealing with is the presence of bottlenecks in the flow of information (e.g., competing and antagonistic behavior among manufacturers, distributors and contractors). The Internet represents a potential solution to smooth and better manage this flow.
THE COMMUNICATION SCENARIO.

The Traditional Channel

Figure 8. The Communication Scenario.

Manufacturers of HVAC that are already managing the information flow using the Internet are discovering a number of actual and potential benefits. These advantages are not limited to their company but can be spread to the entire selling and distribution channel, especially to final customers. The following list includes the most common benefits in using the Internet for improving communication that have been experienced in the HVAC industry.

1. The Communication scenario is the easiest scenario to conceive and implement. Producers of HVAC are able to utilize this new form of communication medium with little changes and transformations of their current operations. Companies neither need to reorganize functions and responsibilities nor to reengineer marketing and distribution processes.

An example of the use of Internet for improving communication with little change in the current operations, is given by FreshAir¹³, a HVAC manufacturers with $80 million in annual sales and 800 employees. The Web site creation was promoted and performed by a programming manager in the Information Service Department. The whole process

¹³ Companies’ names and data will be masked.
(receiving senior management approval, designing the Web page, gathering information in order to create the content, putting everything on-line, etc.) took several months and $20,000 (salary excluded). Nobody in the company has a formal responsibility for Internet operations or for managing and updating the Web page. If any process of transformation to adapt and operate to a information-intensive environment were necessary, it would be gradual and progressive.

2. The second benefit of this scenario for manufacturers of HVAC is the ability to better communicate with channel partners and end customers. The Internet is a communication network and Internet operations that establishes and reinforces connections between people and between companies. Manufacturers of HVAC can take advantage of this communication channel to send and receive information.

An example of the benefits of the Internet as an efficient communication channel is given by BelAir, a manufacturer of HVAC equipment with $120 million in annual sales and 1300 employees. The company promotes dialogue and interaction not only among employees but also with distributors and end customers. The Web page was created not only with the intention of passing information through the channel but also and foremost with the intention of interacting with people. As the company’s Corporate Internet Officer says “The Internet puts the customer in charge. Internet users are information and interaction seekers. They want to contact you, ask you questions.”

3. The Internet gives manufacturers of HVAC the ability to customize information. Customers and distributors decide when and how they will search for information. Every customer doesn’t need the same information. Thus, manufacturers of HVAC can try to address specific needs and requests. The Internet gives them the advantage of layering and customizing information. As a result, manufacturers of HVAC may be able to segment the market in small but profitable niches regardless of geographic limitations.

An example of information customization is given by CondiAir, a manufacturer of HVAC equipment with $45 million annual sales and 160 employees. The company has decided to build a customer database in order to store and retrieve customer and transaction information. The company used to create and send product catalogs on CD-ROM to

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14 As Section 4.2 will point out, manufacturers of HVAC still have to learn how to encourage a two-way communication and interactions with current and prospective customers over the Internet.
promote and advertise its product lines. As the company's Internet Specialist says "We are now doing on the Internet what we used to do on CD-ROM. We save money and, at the same time, we are able to address specific requests. In the future, we will not only customize information, but also products, prices and payments."

4. The capability to communicate directly with channel partners and end customers over the Internet, gives manufacturers of HVAC the potential to reduce costs. In particular, some manufacturers of HVAC are experiencing cost reductions in three areas:

- The Costs of printing, distributing and mailing brochures, catalogs and technical information.
- The Costs of customer representatives (i.e., labor costs).
- The Costs of communication.

An example of reducing the costs of printing, distributing and mailing is given by GoodAir, an HVAC manufacturer with 35 million in annual sales and 320 employees. The company's approach is to sell directly to end customers in specific regions using a direct sales force and independent salesmen. The company created a Web page and then moved all its catalogs and technical information on-line. GoodAir then started to advertise and promote its Web page among distributors and final customers. In the first year of Internet operations, printing, distributing and mailing costs were reduced by 20%. The company expects these costs to go further down in the next two years.

An example of customer representative cost reduction is given by BeautyAir. The company manufactures HVAC, has annual sales of $70 million in 1996 and employs 400 people. BeautyAir operates with independent representatives and it is also active with an internal customer service department that operates primarily on the phone to assist customers. The company moved part of its customer service operations on the Internet and was able to decrease the number of phone calls. BeautyAir foresees a reduction in the number of customer representatives and substantial cost savings in the near future.

In conclusion, it is possible to affirm that the Communication Scenario is more than just a potential scenario in the selling and distribution channel of HVAC. It is already a reality for some companies. Almost one
third of the 96 companies\textsuperscript{15} contacted have a Web page or are currently working to create one.

Companies have initiated on-line operations with the precise intention to better manage the flow of information and communication with channel partners and final customers. However, many manufacturers of HVAC still need to discover and deploy all the advantages and benefits of the Internet as a communication channel. Many companies seem to wait to adopt it until business practices on the Internet have completely proven their value and have become a common practice.

\textbf{3.4 THE “NO-DISTRIBUTOR” SCENARIO.}

A second potential scenario in the selling and distribution channel of HVAC is represented by the “No-Distributor” scenario. In this case, distributors/dealers of HVAC are disintermediated (i.e., bypassed in the flow of products and information in the channel). Manufacturers reorganize the channel creating two direct links: one with end customers and the second one with contractors/installers. Figure 9 illustrates the concept of the “No-Distributors” scenario.

![Diagram](image)

\textbf{THE “NO-DISTRIBUTOR” SCENARIO}

\textsuperscript{15} These companies are all manufacturers and producers of HVAC equipments in the U.S. and in Canada.
A producer of HVAC creates a communication channel with end customers. As in the case of the communication scenario, this direct channel is represented by the Internet. Thus, final customers can take advantage of the manufacturer’s web site to determine not only which product to order but also which contractor in his/her local area is recommended by the producer. The final customer may then contact the suggested contractor in order to complete the transaction and have the product installed.

In this way, the manufacturer sells the products directly to contractors. The current system requires that contractors buy the product from a distributor once they have received an order from an end customer. In this scenario, contractors still buy the product after a customer’s order but they purchase it directly from the producer. Therefore, manufacturers of HVAC need to create a different communication channel with contractors. This second channel is expected to be a private and secure one: an Intranet, an EDI\(^{16}\) or a calling center. Contractors and manufacturers access this private system to exchange information about product availability, prices, shipping and handling, customer requirements, etc.

The adoption of a direct communication channel between manufacturers and contractors represents the first strategic move to smooth the flow of information and to increase efficiency in the channel. Only those manufacturers of HVAC that can count on strong market power and solid brands are expected to perform such a move.

A number of changes in the selling and distribution channel of HVAC has to be considered in this scenario:

- The structure of the distribution channel.
- The levels of distribution\(^{17}\).
- The roles, functions and activities performed by distributors/dealers and contractors.
- The flow of products and information in the channel.
- The economics of the channels and the cost structure of channel players.

The “No-Distributor” scenario represents a significant modification of the channel structure. It implies working without the distribution/dealer.

\(^{16}\) Electronic Data Interchange.
\(^{17}\) The levels of distribution are the number of intermediaries between the producer and the consumer.
The adoption of this scenario must be an explicit distribution strategy. It also must be consistent with the company’s overall business strategy and with its competitive position in each of the chosen market. This is because decisions on marketing and distribution channels also affect every other marketing decisions. For example, the pricing strategy in the HVAC industry cannot be currently made without taking into account the profit margins that distributors usually are able to extract from the product.

In the current transfer of HVAC from manufacturers to end customers, as explained in section 2.3, the distributors play an important role in terms of keeping inventory, forecasting final demand and providing customer service and warranties. They are also active in the transfer of information about the availability, quality and price of HVAC. The extent to which a manufacturer of HVAC depends on the activities and services provided by the distributors is a function of its ability to deliver products and information directly to contractors and final customers. Currently, this ability is widely based on the use of direct sales force, on one hand, and on advertising and promotional efforts, on the other.

