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FACTORS THAT AFFECT THE ELECTRONIC DISTRIBUTION CHANNEL STRUCTURE

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ABSTRACT

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Adriana Mirela Girlea

Today, in the conditions of Internet's expansion and extensive use of information technology, many companies reconsider the way they are doing business. When designing electronic distribution channels, managers have to decide to what extent should the distribution function be performed within the boundaries of their firms. This research identifies the factors that explain such channel structure, based on transaction cost economics theoretical framework. A survey was conducted among Canadian and US firms from the semiconductor and electronic components manufacturing industrial sector (NAICS 33441).

The results of the multiple regression analysis revealed that human asset specificity is marginally correlated with the dependent variable and that behavioral uncertainty is positively correlated with the degree of performing the transaction internally. In the case of other two variables (environmental uncertainty and environmental diversity), the regression coefficients had the hypothesized sign but the results were not statistically significant. Overall, the results indicate that transaction cost economics could be used to explain partially the electronic channel structure.

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Chapter I – INTRODUCTION

When designing distribution channels, managers have to decide to what extent the distribution function should be performed within the boundaries of their companies. Should the company rely on independent intermediaries such as agents and wholesalers, should they perform distribution tasks using the firms' employees or should they use a combination of employees and intermediaries? Since the decision to integrate the distribution function implies sticky investments, managers need frameworks that allow the design of channels that will remain efficient over a long period of time (Sharma & Dominguez, 1992). Consequently, understanding the factors that affect the evolution of channel structure is considered to be a very important research task (Sharma & Dominguez, 1992).

One established theoretical framework used to explain the structure of distribution channels for industrial products was transaction cost economics (TCE). Several empirical studies have validated many of this economic theory's predictions. Although some researchers have pointed out some limitations of TCE (Ghoshal & Moran, 1996), empirical research has proved its usefulness in explaining factors affecting the traditional channel structure (Rindfleich & Heide, 1997).

Today, in light of the Internet's expansion and extensive use of information technology (IT), many companies reconsider the way they are doing business. The new electronic distribution channel offers new challenges and possibilities. Although academic research

has extensively discussed how the Internet is used in business in a general context, the factors that influence the structure of the electronic distribution channel are still under-studied. Several studies have analyzed, from a *theoretical* perspective, these factors but their conclusions are quite contradictory (Malone, Yates & Benjamin, 1987; Benjamin & Wigand, 1995; Sarkar, Butler & Steinfield, 1995; Bailey & Bakos, 1997; Sarkar, Butler & Steinfield, 1998). For example, some researchers argue that that the use of information technology will allow companies to bypass intermediaries and internalize the channel activity (Malone, Yates & Benjamin, 1987; Benjamin & Wigand, 1995). Other researchers criticize this position by advocating that some roles of traditional intermediaries will certainly disappear, but new roles for intermediaries will emerge (Bailey & Bakos, 1997) or that, depending on the transaction type, both scenarios of threatened intermediaries and emergence of cybermediaries are possible (Sarkar, Butler & Steinfield, 1995; 1998). It was even suggested that TCE may not provide the best theoretical framework for the study of the intermediaries in electronic markets and that a new theory that is in line with the roles of intermediaries in electronic markets is needed (Bailey & Bakos, 1997). Until now, little empirical research was conducted to check if indeed, transaction cost economics could be used to explain the structure of the electronic distribution channel.

The objective of this study is to enhance the existent knowledge about the factors that might determine the extent to which a firm should internalize the distribution function, in the context of the newly available electronic environments. From a theoretical standpoint, this research tests the applicability of TCE to the electronic marketplaces.

Based on TCE, specific research hypotheses about the extent of integration of electronic channels of distribution were formulated and tested. One of the main determinants of the integration into distribution, identified by prior TCE research, was the existence of specific assets defined as investment made to support a transaction that have no value outside that transaction (Rindfleich & Heide, 1997). Two types of such assets (human asset specificity and brand name capital) will be considered in this study as factors that might affect the electronic channel structure. Highly specific human assets are the special-purpose knowledge and working relationship that arise in a learning by doing fashion and create specific human capital (Anderson, 1985). The brand name capital represents the total investments made to increase the value of a brand name (Gatignon & Anderson, 1988). The existence of highly specific assets and of a brand name capital should represent powerful incentives for firms to perform internally (at a higher degree) the distribution function in electronic environments. Empirical research on traditional channel supports these hypotheses.

A second major factor that leads to integration is the difficulty to assess the performance of the trading partners, construct called behavioral uncertainty (Williamson, 1985). It is expected that the effect of behavioral uncertainty on integration should be similar with the one found in traditional channel empirical research (a positive correlation should exist between the two variables).

The third factor that, according to TCE studies, leads to integration is the existence of environmental uncertainty (Williamson, 1985). This construct appears to be

multidimensional, its dimensions having opposite influences on the vertical integration (Rindfleich & Heide, 1997; Stucliffe & Zaheer, 1998). The two dimensions considered for the purpose of this study are environmental unpredictability, defined as the inability to predict events due to the fact that the environment is volatile and turbulent (John & Weitz, 1988) and environmental diversity, defined as the degree of similarity or differentiation perceived between the elements of the population dealt with (Achrol & Stern, 1988). Past empirical research had proven that environmental uncertainty has a main effect on vertical integration.

Other factors that affect the channel structure are the frequency of the transaction (Williamson, 1985) and the channel volume (Klein et al., 1990). A positive correlation is hypothesized to exist between these variables and the degree of performing the electronic distribution function internally. Empirical studies on traditional channels provide some support for these hypotheses.

Finally, the size of the company is included in the model as a control variable. Although for traditional channels the size was found to be a determinant of the integration, for the electronic environments such relationship should not exist (from TCE perspective). However, beyond TCE, size represents a proxy for economies of scale and scope and might influence the decision of integration.

This report will first discuss the basics tenets of TCE (Chapter II) and will briefly review its main constructs. A literature review of both traditional and electronic distribution

channel and of the research explaining their structure will follow. Finally, specific research hypotheses will be developed.

The next chapter (Chapter III) describes the research design, the selection of the measures, the sampling technique, the procedure used to collect data and the statistical model used to analyze the data.

The results of the research are shown in Chapter IV and the discussion of the findings, limitations of the study and future research directions will follow in Chapter V.

2.1 TRANSACTION COST ECONOMICS.

Transaction cost economics (TCE) is a theory applicable to all transactions that could be defined as an implicit or explicit contractual problem and explains why firms choose to perform only some activities within the boundaries of the firm. Coase was the first who proposed that, under certain conditions, conducting transactions in a market could be more expensive than organizing transactions internally (Rindfleich & Heide, 1997). TCE posits that the decision to internalize a transaction is based on cost minimization: the firm will perform a certain activity internally if it is cheaper to do so than using the market (Klein et al., 1990; Sharma & Dominguez, 1992; Bello et al., 1997).

Performing an economic activity generates two types of costs. The first category is called production costs and it is defined as the cost of completing the activity (Bello et al., 1997; Sarkar et al., 1998). Some examples of production costs relevant for the distribution channels are the wages paid to the employees involved in distribution, the cost of promotional materials, etc. The second type of costs, named transaction costs, represents the costs incurred to coordinate and control the entity performing the activity (Sarkar et al., 1998). As Williamson (1985, p.19) states, "transaction costs are the economic equivalent of friction in physical systems". Examples of transaction costs in the distribution channel are the cost of monitoring the services' quality an independent distributor provides, the cost of transferring information between the manufacturer and channel members, the cost of screening and selecting appropriate distributors, etc.

TCE states the firm chooses to internalize those activities for which the sum of production and transaction costs is minimum (Williamson, 1985). The existence of non-negligible transaction costs is based on two assumptions, bounded rationality and opportunism (Williamson, 1985).

Bounded rationality refers to the fact that economic actors do not act rationally even though they intend to, due to limited information processing and communication abilities (Rindfleich & Heide, 1997). In a contractual problem, managers are bounded rational because they are not able to foresee everything that could happen, due to the fact that is impossible to do so (Milgrom & Roberts, 1992). The second source of bounded rationality is the communication language. A language that could describe in detail all the foreseen circumstances does not exist (Milgrom & Roberts, 1992). Also, due to the imprecision of language, what is communicated could be interpreted in a different way than it was intended (Milgrom & Roberts, 1992). Williamson (1985) argues that the existence of bounded rationality leads to transaction costs that can not be ignored, such as the cost of planning, adapting and monitoring.

Opportunism is defined as self–interest seeking and includes lying, stealing, cheating and deceit (Williamson, 1985). The type of opportunism generated by the fact that contractual parties possess private information before they enter the contractual exchange, is called adverse selection (Spulber, 1999). For example such an unobservable characteristic relevant of the distribution channel members is the capacity of providing a quality service. Examples of private information possessed by customers are their

valuation of product quality and their willingness to pay for that product (Spulber, 1999). This form of precontractual opportunism increases some transaction costs such as the screening and selection costs (Rindfleich & Heide, 1997).

The second type of opportunism is postcontractual. When one party is forced to accept disadvantageous conditions because it had incurred some sunk costs, or when it worries that such investments could loose value due to the actions of others, a hold-up problem exists (Milgrom & Roberts, 1992). Consequently, non-zero transaction costs are incurred in order to protect (safeguard) such investments (Rindfleich & Heide, 1997). If the actions of the parties are not freely observable, then another form of postcontractual opportunism (called moral hazard) arises because one party might pursue its interests on the expense of the other party (Milgrom & Roberts, 1992). In order to protect against moral hazard, transaction costs related to performance monitoring are incurred (Rindfleich & Heide, 1997).

2.1.1 Factors that influence the value of the transaction costs.

From the perspective of TCE, transactions differ with respect to three dimensions: asset specificity, uncertainty and frequency. Those are the main factors that determine the value of the transaction costs. A definition and a very brief explanation of the mechanisms that raise the transaction costs are provided for each factor.

Asset specificity. Williamson (1991, p.281) defines a specific asset as the investment made to support a transaction that can not be "redeployed to alternative uses and by

alternative users without sacrifice of productive value". Six categories of asset specificity were identified in the literature. Their names and definitions are provided in Table 1.

Since TCE assumes that the trading partners will behave opportunistically, the firm needs to safeguard these specific assets. Consequently, high levels of asset specificity increase the transaction costs (Rindfleich & Heide, 1997).

Table 1 – Types of asset specificity

Type of asset specificity	*Definition*
Site specificity	Investments in facilities located in way that economize on inventory and transportation expenses (Williamson, 1996)
Physical asset specificity	Investments in relation-specific equipment and machinery (Shelanski & Klein, 1995)
Human asset specificity	Investments in knowledge that acquired in a learning by doing fashion (Anderson, 1985; Williamson, 1996)
Brand name capital	Investments made to increase the value of a brand name (Gatignon & Anderson, 1988)
Dedicated assets	Investments in general purpose plant that are made at the request of a particular customer (Williamson, 1996).
Temporal specificity	Investments in assets whose value is highly dependent on reaching the user within a specified, relatively limited period of time (Malone, Yates & Benjamin, 1987).

Uncertainty. Two types of uncertainty were identified by the classic TCE. The first one, behavioral uncertainty, is generated by the opportunistic behavior of the exchange partners, such as strategic non-disclosure, disguise or distortion of information

(Williamson, 1985) and was often associated with difficulties in assessing how the trading partners comply with the contractual agreement (Rindfleich & Heide, 1997). The second uncertainty form, environmental uncertainty, refers to the fact that the environment is unpredictable (Rindfleich & Heide, 1997).

The effect of uncertainty on transaction costs depends on the type of uncertainty considered and is explained through two mechanisms: a performance evaluation problem and an adaptation problem (Rindfleich & Heide, 1997).

Because the trading partners tend to behave opportunistically, the firm must incur costs in order to evaluate their performance. Those costs increase as the level of behavioral uncertainty increases and are related to screening, selecting and measuring performance (Rindfleich & Heide, 1997).

Since TCE assumes that decision-makers are limited by the bounded rationality, the contractual agreements between trading partners are incomplete and difficulties might arise in modifying them when the external environment changes (adaptation problem). The transaction costs increase due to the costs of disseminating new information, contract renegotiating and coordinating activities to reflect the new circumstances (Rindfleich & Heide, 1997).

The original TCE framework considers that increased environmental uncertainty leads to insignificant increase in transaction costs in the case of transactions that have nonspecific

assets (Williamson, 1985). However, empirical studies prove the existence of a main effect of uncertainty (Anderson & Coughlan, 1987, Gatignon & Anderson, 1988; John & Weitz, 1988; Klein, 1989).

Frequency. Transactions performed more often generate higher costs related to the administration and monitoring of those transactions (Klein, 1989; Kulkarni & Heriot, 1999). Consequently recurrent transactions lead to higher transaction costs than occasional ones.

2.1.2 Factors that influence the value of the production costs.

The review of the literature reveals that the scale of the operations is the main factor that influences the value of the production costs. Several researchers argue that a large operation scale generates economies of scale, which lead to lower production costs (Williamson, 1985; Anderson, 1985; Klein et al., 1990; Bello et al., 1997).