Manufacturers of HVAC usually try to minimize the costs of distribution for a given level of customer service. This requires a coordinated systemwide physical distribution network. When a producer of HVAC builds its competitive advantage on the distribution network the impact of the Internet in terms of disintermediation may be a threat.

An example of a producer of HVAC whose competitive advantage is based on a widespread distribution network is given by NetAir. The company has more than $700 million in annual sales in 1996 and more than 8,000 employees. The company’s managers believe that the extension and the level of penetration of its distribution network represents one of the elements in the success of the company, both in terms of volume and profitability.

For companies like NetAir, a potential solution to the problem of experimenting the advantages of this scenario without putting at risk the distribution channel is to initially test the use of the No-Distributor scenario in other markets and channels. One way of testing a market is to target markets in which the company is currently not present. For example, a U.S. manufacturer of HVAC that do not sell its products overseas could start targeting European markets. This move would be a low risk strategy (compared with the option of accessing the existing
physical distribution channels) because it does not affect the existent distribution network.

Manufacturers of HVAC with strong market power and solid brands, like NetAir, are probably not willing to risk to weaken the old and secure distribution channel, that still accounts for the whole percentage of their revenues today, for an uncertain future.

In this scenario, manufacturers of HVAC need to consider the expected potential reactions of distributors/dealers. Such reaction may be directly correlated with:

- The relative market and negotiating power of the distributor.
- The percentage of sales represented by the particular brand in the distributor's portfolio.

The larger these two variables grow, the stronger the potential reactions and retaliations of the distributors.

Therefore, the No-Distributor scenario implies the possibility of restructuring the distribution channel and reducing the levels of distribution. The increase in efficiency and in long term profit margins may be substantial, but it requires a clear future distribution strategy, strong market power and a solid brand.

Changes in the external environment usually reshape the way in which companies compete on the market. The No-Distributor scenario embodies developments of new relationships with contractors by offering them new solutions. It means establishing early alignments with optimal business partners in advance of competitors. It means defining complete solutions (i.e., products and services) to final customers. The advantages of early movers towards the adoption of the No-Distributor scenario may be substantial and not easy to imitate once the selling and distribution channels have been restructured.

3.5 THE DIRECT SCENARIO.
A third potential outline in the selling and distribution channel of HVAC is represented by the “Direct” scenario. In this scenario, not only distributors/dealers but also contractors are disintermediated (i.e., bypassed in the flow of products and information in the distribution channel of HVAC). Figure 10 illustrates the concept of the “Direct” scenario.
THE "DIRECT" SCENARIO

Manufacturers of HVAC reorganize the channel creating a direct link (i.e., the Internet) with prospective final customers. The major difference with the "No-Distributor" scenario is that manufacturers of HVAC do not create a link with contractors, but rather try to complete transactions directly with end customers. Therefore, in the Direct scenario manufacturers and contractors operate autonomously. There are neither relationships nor predefined communication channels between producers of HVAC and contractors. They are not required to share strategic information such as product availability, prices, service requirements and customer preferences, as in the case of the No-Distributor scenario.

In order to have a Direct scenario, it is not strictly necessary that manufacturers conclude transactions on-line. Customers may prefer to complete the order and, above all, the payment processes over the phone or with a manufacturer's representative.

In this scenario, while distributors are completely bypassed in the flow of products and information, contractors are not completely disintermediated. In the case of HVAC that need additional services
(i.e., installment and set up) customers will always need the intervention of a contractor. Thus, in the direct scenario the value added provided by contractors is limited at the installment and maintenance services and does not include any sales activity (as in the “No-Distributor” scenario).

As Figure 10 illustrates, end customers have two options in order to complete the transaction. The first option is that customers not only purchase the product directly from the manufacturer but they also rely on an additional service provided by the manufacturer. In this first case, in fact, the manufacturer takes the responsibility to contact a contractor in the customer’s local area to have him install the product. The second option is that customers buy the HVAC equipment from the manufacturer and then contact a contractor by herself in order to have the product installed.

As in the case of “No-Distributor” scenario, a number of changes takes place. The structure of the channels, the levels of distribution, the roles and functions of the channel players, the economics of the channel are all affected by the choice of the manufacturer of HVAC to pursue end customers directly. The analysis conducted for the “No-Distribution” scenario can be used to determine the most critical changes in these parameters.

Companies operating in the supply chain of HVAC that face the direct scenario encounter a number of opportunities and potential benefits. However, they also have to deal with new problems and challenges. Figure 11 illustrates the most relevant opportunities and challenges.

The direct scenario presents a number of opportunities for manufacturers of HVAC. First of all, it gives producers the ability to create a direct link with final customers. Companies not only are in a position to communicate with end customers but they can also complete transactions. As a result, the physical boundaries and limitations that today preclude manufacturers of HVAC from selling in other channels and markets are expected to disappear.

In this case, one of the most significant advantages may be the broader geographic scope for producers of HVAC that compete on the Internet. This could lead, in turn, to higher profit margins since the volume of sales would increase. As section 3.1 illustrated, more than one company rely on the Internet as a channel to increase sales in new markets.
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<tr>
<th>MANUFACTURER</th>
<th>OPPORTUNITIES</th>
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<td>• Direct link with customers</td>
<td>• Demand Forecasting</td>
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<td>• Higher profit margins</td>
<td>• Inventory</td>
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<td>• Broader geographic scope</td>
<td>• Service Requirements</td>
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<td>DISTRIBUTOR</td>
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<td>• Order System Interface</td>
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<td>CONTRACTOR</td>
<td>• Induced demand</td>
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<td>END CUSTOMER</td>
<td>• Convenience</td>
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<td>• Speed/easy order process</td>
<td>• Do not own customers</td>
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<td></td>
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<td></td>
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Figure 11. Direct Scenario: Matrix Opportunities - Challenges.

An example is given by EcoAir, a manufacturer of HVAC with $45 million in annual sales in 1996 and 40 employees. The company experienced requests for product information from markets overseas (Australia, France, Finland). EcoAir is planning to move more activities and operations on-line in the near future. The company expects to increase sales and profit margins from entering new markets in other countries.

Manufacturers of HVAC that intend to compete in the direct scenario face a set of threats and problems. As in the “No-Distributor” scenario, the changes in the structure of the channel should lead manufacturers to review their existing distribution policies. Such review is necessary for the creation of an appropriate strategy in terms of the level of customer service.

One of the first decisions that manufacturer of HVAC that decide to compete in the Direct scenario need to deal with is the level of customer service to be provided to end customers. Manufacturers initiate operating in a new environment. Market research will be needed to find out what the customers expect from the on-line service.
Significant divergence from the current conditions may arise in terms of transport, warehousing, inventory levels and production policies. Producers of HVAC may experience a much greater variability of demand in serving final customers than they currently face selling to distributors/dealers. This is because:

- The order system interface\(^{18}\) may increase substantially, from hundreds to thousands or even millions.
- Service requirements and customizations will increase directly with the number of customers served on-line.
- Performance measures like on-time delivery, order completeness and lead time will become could make the difference in terms of ability to compete on-line.

Another challenge is given by the fact that producers could be forced to manage a much higher level of inventory in the channel, due to the absence of distributors. This, in turn, means increasing the ability to forecast demand or introducing just in time methods of production. For some producers of HVAC, managing higher inventory levels could be extremely expensive due to the large number of product lines. This is why, a method of production that is pulled by the demand (i.e., just in time) could be the right solution for some companies.

The Direct Scenario holds potential opportunities not only for manufacturers but also for contractors. They could benefit, in fact, from induced demand: contractors operating in a certain area may be contacted from customers or from producers that have already conclude the transaction. In other words, contractors would indirectly benefit from the increase in sales and transactions conducted over the Internet. However, while in the No-Distributors Scenario contractors are affiliated with one or more producers, in the Direct Scenario they cannot count on a direct channel of communication with producers. As a result, their market and negotiating power may be reduced because they would not control the transactions, producers would do it.

In conclusion, it is possible to affirm that the Direct Scenario represents a potential outline for all those manufacturers of HVAC that do not want or do not consider manageable a close relationship with contractors. These companies rely on contractors just for final services (i.e., installation and set up), but not for managing the flow of information,

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\(^{18}\) In this context, the order system interface refers to the number of organizations/individuals that can place an order to a certain company.
the selling and order process. The most critical impediments for building a relationships with contractors seem to be:

- The large number of contractors\(^{19}\).
- The difficulty of selecting contractors in local markets.
- The difficulty in imposing standards of performance and quality of service to contractors.

### 3.6 THE E-COMMERCE SCENARIO.

The fourth and last scenario that can arise in the HVAC industry is called the E-commerce scenario. In this scenario, manufacturers of HVAC market “plug-in” and self installing products\(^{20}\) directly to final customers. Many producers of HVAC, in fact, have a number of product lines that consist of self installing products. It is for these type of products that the E-commerce scenario represents an opportunity for marketing directly to final customers.

Producers of HVAC may find profitable to rethink the way in which products are designed and developed in order to fully exploit the opportunities related with the e-commerce scenario. In other words, producers of HVAC may invest in research and development in order to increase the number of product lines of self-installing products or they could simply increase production of the existing product lines of self-installing products. Figure 12 illustrated the concept of the E-commerce scenario.

Manufacturers of HVAC use the Internet not only as a communication medium but also as a mean to promote and perform transactions with final customers. In this scenario there are no intermediaries: distributors and contractors are completely disintermediated in the flow of products and information. As a consequence, the way to market products changes dramatically. The selling and distribution of HVAC changes and the economics of the channel changes as well.

Manufacturers of HVAC need to create entirely new processes to market and distribute products and to create value for final customers. It is a major shift from the type of operations and from the knowledge and

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\(^{19}\) In many countries contractors are hundreds of thousands.

\(^{20}\) In the context of this research, plug-in and self installing products are intended to be all those HVAC systems that do not need to be installed. Thus, for this category of products there is no need of contractors. This is also the reason why self installing products can be found in the usual retailing channels.
skills producers of HVAC can currently count on. New methods of competing and creating values for final customers are essential.

THE E-COMMERCE SCENARIO

Figure 12. The E-commerce Scenario.

However, in the E-commerce scenario, much more than in any other scenario, the focus is on what final customers really want. Manufacturers of HVAC need to understand how final customers develop new priorities and expectations and try to anticipate and address them.

This is why the analysis of the E-commerce scenario must consider the benefits to final customers. In the HVAC industry the most significant advantages for final customers deriving from e-commerce operations are:

1. Convenience. Customers value products and services that can be bought saving time and money. Customers can experience reduced search costs over the Internet. Manufacturers of HVAC that want to compete in the E-commerce scenario must improve the convenience to final customers. Therefore, the prices of the products must be lower than that offered in the usual distribution channels or the services provided must be greater (i.e., longer warranty). Customers must be given ample demonstrations that buying a HVAC equipment over the Internet is a value-added purchase. One of the most effective methods that
manufacturers of HVAC can adopt to market products in the E-commerce scenario is to perform price discrimination

2. Speed/Ease of order. Competing in the E-commerce scenario implies different speed and different order processes than that utilized in the common channels. Manufacturers of HVAC need to be aware of a substantial difference in the speed of product development, time to market, time to react to competitive threats that modifies the concept of “positioning” (Sviokla, 1997).

But speed also implies timeliness to offer to final customers. In the E-commerce scenario, producers of HVAC need to perform basically functions and tasks (i.e., order processing) in a faster and more efficient way in order to provide final customers with a better service.

3. Service. Competing in the E-commerce scenario involves providing actual and prospective customers with better services. This implies promoting communication with end users to gather information from them. Manufacturers of HVAC must tailor specific services to precise targets: one-to-one marketing, product delivery, on-line service, technical information, etc.

4. More Information. As Hagel & Armstrong affirm “access to information is a key determinant of bargaining power in any commercial transaction. If one party gains access to more information, that party tends to be able to extract more value from transactions than a party with access to less information”. The Internet gives buyers the ability to retrieve and access much more information and much more efficiently than in the usual selling channels. Buyers of HVAC do not constitute an exception to this rule: they can access large quantities of information about the specific product and service they are looking for and they can also count on a degree of comparison shopping previously unknown.

5. More Choice. This is a direct consequence of the ability to retrieve and access more information from different sources. Buyers of HVAC equipment will no longer be limited by their geographic scope. They will be able to interact with producers of HVAC in every region of the world and try to conclude the transactions that offer more value added.

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21 Price discrimination is a pricing strategy that consists in charging different prices to different customers for the same goods, depending on what the market will bear. See also Pindyck & Rubinfeld, 1995.
In conclusion, it is possible to affirm that the strategic decision of entering and competing in the E-commerce scenario has long term implications and perspectives for producers of HVAC. It is not a decision that will show an immediate pay-off. The typical methods of determining an entry decision in a new market or the adoption of a new channel are probably too shortsighted to be used in this case. Measures like return on investments and expected value added can turn out to be not perfectly suited in this context (see also chapter 5 for a detailed analysis of the use of ROI in e-commerce projects).

3.7 CHAPTER SUMMARY.
This chapter illustrated the results of the phone survey that was used to collect data and the basic four scenarios that are expected to arise in the HVAC industry as a result of the impact of the Internet and e-commerce on the distribution channel.

In the future, a number of variables and parameters will determine the real shape and structure of the selling and distribution channel of HVAC:

- Market and negotiating power of each firm in the supply chain of HVAC.
- Marketing and financial resources of the manufacturers.
- The current physical assets (e.g., warehouses).
- Brand power of manufacturers.
- Potential reactions and retaliation of distributors.
- Technological improvements in security.

As mentioned before, the adoption of a particular scenario by a manufacturer of HVAC will be a strategic decision that will impact the company’s long term profitability and competitive advantage. Therefore, it is crucial to examine what are the strategic issues related to this type of decision, what are the barriers and problems, on one hand, and the drivers and facilitating factors, on the other hand, towards the implementation of the different scenarios. Chapter 4 will provide an answer to these questions.
4.0 BARRIERS AND IMPLEMENTATION ENABLERS.
This section investigates strategic and implementation issues of e-commerce in the HVAC industry. Section 4.1 discusses strategic issues and the level of integration of e-commerce operations in the overall business strategy. Section 4.2 illustrates the barriers and difficulties that producers of HVAC have found so far in implementing e-commerce. Section 4.3 illustrates the drivers and facilitating factors towards the implementation. Finally, section 4.4 introduces the concept of re-intermediation and its implications for manufacturers of HVAC.

4.1 STRATEGIC ISSUES.
As many other industries, the HVAC industry is characterized by the uncertainties associated with the evolution of the Internet and e-commerce. Many manufacturers of HVAC seem to argue that the Internet is not yet ready to meet the needs of their particular industry (see section 3.1 for empirical evidence). Many of them believe that the potential benefits and advantages of the Internet are not completely clear, understood and proven. These doubts are understandable given that not many manufacturers of HVAC have started Internet operations and very few have discovered how to generate traffic and interest at their Web site.