2.2 DISTRIBUTION CHANNELS.

Since this research considers only business to business industrial distribution, the following considerations refer only to this topic.

2.2.1 Traditional distribution channels.

A distribution or marketing channel is a set of interdependent organizations "involved in the process of making a product or service available for use or consumption" (Kotler & Turner, 1998, p. 530).

The traditional distribution channel allows the accomplishment of several marketing functions such as information collection and dissemination, promotion, negotiation, ordering, financing, payment, risk taking, ownership (title), logistics, post-sale service (Kotler & Turner, 1998; Rangan et al., 1992). These functions could be classified in two main categories, transaction accomplishment and physical logistics (Sarkar, Butler & Steinfield, 1998; Stanton, 1999). Regardless of the structure of the channel, these functions should be all performed. The real challenge is to find the answer to the question who should perform them (Kotler & Turner, 1998).

2.2.2 Electronic distribution channels.

Academic research employed various definitions for the term electronic commerce. For the purpose of this study it is considered that a company uses electronic commerce in the process of selling one of its product lines if it uses any of the following: electronic data interchange (EDI), its own Web Site, an Industrial Portal or the services of a reseller that has on-line presence (Web Site). The definitions of EDI and industrial Portal are shown in Table 2.

Table 2 – Definitions of e-commerce terms

Term	*Definition*
EDI	An inter-organizational system that allows business partners to exchange structured business information electronically between separate computer applications. The documents that are usually exchanged via EDI are purchase orders, invoices, shipping notices, order confirmations and payment receipts (Kulkarni & Heriot, 1999)
Industrial Portal	Web Site that provides information and a variety of services to a particular industry. Some examples of the services provided are industry news, links to other sites, Web searching, product information and transactions (CMP Media Inc, 2000).

The only difference between the marketing functions performed by traditional and electronic channel members is that, in the case of physical goods, physical logistics could not be accomplished using electronic channels (Sarkar, Butler & Steinfield, 1998; Stanton, 1999). Consequently, in the case of electronic distribution channels for industrial products, the term distribution relates only to the transaction accomplishment. The following discussion will use the terms sale, transaction and distribution interchangeably.

In the e-commerce literature the sale was defined in various ways. For example, Stranton (1999) describes the transaction accomplishment for industrial goods as being composed of multiple steps such as information functions required to bring sellers and buyers together, consummate a deal, transfer title, payments and provide after-sale relationship management. But Liang and Huang (1998) view the sale as being composed of search, comparison, negotiation, ordering, payment and post-sale service. Although this model refers to the business-to-consumer markets, it could be extended to business-to-business markets.

Regardless of how various activities were classified, the general logic is that the sale is a sum of the functions performed in electronic environments. Table 3 shows an extensive list of functions that were cited in the literature as being performed in the electronic environment. For the purpose of this research, the business-to-business sale transaction is considered to be composed of the twenty-seven activities listed in Table 3. The

definitions of the terms marked with an asterisk are listed in the annex to the questionnaire (Appendix 1).

Table 3 – Functions composing a sale transaction in electronic markets.

	Function	*Study*
1	Product information*	Sarkar, Butler & Steinfield (1995); Bailey & Bakos (1997) (1997)
2	Product evaluations (reviews)*	Kuehl (1999)
3	Inventory checking	Samiee (1998)
4	Price quotations	Trembly (1999)
5	Traffic generation*	Dutta, Kwan, & Segev (1998)
6	Web site evaluation*	Sarkar, Butler & Steinfield (1995)
7	Company information*	Samiee (1998)
8	Company performance evaluation*	Samiee (1998)
9	Info about other terms of sale (ex: shipment terms, delivery date...)	Samiee (1998)
10	Comparison of your offer with competitors' offers*	Maes, Guttman & Moukas (1999)
11	Price negotiation using auctions*	Samiee (1998)
12	Negotiation of terms of sale	Samiee (1998)
13	Order placement	Iacovou et al. (1995); Samiee (1998); Fastenal (2000)
14	Order receipt acknowledgement	Kulkarni & Heriot (1999); Fastenal (2000)
15	Order change request	Fastenal (2000)
16	Order change acknowledgement	Fastenal (2000)
17	Payment authorization	Sarkar, Butler & Steinfield (1995)
18	Fund Transfer	Iacovou et al. (1995)
19	Invoicing	Iacovou et al. (1995)
20	Order tracking	Samiee (1998)
21	Shipment confirmation	Kulkarni & Heriot (1999)
22	Return of goods*	Samiee (1998)
23	Technical support	Marsan (2000)
24	Marketplace infrastructure*	Bailey & Bakos (1997) (1997)
25	Secure communication	Bailey & Bakos (1997) (1997); Sarkar, Butler & Steinfield (1998)
26	Authentication*	Bailey & Bakos (1997) (1997); Dutta, Kwan, & Segev (1998)
27	Aggregation*	Bailey & Bakos (1997) (1997)

2.3 THE STRUCTURE OF THE DISTRIBUTION CHANNEL

Several empirical studies (listed in Table 4) that examined the firms' decision whether to internalize or not the functions of the traditional domestic or international distribution channel used TCE as theoretical support.

As previously discussed, a company will integrate an economic activity based on cost minimization, if the sum of transaction costs and production costs is minimum. Because transaction costs are very difficult to measure (Klein et al., 1990), researchers tested if the existence of vertical integration into distribution is correlated with the factors that determine the value of these costs (TCE dimensions): asset specificity, uncertainty (environmental and behavioral) and transaction frequency. It was also tested if the scale of the operations (as a determinant of the production costs' value) is correlated with the decision to integrate the distribution function. A synthesis of the main findings is shown in Table 4.

In contrast with the rich theoretical and empirical literature on traditional channel structure and despite the growing interest in the usage of electronic commerce for business purposes, only few studies analyzed from a theoretical perspective the structure of the electronic distribution channel (Malone, Yates & Benjamin, 1987; Benjamin & Wigand, 1995; Sarkar, Butler & Steinfield, 1995; Bailey & Bakos, 1997; Sarkar, Butler & Steinfield. 1998). No empirical studies that deal with this subject were conducted.

Table 4 – Studies that explain the traditional distribution channel structure

Study	*Dependent variable*	*Independent variables*
Anderson & Schmittlein (1984)	Probability of going direct	Human asset specificity (+)[1], environmental unpredictability (NS)[2], behavioral uncertainty (+), interaction of asset specificity and environmental unpredictability (NS), interaction of asset specificity and behavioral uncertainty (NS), territory density (proxy for transaction frequency; NS), size of the firm (+).
Anderson (1985)	Probability of going direct	Human asset specificity (mixed support), environmental unpredictability (NS), behavioral uncertainty(+), interaction of asset specificity and environmental unpredictability (+), travel requirements (proxy for transaction frequency; NS), product line attractiveness (+), size(NS), importance of non-selling activities(+), time span to feedback (NS)
Anderson & Coughlan (1987)	Probability of using an integrated channel when entering a new international market	Human asset specificity (+), uncertainty (-), age of product (NS), service requirements (NS), product differentiation (+), Number of competitors using integrated channel (NS), strength of patent protection (NS), product's degree of relatedness to firm's principal business (NS).

[1]The sign of the statistically significant regression coefficient is indicated in parentheses.

[2] NS = The regression coefficient is not statistically significant.

Table 4 (cont'd)– Studies that explain the traditional distribution channel structure

Study	*Dependent variable*	*Independent variables*
Gatignon & Anderson (1988)	Probability of total integration (control) of foreign subsidiary	Human asset specificity (+), brand name capital (+), external uncertainty (-), interaction external uncertainty and human asset specificity (NS), company experience (proxy for behavioral uncertainty, +), sociocultural distance (-), legal restrictions (-)
John & Weitz (1988)	Percentage of sales through direct channel & Probability of using a direct channel	Human asset specificity (+), environmental uncertainty (+), behavioral uncertainty (+), sales volume (NS), lack of territory density (-)
Klein (1989)	Degree of vertical control (integration) of export channel	Asset specificity (+), uncertainty-complexity (-), uncertainty-dynamism (+), channel volume (+), frequency (+).
Klein et al. (1990)	Probability of using an integrated export channel	Asset specificity (+), environmental volatility & diversity (mixed support), channel volume(+)

Two contradictory theories exist in the literature. Some researchers argued that the use of information technology would allow companies to bypass intermediaries and internalize the channel activity (Malone, Yates & Benjamin, 1987; Benjamin & Wigand, 1995). The foundation of this disintermediation theory lays on the assumption that the use of information technology will decrease the costs of communicating and processing information (those costs are considered to represent the total transaction costs) leading to an increased use of markets for coordinating an economic activity (Malone, Yates & Benjamin, 1987).

The researchers that criticize this theory present, however, different opinions. For example, Bailey and Bakos (1997) state in their case study that in electronic market place, while some roles of traditional intermediaries will disappear, new roles for intermediaries will emerge (reintermediation). Sarkar, Butler and Steinfield (1995; 1998) argue, based on transaction cost theory, that depending on the transaction type, both scenarios of threatened intermediaries and emergence of cybermediaries are possible (intermediation).

Amazingly, both theories (intermediation/disintermediation) base their arguments on TCE. However, the problem is not due to the theoretical framework provided by TCE but resides in the way its constructs were interpreted and applied. Indeed, IT usage leads to the reduction of some transaction costs, such as the costs of disseminating new information and coordination activities to reflect the new circumstances (Malone, Yates & Benjamin, 1987; Benjamin & Wigand, 1995; Kulkarni & Heriot, 1999).

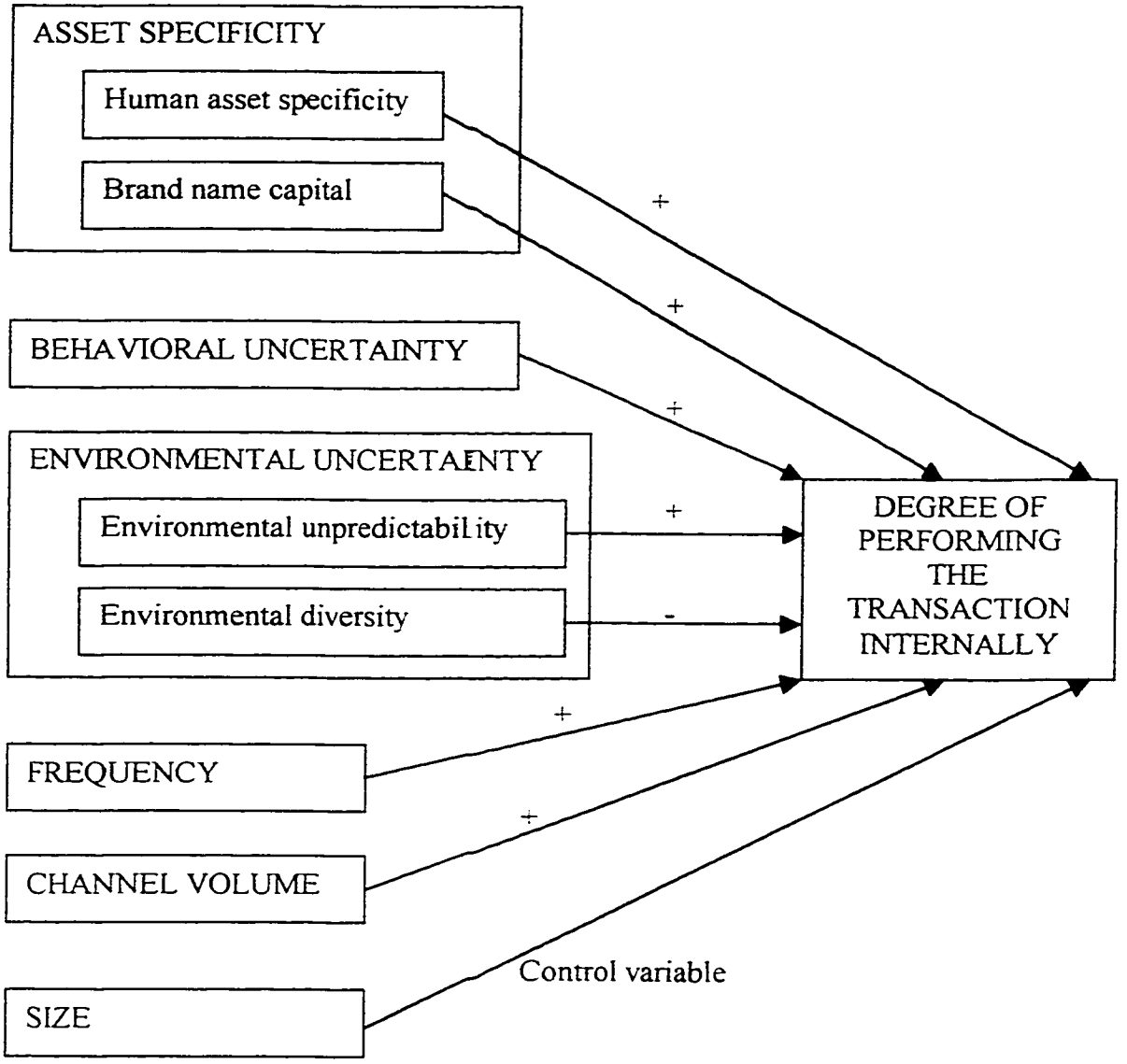
But, other transaction costs such as the costs of protecting sunk investments in specific knowledge, some costs related to performance assessment or some costs of bargaining and solving disputes are not influenced by IT usage. Similar decompositions of transaction costs in costs that are influenced by IT usage and costs that are not affected by IT usage were used in prior research on backward integration into manufacturing (Clemons, Reddi & Row, 1993) and in a synthesis that attempted to clarify the determinants of the organizational form (Kulkarni & Heriot, 1999).

Although it is true that, for a given transaction, the transaction costs are lower in electronic environments than in traditional environments, this does not imply disintermediation in the electronic environment because non-zero transaction costs still exist. In order to understand the notion of intermediation it is important to focus on a specific transaction. Although Sarkar and his colleagues (1995) acknowledge that performing different transactions require different channel structure, they fail to explain the factors that generate such a variation in the transaction costs' value.

Because the review of the existent literature does not provide a clear understanding of the business-to-business electronic distribution channel structure, transaction cost economics will be used to develop a framework that allows more precise hypotheses. The transaction that will be analysed is the sale (distribution) of a product line using electronic commerce. The use of TCE is appropriate in this case, because both TCE assumptions (bounded rationality and opportunism) hold for electronic markets and the transaction studied could be viewed as a contractual problem.

The main TCE constructs and their effect on integration is shown in Figure 1. A detailed literature review of how these constructs were used to explain vertical integration into traditional distribution will follow. It is important to notice that significant differences exist in the way past empirical research defined and measured the dependent and some independent variables.

Figure 1 – Theoretical model



2.4 INTEGRATION INTO DISTRIBUTION

An interesting definition of this construct is provided by the management literature. Harrigan (1985) views the integration as being multidimensional. The dimensions relevant to integration into distribution are the breadth, the degree and the form of integration. The breadth of integration represents the number of activities performed within the boundaries of the firm at any level of the vertical chain. The degree of integration is calculated as the proportion of a product (or service) a company purchases/sells to a sister company. The form of integration is measured as firm's percentage of equity ownership in related companies.

The studies that assess the factors leading to EDI adoption clarify the notion of integration in electronic channels. Although EDI usage was initially considered a bi-dimensional construct, with the number of activities performed via EDI and the number of trading partners as dimensions (Iacovou et al., 1995), subsequent research revealed the existence of a third dimension, the proportion of data processing done via EDI (Williams et al, 1998).

The dependent variable in the present research is the degree of performing the transaction internally. Since the transaction considered is composed of the 27 activities listed in Table 3, the degree of performing the transaction internally represents the number of activities performed within the boundaries of the firm (internally). This conceptualization of the dependent variable is similar with the one proposed by Harrigan (1985) for the breadth dimension of vertical integration and with the operationalizations

used by other researchers (Iacovou et al., 1995; Williams et al., 1998) to assess one of the dimensions of EDI usage.

In the past empirical research, the measurement of the dependent variable (integration into traditional distribution) varied considerably. Some researchers used a continuous variable to tap the degree of integration into distribution (John & Weitz, 1988; Klein, 1989). While Klein (1989) considered the two dimensions of vertical control (centralization and formalization) as a proxy for forward integration into distribution, John and Weitz (1988) used the percentage sold to end-users as a good measure.

The second type of variable used to tap the integration was a discrete one. Although all the manufacturers belonging to the semiconductor and electronic components industrial sector distribute their products using one or a combination of the following methods: company salespeople, manufacturer's representatives, various types of wholesalers, joint ventures (Anderson & Schmittlein, 1984; John & Weitz, 1988; Klein 1989; Klein et al. 1990), the criteria used to classify the types of distribution channel vary considerably (Table 5). For example, in a series of studies, Anderson and her colleagues consider that an indirect distribution channel implies the use of at least one intermediary (Anderson & Schmittlein, 1984; Anderson, 1985; Anderson & Coughlan, 1987). But John and Weitz (1988) use the passage of the title of goods to classify the distribution channel into direct (integrated) or indirect. From this perspective, both the sales force and the manufacturer's agents are considered as a direct distribution channel. Klein and his colleagues (1990) use a combination of the two criteria mentioned above. Finally

Gatignon & Anderson (1988) use combination of the ownership percentage and the number of partners to define the integration levels.

Table 5 – Channel types

Study/ Channel type	Sales force/ Sales dept./ Subsidiary	Reps/ Agents	Joint venture	Wholesalers	Mixed
Anderson & Schmittlein (1984)	Direct	Indirect	-	-	-
Anderson (1985)	Direct	Indirect	-	-	-
Anderson & Coughlan (1987)	Integrated	Independent	-	Independent	-
Gatignon & Anderson (1988)	The integration (control) levels are defined using a combination of ownership percentage and the number of partners				
John & Weitz (1988)	Direct	Direct	-	Indirect	Multiple
Klein et al. (1990)	Direct	Hybrid	Hybrid	Indirect	-

2.5 ASSET SPECIFICITY

All the researchers that applied TCE to determine the structure of the traditional distribution channel viewed the assets with a high degree of specificity as sunk costs that have no value outside the transaction considered (Rindfleich & Heide, 1997). Not all of the types of asset specificity are of interest to the current study due to their low relevance to the electronic environment.

For instance, site specificity should not play any role in the firms' decision to use cybermediaries. This is based on the fact that electronic commerce structures suppress time and place limits (Bloch, Pigneur & Segev, 1996).

Also, physical asset specificity (refers to specialized hardware or software required to sell this particular product using electronic channel) and dedicated assets (investments in specialized equipment or software required to sell the product to a particular buyer) are not the focus of this study. As Clemons and his colleagues state (1993), it is noticed an increased standardization of both hardware and software. Consequently, information technology investments are less specific to a transaction or relationship (Clemons, Reddi & Row, 1993). The last type of asset specificity, time specificity, (its value is highly dependent on its reaching the user within a specified, relatively limited period of time) seems to be more important for the integration into manufacturing than into distribution. None of the studies that attempted to explain the traditional distribution channel structure did account for this type of asset specificity.

The two types of asset specificity that will be used as independent variables in this study are human asset specificity and brand name capital.

2.5.1 Human asset specificity.

Highly specific human assets are the special-purpose knowledge and working relationship that arise in a learning by doing fashion and create specific (not general) human capital (Anderson, 1985). This is the definition that will be used also for the purposes of this research.

The time and effort to acquire firm-specific knowledge seems to be the most common form of human asset specificity present in distribution channels (John & Weitz, 1988).

The existence of high human asset specificity implies the existence of high sunk and switching costs and exposes the transaction to the opportunistic behavior of the trading partners (John & Weitz, 1988). Consequently, the firm must safeguard these assets. According to TCE, the solution is to internalize the transaction (John & Weitz, 1988).

Some researchers argue that using information technology (IT) will decrease the information transfer and processing costs, leading to lower transaction costs than in traditional channels (Malone, Yates & Benjamin, 1987; Clemons, Reddi & Row, 1993; Benjamin & Wigand, 1995). But human asset specificity refers to knowledge and relationships gained from people's own experiences with a firm ("learning by doing") and it is not viewed as knowledge that exists somewhere in an organized form, ready to be transferred as any other information. In other words, human specific assets are gained only if experienced, not through information transfer. This is why the existence of highly specific human assets in electronic markets should have the same effect on transaction costs (and on integration) as in traditional markets.

The studies on traditional channel (listed in Table 4) either included in their model the human asset specificity as an independent variable (Anderson & Schmittlein, 1984; Anderson, 1985; Anderson & Coughlan, 1987; Gatignon & Anderson, 1988; John & Weitz, 1988) or used a general asset specificity measure containing both human and physical asset specificity (Klein, 1989; Klein et al., 1990). The results of the empirical studies provide strong support for the prediction that the existence of highly specific human assets is positively correlated with the integration for both domestic and

international traditional distribution channel (Anderson & Schmittlein, 1984; Anderson, 1985; Anderson & Coughlan, 1987; Gatignon & Anderson, 1988; John & Weitz, 1988). Although asset specificity should be the most important determinant of vertical integration (Williamson, 1996), only two studies (Gatignon & Anderson, 1988; Klein, 1989) found such a result. Some of the studies that included both asset specificity and behavioral uncertainty in their model found that behavioral uncertainty has a stronger effect (than asset specificity) on vertical integration into distribution (Anderson & Schmittlein, 1984; Anderson, 1985). Other variables that had the biggest contribution in explaining the vertical integration into distribution were environmental uncertainty (John & Weitz, 1988) and channel volume (Klein et al., 1990).

H1: The degree of performing the transaction internally is positively correlated with human asset specificity.

2.5.2 Brand name capital.

Brand names are used as signals in marketplaces characterized by information asymmetry (the quality of the product is known by manufacturer but is not observed by customers) and their role is to reduce consumer's perceived risk and information costs (Swait et al., 1993). Brand names are considered to be assets to a firm (Swait et al., 1993). To build a brand name, a firm incurs substantial expenses. The brand name capital represents the total investments made to increase the value of a brand name (Gatignon & Anderson, 1988).

The brand name capital, called also brand equity, could be depreciated if supplying low-quality product (Klein & Leffler, 1981). It should be noted that the term "quality product" does not refer only to the physical product but also includes the quality of the service delivered (Urban & Hauser, 1993). In the case of distribution channels, the problem is not the quality of the physical product (which is controlled by the manufacturer) but the quality of the service that is provided by the independent channel members. In order to avoid the depreciation of the brand name, the manufacturer needs to monitor continuously the performance of the channel members, which raises the transaction costs.

If a brand name does not exist, then the manufacturer needs to use different mechanisms to signal quality, such as physical assets or direct interaction by sales people. These are much more difficult to achieve in electronic markets than in a traditional channel. Since one of the functions performed by cybermediaries is to validate the quality or reputation of the offer (Bloch, Pigneur & Segev, 1996; Spulber, 1999), they represent an ideal channel for products that do not have brand name.

From the perspective of transaction cost theory, not all the products that have a brand name capital are specific assets. Brand equity becomes a specific asset to the transaction studied here only if the brand name belongs solely to the product line that is transacted. Consequently, if the product shares its brand name with other product lines or if the company name is included in this product's brand name, then the brand name is not a specific asset.

Empirical results prove that brand name capital is positively correlated with the integration into distribution in traditional channels (Gatignon & Anderson, 1988).

H2: The degree of performing the transaction internally is higher if the product line possesses brand name capital.

2.6 BEHAVIORAL UNCERTAINTY

Behavioral uncertainty was viewed as the degree of difficulty of performance evaluation of either sales force (Anderson & Schmittlein, 1984; Anderson, 1985) or transaction partners (Gatignon & Anderson, 1988; John & Weitz, 1988).

In line with the definitions used in the studies of traditional distribution channel, behavioral uncertainty will be conceptualized as the degree of difficulty of evaluating the performance of the channel members. For the purpose of this research, it is assumed that if the firm encounters difficulty in assessing the performance of its employees it will not be able to monitor the performance of the channel members.

John and Weitz (1988) give a relevant example of behavioral uncertainty existence in distribution channels. The authors argue that the channel members could claim that they have fulfilled some channel activity, as it was agreed, when in reality, they did not. In order to protect itself against this type of opportunism, the firm must monitor the performance of the channel members, incurring transaction costs (John & Weitz, 1988).

These costs related to performance measurement are higher if the performance is difficult to evaluate.

Clemons and his colleagues (1993) argue that using information technology can lower the monitoring costs because computers can be used to maintain accurate records on performance at a low cost. However, this is true only in the case when it is known who and what to monitor. In some cases, when the sale is the result of a collective effort (Anderson, 1985), it is impossible to assess performance because it is not clear who should take the credit for the sale. In these circumstances, the existence of IT does not help in evaluating performance.

Such is the case of the present research. Since the transaction is considered as a sum of composing activities (functions) and cybermediaries are more specialized than traditional intermediaries (Sarkar, Butler & Steinfield, 1998), it could be concluded that the accomplishing a sale is a common effort.

TCE research on traditional channel integration reveals extremely consistent results. All the studies found a positive correlation between behavioral uncertainty and vertical integration (Anderson & Schmittlein, 1984; Anderson, 1985; Gatignon & Anderson, 1988; John & Weitz, 1988). In some cases, it was even found that behavioral uncertainty has a stronger effect than asset specificity on vertical integration into distribution (Anderson & Schmittlein, 1984; Anderson, 1985).

H3: The degree of performing the transaction internally is positively correlated with the value of behavioral uncertainty.

2.7 ENVIRONMENTAL UNCERTAINTY.

Environmental uncertainty is the most controversial dimension of the TCE (Rindfleich & Heide, 1997). The literature review reveals two important problems that will be discussed in detail hereunder.