However, the skepticism about e-commerce and its future potential in terms of generating sales, improving customer service and gathering valuable information from customers, is counterbalanced by the fear and apprehension of being left behind and by the attraction to a new type of technology. Many producers of HVAC, in fact, observed that competitors and companies in related and unrelated industries are starting to use the Internet. Even some distributors in the channel have created a Web site. The Internal Information Service Departments in many HVAC companies are advocating the creation of a Web site and the budget required for the implementation seems to be reasonable. As a result, many producers of HVAC are thinking about creating their own Web page. Some of them have already done it.

In moving towards the market space, manufacturers of HVAC operating in the U.S., regardless of their relative dimensions, have an initial advantage on overseas competitors. The current state and development of telecommunication infrastructure and regulation, in fact, is much more advanced in North America than in any other country (Gayscöne, 1997). This fact has to be taken into account since the state of telecommunication infrastructure and the entire system of regulating conditions impact users' capabilities as well as operating costs. European
companies, for example, will need to wait until 1998 before existing monopolies in the telecommunication industry will be dismissed and lower prices can emerge as a consequence\textsuperscript{23}.

However, creating a Web site and counting on an external advantage is just the first step. Manufacturers of HVAC that intend to compete on the Internet, in fact, will initially face two major problems:

- Formulating a coherent Internet strategy.
- Successfully implementing the strategy.

While this section addresses the problem of formulating an Internet strategy, section 4.2 and 4.3 will discuss implementation issues. In particular, common barriers and enablers in the HVAC industry will be presented and analyzed.

The first problem that producers of HVAC that want to compete on the Internet have to face is strategy formulation. Terminology, in this case, is not important: one can argue that there is no such thing like an Internet strategy and that, if any, it is an integral part of the company's marketing strategy. The main point is that moving towards e-commerce operations is like entering a new market or a new distribution channel. It is not a good business practice to do it without a definite plan of action in mind.

However, empirical evidences from the surveys show that producers of HVAC are facing problems and barriers that are primarily caused by the lack of some simple business practices. The definition of plans of actions or entry strategy, the involvement of senior management, the definition of clear organizational responsibilities, are usually considered milestones in management practices. Nevertheless, the survey results seem to indicate that is exactly the lack of this common business practices that represent a major barrier towards the implementation of e-commerce in the HVAC industry. It is interesting to note that this conclusion does not contradict with the results of many researchers in implementing e-commerce in other industries (Hills, 1996; Sterne, 1997; Gascoyne, 1997; Emery, 1996; Davidow, M. S. Malone, 1992; Hafner, Lyon, 1996; Jones, 1995).

Therefore defining an Internet strategy or a plan of action is more than advisable in the HVAC industry, as well as in other industries. It requires the definition of some general but fundamental elements:

- Identifying long term objectives.
- Analyzing activities and processes.
- Determining and mobilizing resources.
- Establishing performance measures.

A good example of how it is important to define a definite Internet strategy before moving towards e-commerce operations is given by BeautyAir. The company produces HVAC, has annual sales of $70 million and 400 employees. BeautyAir developed a business plan which defined an entry strategy, long term objectives, activities to be performed, skills to be internalized, investment to be made. Senior management at BeautyAir believes that this is the only serious way to act if a company really wants to compete on-line.

Many companies seem to believe that the Internet primarily concerns management of technology\(^{24}\). Designing and creating web documents in HTML language or using Java software probably concerns technology. However, the Internet actually concerns managing customer relations. Technology is just the means that supports the system. Therefore, the process of strategy formulation represents a first important step that cannot be avoided. As section 4.2 will point out, the lack of strategy formulation is one of the most common barriers towards the successful implementation of e-commerce for manufacturers of HVAC.

Many managers in the HVAC industry are not involved in e-commerce operations and do not formulate Internet strategies. This seems to be because e-commerce operations are not considered fundamental activities, at least, not yet. Therefore, it is useful to summarize potential benefits and advantages\(^{25}\) of e-commerce operations for manufacturers of HVAC. The most significant advantages (see section 3.1-Survey Results-for empirical evidence) related to the use of the Internet as a business and sales tool for manufacturers of HVAC are summarized in Figure 13.

\(^{24}\) The evidence is given by the fact that in many companies the marketing department and the top management are not involved in Internet operations.

\(^{25}\) For a more detailed analysis of potential benefits and advantages of e-commerce operations see chapter 3.
Figure 13. Actual and Potential Advantages of E-commerce in the HVAC Industry.
Manufacturers of HVAC that want to use the Internet as a new channel need to integrate e-commerce activities in the overall company's strategy. Companies will have to reconfigure their organizational structure, reengineer current operations and processes, design entirely new marketing processes in order to optimize the whole system.

In this context, producers of HVAC may find profitable to rethink the way in which products are designed and developed. They may find profitable to invest in research and development in order to increase the number of product lines of self-installing products or they could simply increase production of the existing product lines of self-installing products. In other words, the opportunity to sale directly to final customers is particularly interesting for self-installing products and may induce companies to rethink their engineering, production and marketing plans.

Existing processes (e.g., inventory management systems), infrastructure and asset (e.g., number and location of warehouses), and even employees and management may turn out to be sub-optimal for e-commerce operations. Producers of HVAC that are market leaders in the marketplace may not be well positioned for e-commerce, where product information is distributed electronically and products themselves are distributed by the mail.

This section summarized actual and potential benefits of e-commerce for producers of HVAC that arise from survey results (see section 3.1). The need for determining strategic plans or courses of actions and integrating them into the company's overall business strategy was also discussed. Section 4.2 and 4.3 will investigate implementation issues: common barriers and enablers for implementing e-commerce operations.

4.2 BARRIERS TOWARDS THE IMPLEMENTATION OF E-COMMERCE.
Once a method to facilitate the process of strategy formulation for competing on the Internet have been developed and perfected, companies have just gone half of the way. The second fundamental step is to implement and convert the strategy into concrete actions. It is important to remember that many strategic plans have failed to improve the company's overall performance and shareholders' value mainly because:

- they focused on operating and financial issues much more than
on competitive positioning.
- they focused on formal planning and designing much more than on implementing.

This section uses the survey results (see section 3.1) to investigate the most common barriers and problems that manufacturers of HVAC have encountered so far in implementing e-commerce operations. Figure 14 summarizes these barriers.

Common Barriers towards the Implementation of E-commerce in the HVAC Industry.

- Internet as a non-primary activity
- Senior Management not involved
- No clear organizational responsibility
- No specific skills/knowledge/training
- Communication is missing

Figure 14. Common Barriers Towards the Implementation of E-commerce in the HVAC Industry.

1. Internet as a non-primary activity.
One of the barriers observed among companies that produce HVAC is the belief that Internet and e-commerce operations are not primary activities. Many managers in the HVAC industry believe that e-commerce operations could become strategic in ten or twenty years from now, when the Internet will mature into a common and accepted business practice (see section 3.1 for empirical evidence). But, for the time being, it is just something obscure and indefinite. As a result, managers do not invest time and resources in developing plans of action. Some companies that
are already on-line sometimes explicitly admit that they are there just because:

- the Information System Department pushed for creating a Web site and required a very reasonable budget to realize it.
- when a company that has a recognized brand on the marketplace sees its competitors jumping on the Internet, it simply decide to invest some money to do the same without a specific program on how to use the Internet.

An example of a company that had difficulty in the implementation process of e-commerce activities due to a lack of a strategic plan is EcoAir. The company produces HVAC and has $45 million in annual sales. As a company's marketing manager affirms: "We enter the Internet without a specific plan in mind. In this company, Internet activities are simply recognized as secondary activities."

2. Senior management not involved.
A second prevalent barrier towards a correct and successful implementation of e-commerce is a lack of commitment of senior management. This is a logical consequence of thinking of e-commerce as a non-strategic activity. In some cases, senior management not only is not involved in the decision process about what activities to perform on-line but it is also not aware of what information about the company and its products are placed on the company's Web site.