1) Construct multidimensionality. Environmental uncertainty appears to be a multidimensional construct, its dimensions having opposite influences on vertical integration (Rindfleich & Heide, 1997; Stucliffe & Zaheer, 1998). A synthesis of the various conceptualizations of environmental uncertainty is shown in Table 6. Even if several researchers studied the same dimension of uncertainty, differences exist in the way it was defined (Table 6).

The two dimensions of environmental uncertainty are unpredictability and diversity. An additional dimension of uncertainty, technological uncertainty, was studied in the context of backward integration into production and vertical inter-organizational relationships (Balakrishnan & Wernerfelt, 1986; Heide & John, 1990; Stump & Heide, 1996). However, none of the studies of forward integration included this type of uncertainty.

Table 6 – Conceptualization of environmental uncertainty in TCE studies related to forward integration into distribution

Study	*Sources of uncertainty:*	*Dimension of uncertainty*	*Effect of uncertainty on channel integration*	*Effect of interaction between uncertainty and asset specificity*	*Type of channel*
Anderson & Schmittlein (1984)	Not specified	Unpredictability	Not significant	Not significant	Domestic
Anderson (1985)	Turbulence (instability); Venturing into unknown (new markets, new products)	Unpredictability	Not significant	Positive correlation	Domestic
Anderson & Coughlan (1987)	Venturing into unknown (new markets)	Unpredictability	Negative correlation	Not included in the model	International
John & Weitz (1988)	Volatility; Turbulence	Unpredictability	Positive correlation	Not included in the model	Domestic
Gatignon & Anderson (1988)	Venturing into unknown (new markets)	Unpredictability	Negative correlation	Not significant	International
Klein (1989)	Complexity	Diversity	Positive correlation	Not included in the model	International
	Dynamism	Unpredictability	Negative correlation	Not included in the model	International
Klein et al., (1990)	Diversity	Diversity	Partial support for negative correlation	Not included in the model	International
	Volatility	Unpredictability	Partial support for positive correlation	Not included in the model	International

Most TCE researchers, when discussing environmental uncertainty, focus on its unpredictability (Rindfleisch & Heide, 1997). However, there is a lack of consensus in the TCE literature about the definition of the environmental unpredictability, as summarized in Table 6. The environment is unpredictable because of its characteristics (turbulence, volatility) or because it is unfamiliar to the company such as the case of distributing new products or venturing into new markets). There is some overlap in defining the characteristics of the environment, but the same problem was also encountered in other research areas, such as environmental determinism and strategic choice (Clark, Varadarajan & Pride, 1994).

Diversity, the second dimension of uncertainty, was not as popular as unpredictability. Although classic TCE does not account for this dimension, diversity was used in two of the studies on international channels (Klein, 1989; Klein et al., 1990). A highly diverse environment in a foreign country was defined as having many final users and many competitors with high dissimilarity among them (Klein et al., 1990). Although both studies conceptualize diversity in terms of both quantity and similarity, the scale measures only the quantity (Klein, 1989; Klein et al., 1990). However, other authors conceptualize diversity only as degree of dissimilarity in their studies about marketing channels (Dwyer & Welsh, 1985; Achrol & Stern, 1988).

2) Main effect. Although it was initially believed that the integration will depend on the interaction between asset specificity and environmental uncertainty (Williamson.

1985), empirical studies reveal the existence of a main effect of environmental uncertainty on integration in distribution channels (Anderson & Coughlan, 1987, Gatignon & Anderson, 1988; John & Weitz, 1988; Klein, 1989).

2.7.1 Environmental unpredictability.

For the purpose of this research, the definition of this construct will be adopted from John and Weitz (1988, p. 346). Environmental unpredictability is the "inability to predict relevant contingencies" generated by the fact that the environment is volatile and turbulent. In the case of a distribution channel, unpredictability interferes with the accomplishment of several marketing activities, such as forecasting accurately the sales volume or promotional activities (John & Weitz, 1988).

According to TCE, in an unpredictable environment, if an incomplete contract exists (due to bounded rationality), the company might face difficulties in adapting to changed circumstances because the trading partners can behave opportunistically, by trying to interpret the unspecified clause in their favor (John & Weitz, 1988; Klein et al., 1990). Consequently, the company must incur costs to bargain and solve disputes derived from unforeseen circumstances (Sutcliffe & Zaheer, 1998), costs to disseminate new information and costs to coordinating activities to reflect the new circumstances (Rindfleich & Heide, 1997). For traditional channels, performing a transaction within the boundaries of the firm in conditions of high environmental unpredictability is cheaper because adaptations can be made without revising contracts with independent parties (Anderson & Schmittlein, 1984).

In electronic markets, some transaction costs will be significantly lowered by IT usage (Clemons, Reddi & Row, 1993; Kulkarni & Heriot, 1999). Examples of such costs are the costs of disseminating new information and coordination activities to reflect the new circumstances (Malone, Yates & Benjamin, 1987; Benjamin & Wigand, 1995). However, other costs such as the costs of bargaining and solving disputes are not significantly influenced by IT usage. As a result, non-zero transaction costs will also exist in electronic environment.

Indeed, for a given level of environmental unpredictability, the total transaction costs will be lower in electronic markets than in traditional markets implying that IT usage will allow firms to use market transaction at greater levels of environmental unpredictability than in traditional channels (Kulkarni & Heriot, 1999). However, the channel structure depends, according to TCE, on the value of environmental unpredictability. As the unpredictability increases, the total transaction costs in electronic environments will also increase. Consequently, a positive correlation is expected between environmental unpredictability and the degree of performing the transaction internally. In favor of this argument also comes the empirical finding that EDI adoption is positively correlated with demand uncertainty (Williams, 1994).

The empirical results of the studies that looked at the effect of unpredictability on traditional vertical integration are very diverse (Table 6). It was argued that such diversity derived from the variety of this construct's conceptualizations (Shelanski &

Klein, 1995). Researchers either found a positive correlation (John & Weitz, 1988), a negative correlation (Klein, 1989) or no correlation (Anderson & Schmittlein, 1984; Anderson, 1985) between unpredictability and vertical integration.

H4: Environmental unpredictability is positively correlated with the degree of performing the transaction internally.

2.7.2 Environmental diversity.

In this research the environmental diversity is defined as the degree of similarity or differentiation perceived between the elements of the population dealt with (Achrol & Stern, 1988). In this case, the population is composed of companies that buy the product from the manufacturer.

Internet is a global medium and the use of the diversity as a second uncertainty dimension seems to be appropriate. When geographic location becomes unimportant, as in the case of Internet (Bloch, Pigneur & Segev, 1996), an increased number of sellers (and product offerings) may result and the need for intermediaries might emerge (Bailey & Bakos, 1997). There is also a big variety in the characteristics of the companies using Internet for business to business purposes. Several researchers argue that Internet erodes the advantages of size that big companies have (Hoffman & Novak, 1996; Quelch & Klein, 1996) and constitute a low-cost gateway to global markets (Hamill, 1997). Small businesses also have the possibility of electronic data interchange (EDI) over the Internet

without incurring the high costs required by the implementation of the traditional EDI (Chesher & Kaura, 1998).

A firm facing a highly diverse environment has greater information collection and processing requirements (Dess & Beard, 1984; Dwyer & Welsh, 1985; Klein et al., 1990). Also, when faced with a multitude of demands from its diverse customers, the manufacturer is forced to formulate effective strategic programs and responses, which is a difficult task (Dwyer & Welsh, 1985; Klein et al., 1990). Consequently, the firms will encourage the development of complex (less integrated) channel structures (Klein et al., 1990). In the case of electronic distribution channel, the information presented to the customers through Web Sites or EDI is fairly standardized and might not satisfy the needs of a diverse customer base.

The empirical research reveals mixed results. A positive relationship was found to exist between environmental diversity and the degree of vertical control (integration) of export channel (Klein, 1989). However, in a second study, Klein and his colleagues (1990) found partial support for the hypothesis that a negative correlation exists between the environmental diversity and the probability of using an integrated export channel. As the authors argue, the lack of support for this hypothesis could be attributed to the use of a measure for diversity that clearly needs improvement (low reliability). It should be noted that the same measure was used in both studies but the conceptualization of the dependent variable was different.

The results of another empirical study that hypothesized a negative correlation between the existence of a very diverse environment and the existence of complex (less integrated) channels, failed to support this hypothesis (Dwyer & Welsh; 1985).

H5: The degree of performing the transaction internally is negatively correlated with environmental diversity.

2.8 TRANSACTION FREQUENCY.

The TCE studies on traditional distribution channel account in two ways for transaction frequency, by either considering only the recurrent transactions (John & Weitz, 1988; Klein et al., 1990) or by including this variable in the theoretical model (Anderson & Schmittlein, 1984; Anderson, 1985; Klein, 1989).

Following the logic used by Klein (1989) transaction frequency was defined in the present research as the sum of the frequencies with which the activities composing the transaction occur.

The increase of a transaction's frequency leads to higher transaction costs (Klein, 1989; Kulkarni & Heriot, 1999). In the case of occasional transactions, the costs incurred to set up and perform an activity internally are quite high compared with the losses generated by opportunism (Anderson & Schmittlein, 1984). However, if the frequency of the transaction is higher, performing such transaction within the boundaries of the firm is

desirable because the transaction costs are much higher then the costs related to integration (Anderson & Schmittlein, 1984).

The empirical studies on traditional channel revealed mixed results, depending on how the construct was measured. Frequency was found to be either positively correlated (Klein, 1989) with vertical integration or having no influence on vertical integration (Anderson & Schmittlein, 1984; Anderson, 1985).

H6: The degree of performing the transaction internally is positively correlated with the frequency of the transaction.

2.9 CHANNEL VOLUME.

The definition of this variable was adapted from Klein and his colleagues (1990) and Klein (1989). The electronic channel volume represents the dollar value of the sales of a product line using electronic commerce.

According to TCE, channel volume is positively correlated with the degree of channel integration (Klein et al., 1990). This phenomenon is explained through two mechanisms (Sharma & Dominguez, 1992). First, due to increasing volume, individual firms can attain sufficient economies of scale. Second, economies of scales reduce the cost of producing the distribution function internally. This logic applies to both traditional and electronic distribution channels.

Empirical research on traditional channels had proven that a positive correlation exists between the channel volume and vertical integration (Klein, 1989; Klein et al., 1990). Closely related to the channel volume is the relation of the product to the company's core business (Anderson & Coughlan, 1987). Although the authors hypothesize that integration of the distribution channel function is more likely if the product is closely related to the company's core business, the results did not confirm this hypothesis.

H7: The degree of performing the transaction internally is positively correlated with the channel volume.

2.10 SIZE OF THE FIRM.

Only one control variable is used in this research and this is the size of the company. Size has been associated with the existence of human and financial resources (Weiss & Anderson, 1992). A small company that lacks such resources will be unable to support the costs incurred when integrating the traditional distribution function (Weiss & Anderson, 1992).

Internet seems to erode the advantages of size that big companies have (Hoffman & Novak, 1996; Quelch & Klein, 1996) and constitutes a low-cost gateway to global markets (Hamill, 1997). A new service offered by EDI service providers, the EDI over the Internet, allows small companies to exchange data without needing the resources required for the successful implementation of the traditional EDI (Chesher & Kaura, 1998). Therefore, from TCE point of view, it is expected that the size of the company

does not have an influence on the degree of performing the transaction internally in electronic distribution channels. However, size represents a proxy for economies of scale and scope and might influence the decision of integration based on other criteria than those listed by TCE.

Only few studies on traditional distribution channel accounted for the size of the firm (Anderson & Schmittlein, 1984; Anderson, 1985; Gatignon & Anderson, 1988). Size was either defined as the number of employees (Gatignon & Anderson, 1988) or as the dollar value of the company's assets (Anderson & Schmittlein, 1984; Anderson, 1985).

Mixed results were also obtained in this case. A positive correlation was found by Anderson and Schmittlein (1984) between size and vertical integration. Despite the fact of using the same measure, Anderson (1985) found that the effect of size on vertical integration is not significant. Unfortunately, due to missing data, Gatignon and Anderson (1988) had to exclude this variable from their statistical model. In the context of electronic environments, prior research found a positive relationship between the firm's size and traditional EDI adoption (Williams, 1994; Williams et. al, 1998).

3.1 RESEARCH DESIGN.

This research was undertaken by a survey of Canadian and US companies belonging to the Semiconductor and Electronic Components industrial sector (NAICS 33441). A total of 1042 manufacturing companies, listed in several industry directories, were randomly selected to participate in the study. Although this study should consider only the firms that use electronic commerce, it was impossible to know a priori which of the 1042 firms use this type of commerce, and consequently, a request to participate in this research was sent to all these firms.

A questionnaire was developed and pre-tested. The questionnaire was either posted on-line or mailed to the managers, vice presidents or presidents in charge of designing or implementing the distribution strategy (Sales, Marketing, Product/Brand, Business Development Manager, VP or president, etc...). The respondents who had a valid e-mail address were invited to access the on-line questionnaire. All the other respondents were mailed the request to participate in the study, the questionnaire and a stamped return envelope. The initial mailing was followed by a follow-up phone call. The respondents possessing e-mail address received either a follow-up e-mail messages or a phone call.

3.2 MEASURES.

All the scales used in this research were adapted from previous studies except the one for frequency, which was developed. This study also uses an original measure for the dependent variable.

3.2.1 The dependent variable – The degree of performing the transaction internally.

The measure used for the dependent variable was included in the section of the questionnaire named "Part 3 – Electronic commerce". The number of activities (functions) performed within the boundary of the firm represents the degree of performing a transaction internally. A continuous variable was used because it was considered that the integration is a matter of degree rather than a binary choice (John & Weitz, 1988; Gatignon & Anderson, 1988).

The functions that compose the sale transaction (listed in Table 3) could be accomplished through five e-commerce options (EDI, own Web Site, Industrial Portal, Web Site of a traditional reseller or other cybermediaries such as directories, publishers, search engines, financial intermediaries, etc.). If an activity was performed only via EDI or manufacturer's Web Site, the activity was considered to be performed internally. If an activity was performed both internally and externally (through Industrial Portals or the Web Sites of traditional resellers or directories or search engines or publishers or financial intermediaries, etc.), it was classified as being performed using a mixed (dual) channel. This classification was used because the research on traditional channel either accounted for such type of mixed channel (John & Weitz, 1988) or controlled for its

effects by eliminating the firms/territories using a dual channel (Anderson, 1985; Klein et al., 1990).

Table 7 – Measure of the dependent variable (*j = 1 to 31*).

No.	*Function*	*EDI*	*Own Web Site*	*Industrial Portal*	*Web Site belonging to a traditional reseller*	*Other (search engines, publishers, etc...)*
1	Product information	EDI_1	WS_1	IP_1	TR_1	OT_1
2	Product evaluations (reviews)	EDI_2	WS_2	IP_2	TR_2	OT_2
3	Inventory checking	EDI_3	WS_3	IP_3	TR_3	OT_3
....	....	....	....	....	....	....
j	$Function_j$	EDI_j	WS_j	IP_j	TR_j	OT_j
....	....	....	....	....	....	....

The respondents were given the possibility to add four more functions to the twenty-seven ones listed in Table 3. For every of the thirty-one functions and every e-commerce option a corresponding dummy variable was created (Table 7). This variable had the value "1" if the function was performed through that option and the value "0" if it was not performed through that option. Using the notations from Table 7, the value of the dependent variable (named DOI) was computed using the following formula:

$$DOI = \sum_{j=1}^{31} \left[(EDI_j \text{ "or" } WS_j) \text{ "and" "" not" } (IP_j \text{ "or" } TR_j \text{ "or" } OT_j) \right]$$

where *"or"*, *"and"*, *"not"* are the usual logical operators.

3.2.2 The independent variables.

Human asset specificity. The measure for human asset specificity was adapted from Anderson (1985). The author reported a composite reliability for its general human asset specificity measure of 0.75. Some of the component items of this measure were replaced with the ones that were rephrased and used by John & Weitz (1989). John & Weitz (1989) adapted their measure from Anderson (1985) and reported a reliability of 0.71. Chronbach's alpha for the scale used in this questionnaire is 0.76.

The measure developed by Anderson (1985) was the most commonly used measure of human asset specificity. A recent TCE literature review (Rindfleich & Heide, 1997) reveals that many researchers used variations of this measure and that this measure consistently demonstrated high levels of unidimensionality and internal consistency.

Brand name capital. Two measures were used for this variable. The first one was the advertising/sales ratio, as defined by Gatignon and Anderson (1988). The second measure was the existence of a price premium for the product (compared with the prices charged by the competitors). A dummy variable had the value "1" if a premium price was charged and the value "0" if a premium price was not charged. This measure was used based on the observation of Aaker (1996, p.107) that the "price premium may be the best single measure of brand equity".

Data was missing on the advertising/sales ratio and for the second measure very little variation existed. Although several companies charged a premium price for the product, only three (out of forty-five) possessed brand name capital. In all the other cases the brand name was shared either with other product lines or included the company name. Consequently, the second hypothesis (H2) that predicted a higher degree of performing the transaction internally if the product has brand name capital can not be verified and this construct will not be included in the statistical model.

Behavioral uncertainty. The scale used to measure this variable was adapted from Anderson (1985). The original scale had a Cronbach's alpha of 0.54. Reviewing the TCE literature, Rindfleich and Heide (1997) state that many studies use operationalizations that build on the work of Anderson (1985). Chronbach's alpha for the scale used in this questionnaire is 0.77.

Environmental unpredictability. The measure for environmental uncertainty was adapted from John and Weitz (1988). The only change made to this measure was the replacement of the five-point scale with a seven-point scale. The reported Cronbach's alpha for the original measure was 0.73. John and Weitz (1988) also report the unidimensionality of the measure. Chronbach's alpha for the scale used in the present study is 0.84.

Environmental diversity. This independent variable was measured using a scale adapted from by Achrol and Stern (1988). The reported Cronbach's alpha of the original scale was 0.94. Achrol and Stern (1988) also performed a confirmatory factor analysis that

indicated this measure's unidimensionality. Chronbach's alpha for the scale used in this research is 0.75.

Frequency. The scale developed for transaction frequency is shown in Figure 2. Chronbach's alpha computed for this scale was 0.83. This variable will not be included in the statistical model due to the fact that several companies failed to provide answers to the questions composing this measure.

Figure 2 – Measure used for transaction frequency.

Please indicate how frequently the following functions occur during the sale of this product line using electronic commerce.

	Once in a while						Very frequent
Requests for information (product information, product evaluations, inventory checking, price quotations, traffic generation, Web site evaluation, company information, company performance evaluation, information about other terms of sale).	1	2	3	4	5	6	7
Comparison of your offer with competitors' offers.	1	2	3	4	5	6	7
Negotiation of terms of sale	1	2	3	4	5	6	7
Ordering.	1	2	3	4	5	6	7
Payment .	1	2	3	4	5	6	7
Post sale service (invoicing, order tracking, shipment confirmation, technical support, return of goods).	1	2	3	4	5	6	7

Channel Volume. The measure used to tap the channel volume was borrowed from Klein and his colleagues (1990). The volume was computed by multiplying the firm's total sales value (for the last year) with the percentage of the e-commerce sales of this product

from the total sales value. Due to the lack of data, this variable will not be included in the statistical model.

3.2.3 The control variable.

In this research, the measure of the size of the firm is the number of employees. The same measure was also used by Gatignon and Anderson (1988).

3.3 QUESTIONNAIRE DEVELOPMENT.

Using the measures described above, a questionnaire was developed (Appendix 1). The questionnaire contains an introductory part that instructs respondents how to fill out this questionnaire, questions grouped by topic (ex: questions about your customers, product line, electronic commerce, employees, assessing employees' performance, the sale, general information and reasons for not using electronic commerce) and an annex listing the definitions of some e-commerce terms used. The introductory part was adapted from Ijhaish (1994).

The questionnaire that needed to be mailed (traditional questionnaire) was developed first and pre-tested. The pretest was necessary to assess the clarity of the instructions, the ambiguity of the questions' wording, the presentation format for the measure of the dependent variable, the clarity of the definitions listed in the annex and the overall questionnaire design. The pretest had indicated that it takes about 10 minutes to complete the questionnaire.

The pretests were conducted with one manager from the E-commerce department of a major Montreal based manufacturer and with a supply value chain E-commerce consultant working for a major California based manufacturer. Both manufacturing companies belonged to the sampled industrial sector. Based on their feed-back and suggestions, some items were added in the measure of the dependent variable and its presentation format was changed.

Once the content and the layout of the traditional questionnaire were finalized, the on-line questionnaire was constructed following the recommendations provided by Dillman et al. (1998). The layout of the on-line questionnaire was very close to the layout of the traditional questionnaire. The on-line questionnaire was pre-tested several times to assess the completion time (it takes slightly longer to complete the on-line version, about 13 minutes) and to make sure that the data entered in the Web form is correctly stored in the database.

3.4 THE SAMPLE.

This research uses a sample that was randomly selected from the US and Canadian Semiconductor and Electronic Components industrial sectors (NAICS 33441). Sampling only one industrial sector (rather than multiple industries) avoids confounding with industry specific effects (Anderson & Schmittlein, 1984; Anderson, 1985; Shelansky & Klein, 1995).

All the manufacturing Canadian firms listed in the Canadian Company Capabilities Database (Industry Canada, 2000) as belonging to this industry were included in the sample. The list was completed with the firms listed by Statistics Canada as major players in this industry (Industry Canada, 2000), and with those listed in Web based directories belonging to industry associations (Strategic Microelectronics Consortium, 2000; Canadian Microelectronics Corporation, 2000). A total of 164 Canadian companies were contacted.

The US sample was selected from Manufacturers' News Inc. Database (1999) and was completed with some of the top 60 semiconductor manufacturers listed by Cahners Business Information (2000). A total of 878 US companies were contacted.

This industrial sector was chosen because of several reasons. First, due to its size, it offers the possibility of selecting a big sample. Second, in this industry, a larger number of firms use electronic commerce compared with other industries. According to Forrester Research (1998), computing and electronics industries are the leaders in adopting electronic commerce and are already achieving significant gains from Internet-based trade. Third, firms within computing and electronics industries were found to possess a higher degree of transformation of distribution than the firms belonging to traditional manufacturing industries (Dutta, Kwan & Segev, 1998). Finally, the variety of products manufactured that belong to this industrial sector is very broad. This sector includes semiconductor and related devices, bare printed circuit boards, printed circuit assembly (graphic cards, sound cards, network interface cards, modems, other electronic

assembly), electronic capacitors, electronic resistors, electronic coil, transformer, and other inductors, electronic connectors, electronic tubes. By including both active and passive components, the independent variables should have enough variation. As Anderson and Schmittlein (1984) noted, the passive component sector is more mature, with less differentiation and more intense price competition than the active component sector.

3.5 THE RESPONDENTS.

For each firm, an individual who was believed to be the most knowledgeable about distribution was selected based on his/her position within the firm (John & Weitz, 1988). The respondents were managers, vice presidents or presidents involved in designing and/or implementing the distribution strategy, such as Sales, Distribution, Marketing, Product/Brand, Business Development Manager, VP or president, etc. These persons were also believed to be knowledgeable about the e-business strategy of their firms and able to accurately answer the non-technical questions related to e-commerce listed in the questionnaire. The name of the respondents was provided by the databases for most companies. If a contact name was not provided or if the respondent left the firm, the companies were either called or sent an e-mail to solicit this information.

3.6 DATA COLLECTION.

The data was collected using a self-administered questionnaire that was either posted on-line or mailed. Table 8 briefly synthesizes the data collection methodology.

A personalized cover letter (adapted from Ijhaish, 1994) that explained the objective of the study and invited to participate in this study (Appendix 1) was mailed or e-mailed to the respondents. As an incentive to participate the respondents were promised a summary of the results. The respondents were instructed to complete the questionnaire with respect to only one of the product lines manufactured that belonged to the industrial sector NAICS 33441 and was sold to other companies using electronic commerce.

Table 8 – Data collection procedure

	E-mail address was identified for the respondent	*E-mail address could not be identified for the respondent*
Cover letter	Send via e-mail on Aug. 4, 2000	Send via mail, on Aug. 2, 2000
Questionnaire	URL address provided in the cover letter.	Send via mail together with the cover letter and a stamped return envelope.
Return questionnaires	Data will be collected electronically in a database	Will be mailed by the respondents in the stamped envelope that was provided.
Follow-up started	Aug.15, 2000	Three weeks after mailing questionnaire (Aug. 22).
Follow-up non-responders	E-mail used for the first follow-up. The second follow-up used e-mail for the respondents with personal e-mail address and telephone for those who did not possess a personal e-mail address.	Use telephone
Stop data collection	Nov 1, 2000	
Disclosure of the results	Via mail or e-mail, only if requested by the respondents.	

3.6.1 Traditional data collection (mailed questionnaire).

The cover letter, questionnaire and a stamped return envelope were mailed to 358 respondents for whom an e-mail address could not be identified. The initial mailing was

followed by a phone call. The follow-up started three weeks after the questionnaire was mailed. If the respondents could not be contacted after two calls, a follow-up fax letter was sent. All the questionnaires received by Nov. 1, 2000 were included in the data analysis.

3.6.2 On-line data collection.

The respondents who had a valid e-mail address were invited to access the on-line questionnaire. Two types of e-mail addresses were identified: a general e-mail address (such as sales@xxxxx.xxx, marketing@xxxxx.xxx or info@xxxxx.xxx,) or a personal e-mail address (contains a combination of their first and last name). If the cover letter was e-mailed to a general e-mail address, the recipient was kindly asked to forward the message to the respondent whose name was indicated in the cover letter. Out of the 684 e-mail messages sent 88 could not be delivered due to an incorrect e-mail address (12.8%).