Senior management commitment is, probably, one of the best way to measure the degree to which activities and processes in a company are considered critical and strategic. The survey results show that e-commerce operations seem to be considered marginal activities. As a result, they are delegated to the initiative of the Information System department. As mentioned in section 4.1, the lack of strategic plans and of senior management commitment in e-commerce operations in the HVAC industry, arise from the survey results, does not contradict with the empirical evidence of many researchers in other industries (Hills, 1996; Sterne, 1997; Gayscone, 1997; Davidow, M.S. Malone, 1992; Hafner, Lyon, 1996; Jones, 1995).

3. No clear organizational responsibility.
Another observed barrier that precludes a favorable implementation of e-commerce operations in the HVAC industry is the lack of formal organizational responsibility for Internet operations. Producers of HVAC that do not establish and institutionalize e-commerce projects seem to
receive insufficient support and resources for a successful implementation. Some manufacturers of HVAC do not consider e-commerce operations as a:

- continuous activity that would require the adoption of a separate function.
- critical process that would demand the creation of a process owner.
- temporary task that would postulate the exigency of an empowered team.

As a result, some companies do not guide e-commerce operations. Nobody is considered responsible and nobody controls the development and the update of the entire system. It should be mentioned that the companies in which e-commerce is regarded as a secondary activity are the same companies in which there is a lack of senior management commitment and of clear organizational responsibility for Internet operations.

4. Training or specific skills are missing.
E-commerce operations seem to require the adoption of substantially new activities, processes, technologies and ways of conducting business. This, in turn, demands new skills and knowledge and training investment. The survey results, on the contrary, show that some producers of HVAC do not invest in training, hire new people with specific knowledge, or contract e-commerce operations to external suppliers.

Some companies seem to realize the need for investment in training or the benefits of a closer relationship with external providers only when the e-commerce project reaches an advanced phase. In the early stages, producers of HVAC perform very simple and static activities (e.g., technical information, product description). However, once a company moves to more advanced stages of development of e-commerce projects (e.g., on-line customer service, interactive questionnaires) the need of trained and experienced employees or business partners becomes evident.

As the survey results indicates, some producers of HVAC seem also to rely on training programs to diffuse an "Internet culture" among employees of different functions.

An example of a company that found initial difficulties in implementing e-commerce operations due to a lack of skilled employees
is CondiAir, a producer of HVAC with $90 million in annual sales and 750 employees. CondiAir initially experienced some difficulties in performing on-line customer service due to a lack of trained employees. The company invested in training for internal employees and also decided to contract part of its operations to an external provider. In this way, CondiAir is able to benefits from external knowledge and skills to deliver the greatest possible value to its on-line customers.

**5. Communication with customers is missing.**

The absence of communication and interaction with customers is another common barrier towards a successful implementation of e-commerce operations in the HVAC. As the survey results indicates, some producers of HVAC have encountered communication problems that seem to be primarily caused by inexperience and by insufficient and imprecise understanding of Internet capabilities.

The Internet is not a “push” technology in which content and information are sent along the channel. The Internet is a “pull” technology, where users are information and communication seekers. As Hagel and Armstrong\(^{26}\) observes “the key to exploiting the new market opportunity in on-line networks is to combine content and communication”.

Therefore content is not enough. Many producers of HVAC that started on-line operations created Web sites with the only intention of delivering information and content (e.g., technical data about the products, dealers’ promotion, advertising) to distributors and final customers. Few producers of HVAC that are on the Internet discovered how to develop an effective communication channel for customers that need additional information or want to contact the company. Some of them did not even provide contact points: address, telephone and fax number!

An example of a company that experienced initial problems in providing communication tools to on-line customers is BelAir. As the Corporate Internet Officers says: "Initially we put our product catalogs on-line and waited. We didn’t realize that the Internet, above all, is a communication channel. Internet users are interaction seekers. They want to contact you and ask you questions. Putting your catalogs on-line is just not enough.”

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This section used data from the phone surveys to provide a description of the most common barriers and problems that producers of HVAC have encountered so far in the implementation of e-commerce operations. From the analysis of section 4.2, the prevalence of internal versus external barriers is evident. This means that companies are finding many more problems inside the company than obstacles from channel players.

Moreover, some of the most arduous barriers to remove are upstream to the process of implementation. The lack of a strategic plan and the lack of senior management involvement are a clear demonstration that an Internet culture is not present among many producers of HVAC (see section 3.1 for empirical evidences).

However, not all manufacturers of HVAC have found problems and barriers in the implementation of e-commerce operations. A small fraction of the sample of companies examined does show positive elements and bases for competing on the marketplace. In particular, these companies present a number of significant methods and approaches that facilitated a successful implementation of on-line operations. Section 4.3 illustrates and examines these approaches.

4.3 DRIVERS TOWARDS THE IMPLEMENTATION OF E-COMMERCE.

As survey results show, there seem to be no "ready-to-make" recipe or "how to do it" manual for implementing Internet and e-commerce operations in the HVAC industry. The relative position of the firm in the market, its financial and marketing capacity, the degree of risk propensity of its senior management, its relative market and negotiating power in the supply chain, determine different approaches to transform into actions e-commerce projects.

However, from the analysis of the companies in the HVAC industry that have already implemented some Internet activities (e.g., customer service, database of technical information, on-line catalogs, promotion of local dealers and distributors, advertising) emerges a number of approaches that have positively impacted Internet operations. Figure 15 illustrates the most common implementation enablers and drivers in the HVAC industry.

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27 This is also due to the fact that e-commerce operations are not in an advanced stage (e.g., transactions and on-line sales) and, therefore, are not seen as a threat by distributors and dealers.
Drivers and Enablers for Implementing E-commerce in the HVAC Industry.

- Defining a map of activities.
- Defining a process owner.
- Creating a Cross-functional team.
- Testing a market
  or a product.

Figure 15. Drivers and Enablers for Implementing E-commerce in the HVAC Industry.

1. Defining a map of activities.
In the HVAC industry, opening up a new electronic channel to customers cannot create significant barriers to entry to competitors by itself. This is because the investment required is relatively low and small producers can, in theory, compete with market leaders. It is the implementation process of such a strategy that constitute an important entry barrier. Redesigning and rethinking activities and processes (i.e., map of activities) is a first fundamental step that some producers of HVAC have found effective to implement e-commerce operations.

There are no specific and pre-arranged procedures that can guide the company in this process redesign. Each company needs to redesign its activities and processes starting from the current situation and considering its unique characteristics.

However, as the survey results indicates, this initial work of process mapping seems to be particularly helpful in guiding the system change. The process mapping helps senior management in determining what activities need to be performed, by whom, with which resources, in what time, and with which performance measures.
An example of the utility of defining an initial map of processes and activities to perform on-line is represented by FreshAir, a manufacturer of HVAC with $80 million in annual sales and 800 employees. The senior management initially scarcely involved in Internet operations, decided, supported by external consultants, to design a process map for on-line activities. This plan helped the company in the process of integrating off-line and on-line activities in order to be able to offer complete solutions to customers.

2. Defining a Process owner.
The survey results suggest that successful implementation of Internet operations in the HVAC industry requires an integrated effort and the definition of clear organizational responsibilities. Some producers of HVAC have approached e-commerce projects as a change process. They have defined step-by-step procedures and process mapping in order to guide the company towards specific long term objectives. They have redesigned tasks, jobs, functions and structures. They have introduced and tested new performance measures.

Implementing e-commerce operations in the HVAC is a non-trivial task that requires organizational capabilities. As survey results suggest, only when e-commerce projects are institutionalized in a company, they seem to receive the amount of resources and consideration necessary for a successful implementation.

The organizational answer that some producers of HVAC gave to this problem was to create clear organizational responsibility for Internet projects. A team, a project manager or a process-owner is assigned to e-commerce operations and has full authority, control and responsibility in that field. This person works with the senior management to create and diffuse a clear vision for e-commerce activities inside the company, to identify the need for change and to quantify the benefits and advantages of e-commerce operations. He/she also works with functional managers to coordinate activities that need to performed on-line. In this way, everyone in and outside the company has a clear and unambiguous point of reference for Internet operations.

To understand the importance of a clear organizational responsibility on e-commerce operations it is useful to discuss the situation at PerfectAir. The company initiated e-commerce operations without clear responsibility. As the current Internet Officer says: "At the early stage of the project, things just did not work. Nobody in the company knew who was in charge. Overlapping and misunderstandings frequently
happened.” One year later, the CEO decided to put one person in charge of the whole system. As a result, the number of activities performed online increased, the costs went down, barriers among marketing and I.S. departments were solved.”

Managing on-line activities in the HVAC industry requires different skills and knowledge. It is just not a management of technology. Technological issues like bandwidth, security, encryption, system integration, platform independence and standards of communication need to be integrated with marketing, logistics, production and R&D issues. The survey results indicate that the organizational answer of some companies was to create cross-functional teams to manage these issues.

In some cases, cross-functional teams work with the process owner to determine the necessary changes from off-line to on-line activities. In this case, the process-owner (a senior executive) not only has full authority and control of the process but also guides and coordinates a temporary cross-functional team. In other case, the cross-functional team has a permanent nature and is, by itself, the process owner.

One of the most important components in the use of cross-functional teams seems to be the investment of time, attention and efforts of the company’s best people. Implementing e-commerce operations, in fact, demands a vision of the entire value chain and profound understanding of many different issues. The direct and personal involvement of managers with diversified skills and competencies ensures that all different aspects and circumstances will be taken into account.

An example of successful implementation of an Internet project facilitated by the adoption of an inter-functional team is represented by GoodAir. The senior management fully committed to reduce distribution costs and increasing sales through the use of the Internet, decided to create an interfunctional team. Managers from the marketing, engineering, production, I.S. department work together with the CEO to implement e-commerce. The team meets and discusses related issues regularly every week.

4. Testing a product or a market
Managing in the marketspace (see section 1.1) is a learning experience that requires time and effort. It also requires that companies learn new ways of conducting business while managing on-line operations. Internet
business practices are still very new and no hard and verified model exists to guide this process.

The effects and implications of Internet operations can be substantial for producers of HVAC and for distributors, dealers and contractors, as well. On-line activities can alter the structure of the distribution channel and modify the economics of the channel. The risks and costs involved in these operations are not totally clear and understood. This is why, some producers of HVAC have started testing Internet operations with specific products or in certain markets. In this way, companies obtain two distinct benefits:

- They initiate to build a learning curve in e-commerce operations.
- They minimize the risks and the impact of wrong decisions to a limited portion of company’s revenue.

Some producers of HVAC decided to start with non-domestic markets as a way to explore directly opportunities and threats of e-commerce. Some other companies started with product lines (e.g., self installing products) that seem to be more suited to e-commerce operations.

Thus, producers of HVAC that test and experiment with a product or a market can be early adopters of e-commerce technologies. They can perform tasks with greater economy and impact. They can verify the implications of doing business on-line and better control future marketing programs. In the long run, these companies may be able to build significant entry barriers and establish a competitive advantage.

This section has investigated a number of drivers and enablers that have been successfully adopted by producers of HVAC for implementing e-commerce operations. The impact of many different factors will determine the effectiveness of e-commerce operations. One of the most important factors that will determine the nature and the attributes of Internet processes in the HVAC industry, is the future structure of the selling and distribution channel.

In particular, the transition from a first stage, in which Internet operations are considered as a cost center, to a more advance stage, in which Internet operations are viewed as a revenue center (i.e., companies initiate on-line transactions), will largely depend on the functions and roles performed by existing intermediaries and by the birth of new form of intermediaries. Therefore, section 4.4 addresses some of the most
significant issues related to the advent of new type of intermediaries in the supply chain of HVAC.

4.4 RE-INTERMEDIATING THE SUPPLY CHAIN OF HVAC.
Currently intermediaries operating in the supply chain of HVAC (i.e., distributors, dealers and contractors) provide several services and functions to both producers and consumers. In a new competitive environment like the markespace, it will be the value-added to the transactions which determines, ultimately, what type of intermediary will survive. Those who provide minimal real value will be vulnerable to disintermediation. Those who provide sustainable, positive value will survive.

Some functions and services provided by intermediaries in the supply chain of HVAC may be eliminated, while other services may be internalized by manufacturers. However, competing in the markespace may require new functions and roles that could be performed by new type of intermediaries. Therefore, the term “re-intermediation” refers to the birth of new type of intermediaries and distributors in the virtual supply chain. It is the creation of new value by new types of intermediaries (e.g., virtual resellers, electronic malls, intelligent agents, etc.) between producers and final customers exploiting the Internet.

It may happen that some of the distributors and intermediaries that are already present in the physical world (e.g., dealers, retailers, contractors) and can count on recognizable brands and/or on specific knowledge and competencies will start providing services on-line. The existence and development of an information infrastructure will also create the conditions for the birth of several new forms of virtual intermediaries (i.e., intermediaries that exclusively provide on-line services).

Sarkar, Butler and Steinfeld (1995) consider that “the existence of cybermediaries is consistent with traditional marketing theory, which views intermediaries as organizations that support exchanges between producers and consumers, increasing the efficiency of the exchange process by aggregating transactions to create economies of scale and scope”.

Figure 16 illustrates the concept of re-intermediating the supply chain of HVAC.
To better analyze the possibility of re-intermediating the value chain of HVAC it is necessary to address two basic questions (Bendiek, Laws, Woehler, 1996):

1. Are some of the services provided by intermediaries still relevant on the Internet?
2. What fraction of the value created to virtual customers can still be realized by intermediaries and what fraction can be appropriated by producers?

Among the functions provided by intermediaries (see section 2.2), particularly relevant to the e-commerce is the one of searching and evaluating information. People who are willing to purchase consumer durables over the Internet need even more information that those who continue to buy items using the traditional channels. Virtual buyers need to gather, organize and synthesize information during the various steps of the purchasing decision process.

On the Internet there are millions of pages of information available and thousands of products and brands. Users are simply not able to visit all sites and to collect information about all products. While in the
traditional channels, buyers are limited by geography, in the virtual channel it is in theory possible to go through all the information available. However, virtual buyers usually have a high value of time and decide to purchase items on-line exactly because they can save time and money (Sterne, 1997). Having someone sort through the available products and brands and indicate the ones that match consumer’s preferences and needs represent a valuable service.

A large fraction of the value created through the searching and evaluating information can still be appropriated by an intermediary. This is still a value-added service in the marketplace. The knowledge and competencies of the distributor are critical to determine the fraction of the transaction value that can be taken. On the other hand, the brand name of the producer can reduce the quantity of information that the buyer needs to complete the transaction. In this case, the brand name is synonym of trust and customer loyalty.

The customer risk management service (see also section 2.1) can be successfully provided on the Internet by an intermediary. For example, a distributor can perform an important service whenever there is not enough information about a producer or about its products. This service is particularly relevant to the Internet because of the low cost of entering the on-line market.

The Internet eliminates or, at least, reduces the importance of scale economies: small producers of HVAC can compete at the same level with huge corporations. Anybody can create a Web site at a relatively low cost. As a result, buyers need to be sure about the fact that not only the information about the products but also the information about the producers are trustworthy. The intermediary can take the responsibility of verifying the information provided by small and unknown producers so that buyers can enter a transaction being sure of the credibility of the seller.

Trust and customer’s risk management is even more critical on the Internet than on the physical world (Bendiek, Laws, Woehler, 1996). In the traditional channels, distributors are physically located and buyers can always find and refer to them. Dealing with electronic transactions, on the other hand, means sending credit cards numbers over insecure channels to businesses whose location is unknown.