Ten days after the cover letter was e-mailed, a follow-up message was sent only to the e-mail addresses that were identified as being correct. The text of this e-mail was adapted from Ijhaish (1994) and it is shown in Appendix 2. The follow-up e-mail message was not delivered to other 26 addresses. The respondents who possessed a correct personal e-mail address were sent a second follow-up e-mail (Appendix 2) and those with a correct general e-mail address were called to make sure that they received the cover letter.

The respondents whose e-mail address was incorrect were called. This had indicated that the respondent either left the company or changed their e-mail address. Only in 37 cases

(out of 114 that had incorrect e-mail address) a new respondent or correct e-mail address was identified.

Because the response rate was quite low and additional completed questionnaires were needed, starting with Oct. 1, 2000, the 52 companies that were not contacted initially (due to the fact that no contact name was provided) were contacted. The companies were contacted via e-mail or the correspondence forms provided on their Web Sites. The letter briefly explained the objective of the study and requested the name and contact details of the person in charge of designing/implementing the distribution strategy. Nine managers replied that they are interested in the study. They were sent the request to access the on-line questionnaire and, ten days later, a follow-up e-mail. Only five answers were received.

3.7 RESPONSE RATE.

Fifty-six questionnaires were returned, but only fifty-four belonged to companies that used electronic commerce. Most respondents did not provide data related to sales volume, advertising/sales ratio and transaction frequency. The questionnaires that were not complete on the other measures were excluded. Most of the incomplete questionnaires were missing one answer to various questions belonging to the human asset specificity measure. Only 45 questionnaires were usable.

The response rate (Table 9) was calculated based on the corrected sample size. This was obtained by subtracting from the original sample size (1042 firms) the number of

companies that could not be contacted (due to incorrect address, closed or acquired by firms that were already contacted) or did not manufacture products belonging to industrial sector studied.

Table 9 – Response rates.

	Canadian firms contacted via:		US firms contacted via:		Total
	Mail	e-mail	Mail	e-mail	
Number of firms sampled	10	154	348	530	1042
Returned questionnaires (incorrect address)	2	16	18	61	97
Firms that were closed or acquired by other firms	0	3	0	1	4
Firms sampled that did not manufacture a product belonging to NAICS 33441	0	16	9	18	43
Corrected sample size	8	119	321	450	898
Number of completed questionnaires received	0	16	19	19	54
Usable questionnaires	0	14	15	16	45
Response rate	0%	13.44%	5.91%	4.22%	6.01%

The overall response rate was 6.01%. The Canadian response rate was much higher (13.44%) than the US response rate (4.92%). The low response rate could be explained by the following factors:

1. The sample selected contained both users and non-users of electronic commerce. It was impossible to assess how many firms were e-commerce users. Consequently, the real response rate might be higher than the one reported above. For 197 US companies, even after using several search engines, a Web Site was not found. It was impossible to assess if these companies are e-commerce users.

2. The respondents were the highest decision-makers regarding distribution in their firms. They were in charge of either Sales, Marketing, Distribution and/or Business Development departments and were characterized by lack of time. This was the most common excuse invoked during the follow-up calls or e-mails.

3. During the follow-up period the following problem was discovered. Although both the manufacturers and the service providers of loaded PCB are included, according to Statistics Canada (2000) and US Census Bureau (2000), in the industrial sector studied, several managers did not consider their companies as being representative for this research because their companies were only services providers. Since not all the companies received a follow-up call (due to time constraints) it was not possible to assess exactly how many manufacturers were in such situation. The figures in Table 9 were based on the feedback received during the follow-up period.

4. The industry sampled is a very fast paced one and is also characterized by a high turnover rate. It is possible that some of the respondents were no longer with the companies surveyed.

5. This is a new and sensitive research area and companies might feel that using electronic commerce might confer them a competitive advantage. The managers might feel that e-commerce usage information shouldn't be disclosed.

3.8 THE STATISTICAL MODEL USED.

A diagnostic check of dependent variable was performed to assess the appropriateness of using a multiple regression model. The descriptive statistics (Figure 3) show that the dependent variable is continuous, with a mean of 7.289, a standard deviation of 5.426 and a 74.947 coefficient of variation, indicating that a multiple regression analysis could be performed.

Based on the theory, the full regression model considered for the i-th observation (i=1 to 45) is shown in Fig. 4.

This model is appropriate to use for the data set if the following assumptions are satisfied:

1. INDEPENDENCE: The DOI observations are statistically independent one of the other.
2. LINIARITY: The mean value of DOI is a linear function.
3. HOMOSCEDASTICITY: The variance (σ^2) of DOI is constant.
4. NORMALITY: The response DOI is normally distributed with the mean μ and the variance σ^2.

The correlation matrix shown in Fig 5 indicates that multicollinearity is not a problem.

Figure 3 - The dependent variable (DOI)

N	45	Sum Weights	45
Mean	7.28888889	Sum Observations	328
Std Deviation	5.42562197	Variance	29.4373737
Skewness	0.80226821	Kurtosis	0.47230461
Uncorrected SS	3686	Corrected SS	1295.24444
Coeff Variation	74.4368868	Std Error Mean	0.80880397

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.93833	Pr < W	0.0187
Kolmogorov-Smirnov	D	0.127221	Pr > D	0.0676
Cramer-von Mises	W-Sq	0.100771	Pr > W-Sq	0.1081
Anderson-Darling	A-Sq	0.705645	Pr > A-Sq	0.0640

Stem	Leaf	#	Boxplot
22	0	1	0
20	0	1	|
18			|
16	00	2	|
14	00	2	|
12	00	2	|
10	000000000	9	+------+
8	000	3	| |
6	000000	6	*--+--*
4	000000	6	| |
2	0000000	7	+------+
0	000000	6	|

----+----+----+----+

Normal Probability Plot

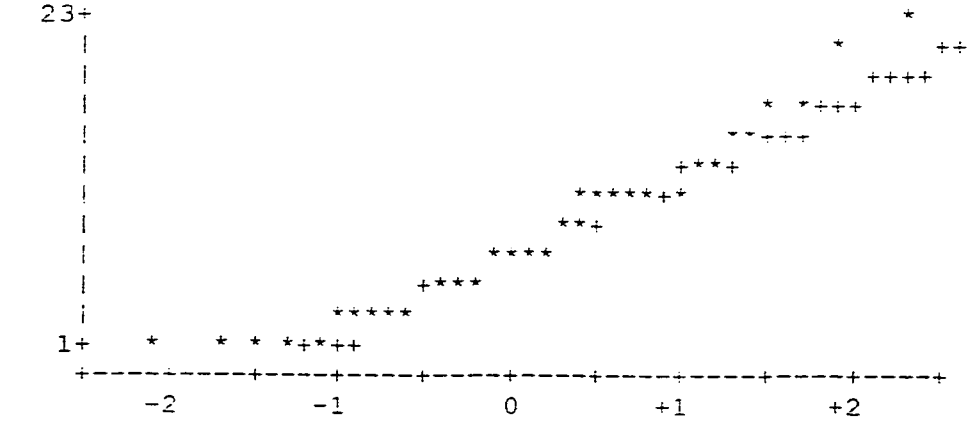


Figure 4 – Statistical model derived from theory.

$$DOI_i = \beta_0 + \beta_1 HAS_i + \beta_2 BU_i + \beta_3 EU_i + \beta_4 ED_i + \beta_5 NoEmpl_i + \varepsilon_i \qquad i=1 \text{ to } 45$$

Where:

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are partial regression coefficients that must be estimated

DOI= Degree of performing the electronic transaction internally

HAS= human asset specificity

BU= behavioral uncertainty

EU= environmental unpredictability

ED= environmental diversity

NoEmpl= size of the company (number of employees)

ε_i is the random error in DOI_i

Figure 5 - The correlation matrix

Pearson Correlation Coefficients, N = 45
Prob > |r| under H0: Rho=0

	DOI	BU	NOempl	ED	EU	HAS
DOI	1.00000	0.28480 0.0579	0.05859 0.7023	-0.08579 0.5753	-0.01003 0.9478	0.16937 0.2660
BU	0.28480 0.0579	1.00000	0.08903 0.5609	0.17334 0.2548	0.16546 0.2774	0.01505 0.9218
NOempl	0.05859 0.7023	0.08903 0.5609	1.00000	-0.03753 0.8066	-0.00541 0.9719	0.18856 0.2148
ED	-0.08579 0.5753	0.17334 0.2548	-0.03753 0.8066	1.00000	0.18460 0.2248	-0.22351 0.1400
EU	-0.01003 0.9478	0.16546 0.2774	-0.00541 0.9719	0.18460 0.2248	1.00000	0.23214 0.1249
HAS	0.16937 0.2660	0.01505 0.9218	0.18856 0.2148	-0.22351 0.1400	0.23214 0.1249	1.00000

The descriptive statistics of the independent variables are shown in Figure 6. The coefficient of variation has values between 29.9% and 37.9% with the exception of the one for human asset specificity, which is only 14.4%, indicating a poor variation.

Figure 6 - Independent variables: descriptive statistics

Variable	Sum	Mean	Uncorrected SS	Variance	Standard Deviation	Coef. of Variation
BU	767.000	17.04444	14911	41.77071	6.46303	37.918
size	234.632	5.21404	1386.33769	3.70355	1.92446	36.909
ED	1126.000	25.02222	30640	56.02222	7.48480	29.909
EU	894.000	19.86667	19322	35.48182	5.95666	29.983
HAS	4717.000	104.82222	504703	233.10404	15.26775	14.565

The distribution of the independent variables was examined. All the variables have a normal distribution except NoEmpl. This might create some problems. Indeed, the plot of residuals against NoEmpl indicates a violation of the linearity and homoscedasticity assumptions. This variable will be transformed using a logarithmic function. After performing this transformation, all the assumptions were met except normality. As a remedial measure, the dependent variable was transformed using a logarithmic function. In order to transform the dependent variable, three observations were deleted because the value of the dependent variable was zero.

The new statistical model is:

$$\text{Log}(DOI_i) = \beta_0 + \beta_1 HAS_i + \beta_2 BU_i + \beta_3 EU_i + \beta_4 ED_i + \beta_5 SIZE_i + \varepsilon_i \qquad (1)$$

where $SIZE_i = \text{Log}(\text{NoEmpl}_i)$ $i=1$ to 42

The analysis of variance and parameter estimates for this model are shown in Figure 7.

Figure 7 - Analysis of variance and parameter estimates for the model (1)

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	3.73674	0.74735	1.12	0.3685
Error	36	24.07656	0.66879		
Corrected Total	41	27.81330			

Root MSE	0.81780	R-Square	0.1344
Dependent Mean	1.78201	Adj R-Sq	0.0141
Coeff Var	45.89183		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	0.60370	1.07884	0.56	0.5792	0
BU	1	0.03469	0.02026	1.71	0.0954	1.10905
size	1	0.03688	0.07070	0.52	0.6051	1.18333
ED	1	-0.01434	0.01779	-0.81	0.4253	1.12772
EU	1	-0.00275	0.02303	-0.12	0.9055	1.17715
HAS	1	0.00756	0.00931	0.81	0.4223	1.30397

Because the sample size is small it is important to check the existence of outliers and see if any influential cases exist. The criteria used were Studentized Residuals, Leverage, Dffits, Cook's Distance, Dbetas and Covratio. Analyzing Figure 8 we notice that the observation i =5 could be considered an outlier because the $STUDENT_i>2$ and $RSTUDENT_i>2$.