It is not just a matter of encrypting credit cards using solid algorithms; it is also a matter of trusting the counterpart in the electronic transaction.
As more commerce of HVAC moves to the Internet, buyers will need some mechanisms not only to encrypt their financial transactions but also to make sure that the company they are dealing with can be trusted. This service is even more important for durable products like HVAC than for any other category of products due to the relative high value of these products. It is likely that e-commerce of consumer durables will take-off only when firms will be ready to deliver customers risk management services (Gibbs, 1996).

The value created by guaranteeing trust can be appropriated by an intermediary, unless the producer of HVAC can count on a strong and solid reputation. Some major credit cards companies, like Visa and Mastercard, are moving to the Internet to create new type of services. They will use their widely-known brand names and reputation to create trust and confidence to consumers that want to purchase products and services over the Internet.

In this way, buyers will be sure about the reliability of the transaction and that the company they are dealing with will live up to its stated obligations and will not cheat them. Another example of providing customer risk management on-line is given by the Internet Shopping Network. The core business of ISN is to take on-line orders from consumers and to contact the company that manufactures the product to ship it. ISN gets a percentage of the sales price as commission. This service is even more important for consumer durable products than for any other product.

However, an important exception to this scheme is given by those producers of HVAC that have a recognized brand name, a solid reputation in the marketplace and can, therefore, count on consumer’s loyalty. In this case, it is the producers that, with its name and solidity, can manage customer’s risks and can appropriate the bulk of the value created with the electronic transaction. It is for market leaders that the e-commerce represents a great chance for disintermediating the value chain and to gain additional revenue streams (Hagel, Armstrong, 1997).

In the traditional channels, distributors of HVAC provide relevant services related to their technical knowledge and expertise and their ability of creating economies of scale. This function is still relevant on the Internet. The marginal cost of serving one more on-line transaction is very small, but the sunk and fixed costs associated with creating and managing a Web site and software can be considerable. Moreover, managing on-line transactions and tracking customers over the Internet
requires specific skills and competencies that not all producers are ready to internalize. Therefore, it may be convenient for many producers to buy or sub-contract such services directly from the market.

For example, to deliver value added services over the Internet, producers can be forced to subcontract their on-line operations to an intermediary that is able to support help in multiple languages, 24 hours a day, with professionally trained staff.

The value created by managing electronic transactions can hardly be appropriated by an intermediary, especially in the case of plug-in products. Producers will pay a certain fee to have virtual intermediaries managing their on-line operations, but the value created with electronic transactions will still be taken by the producers. This will be especially true, when the competition among intermediaries will increase the number and the quality of the services provided, while costs and fees will go down.

The ability of an intermediary to bring together buyers and sellers is still required on the Internet. The “market making” services of an intermediary are particularly necessary for producers that cannot count on a widely-known brand and for consumers that are not searching for top brands. In this case, buyers and sellers still depend on intermediaries that are able to deliver such a service and to take a fraction of the transaction value.

The development of e-commerce is creating room for the birth of new forms of intermediaries that provide their services almost exclusively on-line. The growth of these new forms of intermediaries may impact the shape and the structure of the supply chain of HVAC.

Sarker, Butler and Steinfield (1995) analyze a number of cybermediaries. Some of them may be directly involved in the supply chain of HVAC, replacing existing intermediaries or adding new value in on-line transactions.

**Virtual Malls.** Like a traditional physical mall, a virtual mall provides “infrastructures” and services for producers and retailers that want to sell products on-line. A virtual mall or Internet mall is usually a site that has more than two commercial sites linked to it. Virtual malls often provide links to stores other than the ones that are explicitly part of the mall as a way of creating value in order to attract more customers. The target market of an Internet mall can be a geographic
focus (e.g., The Alaskan Mall), or it can tie together a particular type of producer/retailer (e.g., The Asian American Mall) or can be composed of a variety of stores and products (e.g., Cybersuperstores).

**Virtual Resellers.** Virtual malls provide infrastructures for other companies that want to sell their products on-line, but they do not own inventory or sell products directly. Virtual resellers do. This type of intermediaries exist to sell directly to consumers. They are able to buy products from manufacturers and sell them to consumers that benefit from discounted prices due to the efficiency of the intermediary rather than producer-to-consumer direct links.

**Directories.** Directory service intermediaries help consumers find producers by categorizing Web sites and providing structured menus to facilitate navigation. There are three types of directory services that usually offer free services to consumers (but in the future they will probably charge for some value-added services). **General Directories:** (e.g., Yahoo, ElNet Galaxy) provide a general index of a large variety of different sites (from browsing support to keyword searches). **Commercial Directories:** (e.g., The All Internet Shopping Directory) provide indices of commercial sites on the Web or provide information about specific commercial areas, even listing firms that do not have Web sites. **Specialized Directories:** (e.g., Jeff Frohwein’s ISDN Technical Page) provide topic oriented information and support commercial transactions by providing consumers with technical and evaluative information about a producer and its products.

**Search Services.** In contrast to the directories, search services (e.g., Lycos, InfoSeek) provide users with the capabilities for conducting keyword searches of extensive databases of Web sites. Search services do not allow browsing of the database directly and are more oriented to completeness than to be topic specific.

**Publishers.** They are traffic generators that offer content of interest to consumers (e.g., Information Week, Wired Magazine). In many cases, they are pre-existing publishers in the physical world that decide to move on the Internet to offer on-line services. Publishers become cybermediaries when they offer links to producers through advertising or product listings related to their content.

**Web Site Evaluators.** Consumers may be directed to a producer’s site via this new type of intermediary that provide some forms of evaluation which help to reduce some of the risks to consumers (e.g., Top 5% of the
Web, GNN). Sometimes they charge producers that want to be evaluated, sometimes they charge consumers for their services.

**Auditors.** As in traditional media, on the Internet auditors provide audience measurement services. Auditors are not direct intermediaries but provide functions that serve to facilitate commercial activities. Companies that want to advertise on-line need information on the usage rate associated with Web sites and on audience characteristics. Nielsen Interactive Services and The Internet Audit Bureau are good examples of audience measurement service companies.

**Financial Intermediaries.** Many forms of e-commerce will require some means of making or authorizing payments from buyers to sellers. Payment systems will operate in many forms: credit authorizations by major credit card companies (Visa, Mastercard, etc.); electronic equivalents of writing checks (e.g., Checkfree); paying in cash (e.g., DigiCash) or sending secure electronic mail authorizing a payment (e.g., First Virtual).

**Intelligent Agents.** Intelligent agents help consumers overcome the problems related with navigation in the chaos of the Internet. Agents are software programs that facilitate searches by learning from past user behavior. Bargain Finder by Andersen Consulting is a good example of Intelligent Agents.

In conclusion, a number of issues should be taken into account when dealing with the possibility of the disintermediation and re-intermediation of the supply chain of HVAC:

1. The market power of distributors, dealers and contractors often derived from their current direct relationships with final customers, can turn out to be a major impediment for disintermediation. A producer of HVAC could be risking loss of the majority of its business for the small fraction of profits that may come from on-line marketing.

2. Final customers may choose to continue to buy from intermediaries (physical or virtual) because the distributors present multiple brands and products. Therefore, buyers could inhibit producers from abandoning traditional intermediaries that can better serve their needs.

3. Customers may trust the advice of an intermediary in buying a product that has the characteristic of HVAC and, in general, of durable
goods (i.e., high price, high risk, infrequent purchase) because it should not have the same bias and interest as the producers in selling its own products. This condition is somewhat modifiable when the producers have a solid reputation and can count on strong brand recognition in the marketplace.

4. When deciding to purchase HVAC equipment over the Internet buyers will be primarily guided by considerations about convenience and utility. In particular, cost savings issues are expected to boost Internet operations and to permit on-line transactions to take-off.

The opportunities embodied in on-line operations are not strictly limited to a future increase in sales. Producers of HVAC will also have the chance of reinforcing the existing links with final customers and to create a more direct and powerful channel of communication. The analysis conducted so far also shows that Internet represents a powerful way for producers of HVAC that want to differentiate their products, reach new customers, offer new services and improve their bottom line.

By eliminating the barriers between producers and final customers, the e-commerce will make personalized marketing possible. Companies can use the Web to communicate images of their products, services and processes to an audience as small as one. In this way, producers are in a position for creating marketing campaigns and processes targeted to a restricted number of customers. Ultimately, for just one customer at a time. The ability of customizing and personalizing marketing processes, the ability of managing customer relations, and the competence of gathering, organizing and re-distributing information will have to become the core competencies of producers of HVAC that want to do business on-line.

CHAPTER SUMMARY.
This chapter discussed the results of the phone surveys conducted with ninety six manufacturers of HVAC. These results was used to examine implementation issues of e-commerce projects in the HVAC industry. In particular, section 4.1 investigated the implications related with strategy formulation and definition of plans of action for e-commerce operations. Sections 4.2 discussed the most important barriers and problems encountered by producers of HVAC towards implementation of e-commerce operations. Section 4.3 investigated enablers and drivers that have been used to convert projects into courses of actions. Finally, section 4.4 presented the implications of a potential re-intermediation in the supply chain of HVAC.
5.0 SUMMARY AND CONCLUSIONS.
This thesis has investigated the multi-level impacts of Internet and electronic commerce on the supply chain of durable products. In particular, the research has focused the analysis on the supply chain of HVAC and has discussed the concept and implications of disintermediating the distribution channel of HVAC.

The structure of the distribution channel, the activities of distributors and intermediaries and the characteristics of the HVAC products (see section 2.3 and 3.2 for a detailed analysis) make the HVAC industry a significant case that can be used to examine the impact of e-commerce on producers of durable products.

The data presented in this thesis have been collected using phone surveys. Ninety six companies operating in the production phases of HVAC were contacted. The survey results are described in section 3.1. The data and information collected, probably, do not have a specific statistical validity because of the limited sample. However, data and information do have general validity and legitimacy because of the homogeneity of the sample and the structure of the questionnaire (see section 3.1 for a detailed description).

The survey was divided in five sections. The first section determined the relative size of the company in terms of number of employees, annual sales and market scope. The second section investigated the current structure of the distribution channel, the future expected changes in this structure and the economic impact of e-commerce on the HVAC industry. The third section analyzed what on-line activities and processes have being performed or planned to perform by manufacturers of HVAC. The fourth section examined potential and actual barriers and problems towards the implementation of e-commerce activities. Finally, the fifth section investigated the drivers and enablers that have been adopted in implementing e-commerce.

The thesis examined four potential scenarios in the selling and distribution channel of HVAC:

1. The Communication Scenario.
2. The No-Distributor Scenario.
3. The Direct Scenario.
4. The Electronic Commerce Scenario.
Using these scenarios the thesis analyzed the changes in the structure of the distribution channel of HVAC. The main objective of this analysis was to provide:

1. A broad understanding of the most significant options that producers of HVAC face when decide to compete on the Internet.
2. The major implications and effects of these options on distributors, dealers and contractors and their potential counteractions.

The last part of the thesis used the survey results to investigate the process of strategy formulation and implementation of e-commerce operations. While the process of formulating a correct strategy is the first step to enter on-line markets, concrete implementation represents an important challenge. In this delicate phase, the role of senior management seem to be fundamental in diffusing an “Internet culture” and to mobilize resources for e-commerce projects.

Moreover, the level of commitment of senior management seems to be a good indicator of the relative importance assigned to e-commerce operations and also of the stage of development of e-commerce operations. The companies in which senior management were committed and involved in e-commerce operations are also the ones that:

- performed the most advanced on-line activities (e.g., on-line customers service).
- experienced significant cost reductions.
- did not experienced significant barriers towards implementation.
- invested in training and education as well as in technological improvements.
- predicted on-line transactions and sales in the near future.

The survey results suggest that there are neither implementation solutions valid for all companies, nor ready-to-use manuals to adopt in all circumstances. The relative position of the firm in the market, its financial and marketing capabilities, the degree of risk propensity and commitment of its senior management, its relative market power in the supply chain, contribute to determine different approaches to implement the Internet strategy into actions.

However, from the analysis of the companies that have already successfully started e-commerce operations (e.g., on-line customer service, database of technical information, on-line catalogs, promotion of
local dealers and distributors, advertising, interactive questionnaires -see section 3.1) emerges a numbe. of approaches that have been positively adopted by producers of HVAC\textsuperscript{28}.

These companies work to integrate off-line and on-line activities and to provide complete customer solutions. They try to adapt their strategy to competitive forces that are rapidly and constantly changing. These companies always measure the relative performance of their Internet activities and benchmark it versus competitor's performances.

Since producers of HVAC are still using their Web site as a cost center (i.e., do not perform on-line transactions), it is not possible to affirm that what these companies measure is the impact on sales and profitability.

In this sense, the situation in the HVAC industry does not differ from that of the great majority of other manufacturing industries. Gayson (1997) affirms that Internet processes and activities cannot be measured in terms of ROI\textsuperscript{29}, at least not initially. This is because, in order to calculate ROI it is necessary to have an understanding of the future cost components, on one hand, and of the future profitability (expressed in terms of net income), on the other, that are likely to come from the given investment project. Internet projects in the HVAC industry, at present time, are still characterized by a high degree of uncertainty in both cost and income components.

This high degree of uncertainty, in the HVAC industry, is one of the most relevant factors that determine managers' skepticism about e-commerce operations and its future potential of generating sales, improving customer service and gathering valuable information from customers.

A second important factor that determines managers' skepticism, in the HVAC industry, is the fact that e-commerce is still a not widely accepted business practice. Many producers of HVAC seem to remain tied and anchored to systems and methods that worked efficiently in the past. They seem to wait until the e-commerce is recognized as a widespread and diffused phenomenon.

\textsuperscript{28} See section 4.3 for a detailed analysis.

\textsuperscript{29} The Return of Investment (ROI) is one of the most used and accepted indexes in financial analysis. It measures the ratio of net income and overall investment. It is particularly useful when it comes to evaluate the profitability of two or more investment projects.
However, this is a very risky way of facing the future because it completely avoids developing a strategy for the inevitable changes coming and misses the opportunity to anticipate and shape the future. Producers of HVAC that are early movers in the new scenario may benefit in a number of ways (Gayscone, 1997):

- Ability to establish installed customer base early to gain considerable market share.
- Opportunity to develop knowledge and test solution without competitive pressures.
- Establishment of early alignments with optimal business partners in advance of competitors.
- Receiving favorable industry and customer press by being early movers in the market.
- Opportunity to rethink products, processes and markets before competitors.
- Rapid customer acquisition and retention by getting people familiar with the services provided.

The present thesis discussed the concept and implications of disintermediation in the supply chain of durable products and, in particular, of HVAC. This thesis also presented data collected from the field relatively to activities performed on-line, future structure of the distribution channel of HVAC, barriers and drivers towards implementation of e-commerce projects and the concept of re-intermediating the supply chain of HVAC.

Future research should focus on three directions:

- The impact of e-commerce projects on the cost structure of producers, distributors/dealers and contractors in the HVAC industry.
- The impact of e-commerce projects on physical assets in the supply chain of HVAC (e.g., warehouses).
- The impact of e-commerce projects on total logistics cost and on the required level of service.
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CHAPTER 1
INTRODUCTION


CHAPTER 2
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CHAPTER 3

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