Figure 8 – Outliers

Obs	student	cookd	leverage	rstudent	dffits	covratio
1	0.51335	0.00360	0.07581	0.50804	0.14550	1.22603
2	1.79433	0.10714	0.16643	1.85409	0.82846	0.80971
3	0.11126	0.00015	0.06862	0.10972	0.02978	1.26877
4	-1.90980	0.03883	0.06004	-1.98640	-0.50201	0.66365
5	-2.27801	0.14310	0.14197	-2.42794	-0.98760	0.54237
6	-0.50730	0.00275	0.06031	-0.50200	-0.12717	1.20705
7	0.66932	0.01779	0.19244	0.66410	0.32419	1.36020
8	1.05009	0.04701	0.20369	1.05164	0.53187	1.23384
9	-0.90319	0.03153	0.18825	-0.90082	-0.43380	1.27133
10	1.24855	0.03326	0.11349	1.25863	0.45034	1.02417
11	1.72079	0.06371	0.11434	1.77112	0.63636	0.79687
12	0.39523	0.00490	0.15852	0.39055	0.16951	1.37098
13	0.74286	0.00585	0.05982	0.73815	0.18620	1.14801
14	-0.59358	0.00692	0.10542	-0.58816	-0.20190	1.24783
15	-1.49084	0.08797	0.19190	-1.51759	-0.73953	0.99973
16	-0.27599	0.00522	0.29152	-0.27242	-0.17474	1.65028
17	1.21746	0.02981	0.10767	1.22593	0.42584	1.03115
18	-0.79948	0.01669	0.13544	-0.79539	-0.31482	1.23008
19	0.98131	0.03950	0.19752	0.98079	0.48659	1.25406
20	-0.06934	0.00021	0.21092	-0.06838	-0.03535	1.49947
21	-1.18386	0.08321	0.26266	-1.19070	-0.71067	1.26551
22	0.42493	0.00460	0.13269	0.42004	0.16430	1.32474
23	1.00224	0.01036	0.05827	1.00231	0.24933	1.06106
24	1.07806	0.05241	0.21297	1.08056	0.56209	1.23567
25	-0.57743	0.02227	0.28610	-0.57200	-0.36211	1.56863
26	-1.63761	0.08195	0.15494	-1.67843	-0.71870	0.88064
27	0.60538	0.00868	0.12443	0.59998	0.22618	1.27190
28	0.53263	0.00202	0.04105	0.52726	0.10909	1.17759
29	-1.00110	0.03715	0.18195	-1.00113	-0.47215	1.22196
30	-0.23382	0.00393	0.30126	-0.23073	-0.15150	1.67932
31	-1.30241	0.02264	0.07415	-1.31556	-0.37231	0.95742
32	1.21598	0.04873	0.16510	1.22438	0.54447	1.10276
33	0.95972	0.01013	0.06191	0.95864	0.24627	1.08050
34	-0.59042	0.00613	0.09547	-0.58500	-0.19005	1.23489
35	0.40733	0.01036	0.27255	0.40256	0.24641	1.58332
36	0.62376	0.00439	0.06335	0.61839	0.16082	1.18444
37	-0.83765	0.00386	0.03192	-0.83410	-0.15147	1.08695
38	0.25500	0.00174	0.13825	0.25166	0.10080	1.35930
39	-1.23042	0.04484	0.15089	-1.23955	-0.52254	1.07768
40	-0.27105	0.00105	0.07921	-0.26753	-0.07847	1.27035
41	0.02909	0.00003	0.17533	0.02868	0.01322	1.43571
42	-0.00274	0.00000	0.09144	-0.00270	-0.00086	1.30332

Using the leverage (if Leverage>0.285=2*(5+1)/42 then the observation is influential) and Cooks Distance criteria (if Cookd >0.901=$F_{0.5,6,36}$ then the observation is influential), this observation does not seem to be influential. However, using DIFFITS (if the abstract of DIFFITS >0.7559= $2*(6/42)^{1/2}$ then the observation is influential) this observation appears to be influential. According to COVRATIO criteria (if COVRATIO > 1.357 – precision lost if observation eliminated; ifCOVRATIO <0.642 -precision improved if observation eliminated) I decided to eliminate this observation in order to improve precision.

The results obtained after eliminating obs.#5 from the data set are shown in Figure 9.

Figure 9 – Results after deleting observation #5

Dependent Variable: ldoi

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	3.95430	0.79086	1.34	0.2693
Error	35	20.60598	0.58874		
Corrected Total	40	24.56028			

Root MSE	0.76730	R-Square	0.1610
Dependent Mean	1.82548	Adj R-Sq	0.0411
Coeff Var	42.03264		

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	1	0.19284	1.02626	0.19	0.8520	0
BU	1	0.03609	0.01902	1.90	0.0660	1.10790
size	1	0.00026606	0.06802	0.00	0.9969	1.20216
ED	1	-0.00975	0.01680	-0.58	0.5653	1.12251
EU	1	0.00659	0.02195	0.30	0.7656	1.13963
HAS	1	0.01071	0.00883	1.21	0.2333	1.31737

The effect sizes of the independent variable on the dependent variable are shown in Figure 10.

Figure 10 – Effect sizes

Pearson Correlation Coefficients, N = 41
Prob > |r| under H0: Rho=0

	ldoi	DOI	BU	size	ED	EU	HAS
ldoi	1.00000	0.91837	0.29979	0.14083	-0.07901	0.14341	0.24836
p		<.0001	0.0569	0.3798	0.6234	0.3711	0.1174

The regression coefficients were examined in order to assess the contribution of each independent variable.

The coefficient of human asset specificity is positive, as hypothesized, but only marginally statistically significant ($p = 0.233$; $r = 0.24$). The results offer some support the first hypothesis that stated that a positive correlation exists between the degree of performing the transaction internally and the human asset specificity. It should be noted, however, that the variation of this variable is very poor (coefficient of variation is 14.56, Figure 6).

The second hypothesis (H2) that predicted a higher degree of performing the transaction internally if the product has brand name capital could not be verified due to the lack of data.

The coefficient of behavioral uncertainty is positive, as hypothesized, and significant at 0.066 ($r = 0.29$). This hypothesis (H3) is supported. Behavioral uncertainty is positively correlated with the degree of performing the transaction internally.

The coefficient of environmental uncertainty is positive, as hypothesized, but it is not statistically significant ($p = 0.765$, $r = 0.14$). These results do not validate the forth hypothesis (H4) that predicted a positive correlation between environmental uncertainty

and the dependent variable. However, due to the low statistical power, this hypothesis could not be rejected.

It was hypothesized that environmental diversity will be negatively correlated with the dependent variable. The regression coefficient, although has the right sign, is not significant ($p = 0.565$, $r = -0.07$). The results fail to support this hypothesis (H5). Also, it is not possible to reject this hypothesis due to the low statistical power.

The lack of data on frequency and channel volume did not allow testing the last two hypotheses (H6 and H7).

The coefficient of the size of the company (control variable) is positive but is not statistically significant ($p = 0.996$, $r = 0.14$). However due to the low statistical power, it is not possible to conclude that the size of the firm is not correlated with the dependent variable.

The model explains 4.11% ($=R^2_{adj}$) of the total variance, with behavioral uncertainty (significant at 0.066) and asset specificity (marginally significant at 0.233) as the only predictors of the degree of performing the electronic transaction internally.

Because of the low overall response rate it is important to provide demographic information of the resulting sample. Such information is shown in Table 10.

Table 10 – Sample characteristics

Characteristic	*Canada*		*USA*	
	Active components	Passive components	Active components	Passive components
Number of usable answers received	2	12	12	19
Number of employees (mean)	23	180	2430	1111

Chapter V – DISCUSSION

This research identifies the factors that explain why firms choose to perform internally, only to a certain degree, the on-line distribution function. Transaction cost economics provided the theoretical framework. A survey was conducted among Canadian and US firms from the semiconductor and electronic components manufacturing industrial sector (NAICS 33441). The questionnaire was either posted on-line or mailed to the respondents.

The results of the multiple regression analysis revealed that human asset specificity is marginally correlated with the dependent variable and that behavioral uncertainty is positively correlated with the degree of performing the transaction internally. In the case of other two variables (environmental uncertainty and environmental diversity), the regression coefficients had the hypothesized sign but the results were not statistically significant. The corresponding hypotheses could not be rejected due to the low statistical power. Similarly, it was not possible to assess if the size of the company had any effect on the dependent variable.

5.1 THEORETICAL IMPLICATIONS.

Although the theory predicted and some empirical research on traditional distribution channel found that human asset specificity is the main determinant of integration, this finding is not confirmed by the present study. The results indicate only a marginal support for the hypothesis that human asset specificity is positively correlated with the

degree of performing the transaction internally. The weak statistical significance could be partially attributed to its small variation. Such poor variation derives from the fact that a smaller number of manufacturers of active components answered the survey, compared with the number of respondents from the passive components industry (Table 10). The passive component sector is more mature, with less differentiation than the active component sector (Anderson & Schmittlein, 1984).

Behavioral uncertainty was found to be positively correlated with the degree of performing the transaction internally. This result is in line with the ones obtained in traditional distribution channels and with the predictions of TCE.

In the case of environmental unpredictability, although the regression coefficient had the predicted sign, the results were not statistically significant. The effect size (Figure 10) of this variable is small; in fact that might explain the lack of significance obtained on such a small sample (using a small sample will not generate statistically significant results if the effect size is small). It is not possible to conclude that this variable did not have any effect on the degree of performing the transaction internally.

Statistical insignificant results were obtained in the case of the second dimension of uncertainty, environmental diversity. Such insignificance could be attributed to the size of the sample and the small effect size (Figure 10). Unfortunately, due to the low statistical power, it is not possible to conclude that this variable does not have an effect on the dependent variable.

Statistically insignificant results were also obtained for the size of the firm. As in the case of the two dimensions of uncertainty and due to the same reasons, it could not be concluded if the size of the firm has any effect on integration in electronic environments.

5.2 MANAGERIAL IMPLICATIONS.

Managers should understand that performing the distribution function requires, besides the expenses needed to complete the activity (such as. wages, cost of promotional materials, etc.), some expenses that are not so obvious but that could be, in certain conditions, quite high. Such hidden costs are called transaction costs and represent the costs incurred for coordination and control. Some examples relevant to distribution channels are the costs of monitoring the services' quality an independent distributor provides, the cost of transferring information between the manufacturer and channel members and the cost of screening and selecting appropriate distributors.

Although some researchers portrayed the electronic channel as a perfect, frictionless, environment that significantly lowers the transaction costs to a negligible value, this study provides some evidence that this phenomenon does not take place. Managers should understand that while some transaction costs become extremely low in electronic markets, other costs are only marginally influenced by IT usage. This is why they should carefully analyze the cost structure for every possible channel structure and determine the ideal electronic distribution structure based on a cost minimization principle: the total cost for the structure chosen should be minimum. Because such costs are quite difficult

to estimate, managers should look at the factors that influence the value of these costs. These factors will be briefly discussed hereunder.

Prior academic research considers that one of the most important determinants of the transaction costs' value is the existence of highly specific human assets, defined as special-purpose knowledge and working relationships that arise in a learning by doing fashion. An example of such specific asset is the knowledge a channel member (or an employee) with experience in a product category is required to learn (your company's procedures, special product characteristics, special requirements of your customers, etc.) when joining your distribution system in order to be able to effectively sell one of your products belonging to that category. If highly specific assets exist, managers should decide to perform internally a higher number of the activities related to distribution in electronic environments. The research on traditional channels strongly advocates integration when highly specific human assets exist and the present research does not offer any reason to believe that such recommendation is not applicable to the electronic environments. Although the present study does find only a marginal statistical significance for this variable, such a result could be explained by the poor variation of this variable.

Equally important in designing the on-line distribution channel is the existence of brand name capital. If the product's brand name is not shared with other product lines or with the company name and a price premium or a high advertising/sales ratio exists, then the product has brand name capital. In these conditions managers should decide to perform

internally more activities related to distribution because the brand name capital could be depreciated if a poor service is delivered. Prior research on traditional channel provides empirical support for this recommendation, but this research could not verify it due to the missing data on this variable.

Another very important factor that determines to what degree the electronic distribution function should be performed within the boundaries of the firm is the difficulty of evaluating the channel members' performance. In some cases, such as when the sale is the result of the effort of several channel members, it is quite difficult to judge who should get credit for this sale or who should be blamed for the mistakes made. The more difficult it is to assess individual performance, the opportunistic behavior of the channel members will go unobserved, producing damages to your firm. The channel members could claim that they have fulfilled some channel activity, as it was agreed, when in reality, they did not. In order to avoid such problems, when the performance is difficult to measure, managers should consider performing at a higher degree the electronic distribution within the boundaries of the firm. This recommendation is based on the results of this study, which are in line with the results of prior research on traditional channels.

When designing electronic channels managers should also account for the fact that the environment is unpredictable (volatile market share, difficult to monitor trends, volatile industry volume, inaccurate sales forecasts). In such conditions, when an incomplete contract exists, the company might face difficulties in adapting to changed circumstances

because the trading partners will try to interpret the unspecified clause in their favor. Consequently, the company must incur costs to bargain and solve disputes derived from unforeseen circumstances, costs to disseminate new information and costs to coordinate activities to reflect the new circumstances. To reduce such costs, the solution is to perform a higher number of activities related to the electronic distribution internally. The results of this study, although provide some support for this recommendation, are not statistically significant. The lack of significance could be attributed to the small sample size.

Managers should also understand that the existence of a high degree of differentiation between their customers requires less integration. This is explained by the fact that the information presented to the customers through Web Sites or EDI is fairly standardized and might not satisfy the needs of a diverse customer base. The statistically insignificant results reported by this research could be attributed to the small sample size.

Managers are advised to internalize to a greater degree the activities related to distribution that occur with a higher frequency. In the case of occasional transactions, the costs incurred to set up and perform an activity internally are higher than the losses generated by opportunism but as the frequency of the transaction increases, transaction costs are much higher then the costs related to integration. Due to the missing data this hypothesis could not be verified by the present research. However, past research on traditional channels offers some empirical support for this prediction.

The last factor that should affect the electronic channel structure is the channel volume, defined as the dollar value of the sales of a product line using electronic commerce. Due to increasing volume, individual firms can attain economies of scale reduce the cost of producing the distribution function internally. Consequently, the higher the channel volume, the higher should be the degree of performing the distribution internally. Due to the missing data this hypothesis could not be verified but previous empirical research on traditional channels provides some evidence that supports this affirmation.

5.3 LIMITATIONS

The limitations of this study are discussed hereunder.

1. The sample size was quite small. It was impossible to assess if two variables (environmental diversity and size of the firm) have or not a contribution to the variation of the dependent variable. The small sample size generated a low statistical power. Also, due to the small effect size of the two variables on the dependent variable, using a small sample size does not lead to statistically significant results.
2. Due to the lack of data, three hypotheses could not be tested. The measures for channel volume and brand equity are based on sales figures that are not easily disclosed by privately owned firms.
3. The number of independent variables used for the regression analysis is limited, which might explain the low variance explained by the regression model.
4. The generalizability of this study's results to other sectors or industries is limited due to the fact that the sample used belonged only to one industrial sector.

5. As any theory, TCE has limitations (Ghoshal & Moran, 1996). Since this study is based on TCE framework, such limitations are transferred to this research.

5.4 CONCLUSIONS AND RECOMMENDATIONS.

The results of this study are quite strong, having in view the small sample. From the theoretical point of view, these findings show that some of the factors that were proven to affect the traditional channel structure (human asset specificity, behavioral uncertainty) also explain the integration of the distribution function in the electronic environment. This research also offers some evidence for the fact that environmental unpredictability is positively correlated with the degree of performing the transaction internally and for the negative correlation between environmental diversity and the dependent variable.

Future research should replicate this survey using a larger sample that should be randomly chosen from public companies (to avoid the lack of data for sales figures). Other independent variables that could be introduced in the theoretical model are technological uncertainty and the experience in on-line distribution. Also, researchers should go beyond TCE framework when considering other factors that might affect the channel structure.

In conclusion, the results of this study indicate the fact that TCE could be used to understand at least partially the electronic channel structures. The results also indicate that electronic marketplaces are not frictionless, as some theoretical studies portrayed, because transaction costs that could not be neglected still exist in these environments.

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APPENDIX 1 - The questionnaire

August 2, 2000

Dear Madam / Sir,

This is a survey addressed to decision-makers from Canadian and US semiconductor and electronic components industry. The objective of this research is to identify the factors that influence the electronic distribution channel structure. The survey has no commercial purposes. It is being conducted for partial fulfillment of a Master of Science degree in Administration and its results will contribute to the advancement of both theoretical and managerial knowledge. Your participation in the study is voluntary.

One of the questions you probably ask yourself is why should you spend valuable time to complete this survey? Well, spending about 10 minutes today to complete it, will give you free access to valuable information about business to business electronic commerce distribution. If you choose to participate in this study you will be sent, if you desire, a summary of its findings. Please be assured that your responses will be kept confidential and will be used for statistical purposes only.

Please be advised that the questionnaire should be completed by the person who makes decisions regarding distribution (Sales Manager, Product/Brand Manager or Marketing Manager, etc...). If you are not such a person, please pass along this questionnaire to a manager in your company who meets the above description.

Thank you in advance for participating in this survey. Should you have any questions about this study, please feel free to contact my supervisor, Dr. Chandra, Assistant Professor of International Marketing at Concordia University or me. Please return the completed questionnaire in the provided pre-paid envelope, addressed to my supervisor.

Sincerely,
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Questionnaire

Thank you in advance for participating in this study. Your responses will be kept confidential. It is important that you answer ALL the following questions (if applicable). If at any point you do not know the exact answer, please provide your best estimate.

WHICH PRODUCT IS RELEVANT FOR THIS QUESTIONNAIRE?

The questionnaire should be completed with respect to only ONE of the product lines manufactured that belongs to the industrial sector NAICS 33441[1] and it is sold to other companies using electronic commerce.

Please briefly describe your product line without mentioning its brand name but the general category it belongs (ex: capacitors, resistors). Your product line is _____.

To determine if your company uses electronic commerce in the process of selling this product, please answer the following four questions:

	Yes	No
Does your company:		
1) use electronic data interchange (EDI)[2]?	☐	☐
2) have a Web Site?	☐	☐
3) use an Industrial Portal[3]?	☐	☐
4) use the services of a reseller that has on-line presence (Web Site)?	☐	☐

If you answered NO to ALL of these four questions, your company does not use electronic commerce to sell this product. Please complete ONLY the questions listed in **Part 7** and **Part 8** (at the end of the questionnaire).

If you answered YES to at least one of these questions, your company uses electronic commerce in the process of selling this product. Please complete the entire questionnaire, starting with **Part 1.**

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[1] This code corresponds to Semiconductor and Other Electronic Component Manufacturing industrial sector and includes the manufacturers of the following products: semiconductor and related devices, bare printed circuit boards, electronic capacitors, electronic resistors, electronic coil, transformer, and other inductors, electronic connectors, printed circuit assembly (graphic cards, sound cards, network interface cards, modems, electronic assembly), electronic tubes.

[2] For the purpose of this study, the term EDI refers only to the EDI type that allows data exchange between your company and the companies that buy this product line from you.

[3] A definition of Industrial Portal is provided in the attached Annex.

Part 1 – Your customers.

Please indicate the degree to which your customers are similar or different from each other. The term customer refers to the companies that buy this product line from you.

	Very similar			Neither nor			Very different
Nature of the business	1	2	3	4	5	6	7
Size of the business	1	2	3	4	5	6	7
Preferred variety of product features	1	2	3	4	5	6	7
Product preferences in price	1	2	3	4	5	6	7
Product preferences in quality	1	2	3	4	5	6	7
Credit needs	1	2	3	4	5	6	7

Part 2 – Your product line.

Please indicate the brand name of the considered product line _____

How would you describe this product line compared with other product lines in general?

Stable market share	1	2	3	4	5	6	7	Volatile market share
Easy to monitor trends	1	2	3	4	5	6	7	Difficult to monitor trends
Stable industry volume	1	2	3	4	5	6	7	Volatile industry volume
Sales forecasts are quite accurate	1	2	3	4	5	6	7	Sales forecasts are quite inaccurate
Predictable	1	2	3	4	5	6	7	Unpredictable

Please circle the most appropriate rating for this product line.

Low engineering content	1	2	3	4	5	6	7	High engineering content
Fast changing	1	2	3	4	5	6	7	Slowly changing
Unsophisticated	1	2	3	4	5	6	7	Sophisticated
Commodity	1	2	3	4	5	6	7	Customized
Unique	1	2	3	4	5	6	7	Common
Complex	1	2	3	4	5	6	7	Simple

Does this product line:	Yes	No
Share its brand name with other product lines?	☐	☐
Include in its brand name the company name?	☐	☐

How long has this product line been in the market:_____YEARS (Example: 3.5 years)

	Yes	No
Compared to your competitors, do you charge a premium price for this product line?	☐	☐

Please indicate the value of the following ratio:

Advertising/Sales = _____ where

Advertising = The estimated advertising expenses incurred for this product line in a year.

Sales = Total dollar value of sales for this product in a year.

Part 3 - Electronic commerce.

Various functions your company provides its customers are listed below (example: providing product information, price quotations....). For each function, please check the square corresponding to the e-commerce option that you use to provide that function (example: product information could be provided using your company's Web site, but also using an Industrial Portal or the Web site belonging to a traditional reseller). The term customer refers to the companies that buy this product line from you.

*IF YOU ARE NOT SURE ABOUT THE MEANING OF SOME OF THE TERMS USED (MARKED WITH AN ASTERISK), PLEASE CONSULT THE ATTACHED ANNEX WHERE DEFINITIONS ARE PROVIDED.

	EDI	Own Web Site	Industrial Portal*	Web Site belonging to a traditional reseller	Other (directories, search engines, publishers, financial intermediaries, etc...)
Product information*	☐	☐	☐	☐	☐
Product evaluations (reviews)*	☐	☐	☐	☐	☐
Inventory checking	☐	☐	☐	☐	☐
Price quotations	☐	☐	☐	☐	☐
Traffic generation*	☐	☐	☐	☐	☐
Web site evaluation*	☐	☐	☐	☐	☐
Company information*	☐	☐	☐	☐	☐
Company performance evaluation*	☐	☐	☐	☐	☐
Info about other terms of sale (shipment terms, delivery date...)	☐	☐	☐	☐	☐
Comparison of your offer with competitors' offers*	☐	☐	☐	☐	☐
Price negotiation using auctions*	☐	☐	☐	☐	☐
Negotiation of terms of sale	☐	☐	☐	☐	☐
Order placement	☐	☐	☐	☐	☐
Order receipt acknowledgement	☐	☐	☐	☐	☐
Order change request	☐	☐	☐	☐	☐
Order change acknowledgement	☐	☐	☐	☐	☐
Payment authorization	☐	☐	☐	☐	☐
Fund Transfer	☐	☐	☐	☐	☐
Invoicing	☐	☐	☐	☐	☐
Order tracking	☐	☐	☐	☐	☐
Shipment confirmation	☐	☐	☐	☐	☐
Return of goods*	☐	☐	☐	☐	☐
Technical support	☐	☐	☐	☐	☐
Marketplace infrastructure*	☐	☐	☐	☐	☐
Secure communication	☐	☐	☐	☐	☐
Authentication*	☐	☐	☐	☐	☐
Aggregation*	☐	☐	☐	☐	☐
Other (please specify the function names and the corresponding options in the spaces provided below)					
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐
_____	☐	☐	☐	☐	☐

Part 4 – Your employees.

The term "employee" is used in the following questions instead of sales person, customer service person, sales engineer, technical support or any other person that has contact with the client during the sale of this product line via electronic commerce. Please indicate your agreement or disagreement with the following statements using a 1 to 7 scale.

	Strongly Disagree			Neither nor			Strongly agree
It is difficult for an employee to get something done for an account (i.e., inventory checking, shipment tracking, handling claims).	1	2	3	4	5	6	7
In our company, it helps tremendously if an employee has been with us for a while, to know who to see to get something done.	1	2	3	4	5	6	7
It is vital that employees build strong working relationships within our company.	1	2	3	4	5	6	7
It is difficult to learn all the ins and outs of our company that an employee needs to know to be effective.	1	2	3	4	5	6	7
A newcomer to our firm has to learn our "language", our own words for various things.	1	2	3	4	5	6	7
A newcomer coming to our firm with experience in our product class still needs a lot of training.	1	2	3	4	5	6	7
Our customers and prospects view our product line as similar to the competition's.	1	2	3	4	5	6	7
It takes very little time for most employees to learn our product line.	1	2	3	4	5	6	7
An experienced employee's inside information could do us a lot of damage if let out.	1	2	3	4	5	6	7
Our employees aren't in a position to learn much information of a confidential nature.	1	2	3	4	5	6	7
To be effective, the employee has to take a lot of time to get to know our accounts.	1	2	3	4	5	6	7
Our employees can't make the grade unless they invest a lot of effort to build a relationship with an account.	1	2	3	4	5	6	7
In our business, the accounts do not care if we replace our employees, as long as the new ones are capable.	1	2	3	4	5	6	7
If our employees quit, they could take the best accounts with them.	1	2	3	4	5	6	7
Personal relationships between our employees and accounts have little influence on sales of our product line.	1	2	3	4	5	6	7

Consider those operating methods of your company that affect the employee (for example, procedures for getting a quotation, getting approval for a sale, etc). How would you describe your company's procedures relative to the industry?

Simple	1	2	3	4	5	6	7	Complex
Fast	1	2	3	4	5	6	7	Slow
Common	1	2	3	4	5	6	7	Unusual
Informal	1	2	3	4	5	6	7	Bureaucratic

Part 5 – Evaluating employees' performance.

The term "employee" is used in the following questions instead of sales person, customer service person, sales engineer, technical support or any other person that has contact with the client during the sale of this product line via electronic commerce. Please indicate your agreement or disagreement with the following statements using a 1 to 7 scale.

	Strongly Disagree			Neither nor			Strongly agree
We can get a very accurate measure of each employee's sales.	1	2	3	4	5	6	7
It is very difficult to measure equitably the results of individual employees.	1	2	3	4	5	6	7
Our sales and cost figures for each employee have no serious accuracy problems.	1	2	3	4	5	6	7
No one really knows who is specifically responsible for many of our sales.	1	2	3	4	5	6	7
We can fairly evaluate our employees just on sales and cost measures.	1	2	3	4	5	6	7

Part 6 – The sale.

Of your total sales last year, what percentage is made up by this product sold using electronic commerce? _____%

Approximately, what was the total value of your firm's sales last year? _____$

Please indicate how frequently the following functions occur during the sale of this product line using electronic commerce. IF YOU ARE NOT SURE ABOUT THE MEANING OF SOME OF THE TERMS USED (MARKED WITH AN ASTERISK), PLEASE CONSULT THE ATTACHED ANNEX WHERE DEFINITIONS ARE PROVIDED.

	Once in a while						Very frequent
Requests for information (product information*, product evaluations*, inventory checking, price quotations, traffic generation*, Web site evaluation*, company information*, company peformance evaluation*, information about other terms of sale).	1	2	3	4	5	6	7
Comparison of your offer with competitors' offers.	1	2	3	4	5	6	7
Negotiation of terms of sale	1	2	3	4	5	6	7
Ordering.	1	2	3	4	5	6	7
Payment .	1	2	3	4	5	6	7
Post sale service (invoicing, order tracking, shipment confirmation, technical support, return of goods*).	1	2	3	4	5	6	7

Part 7 – General information.

Company name: _____
Total number of employees: _____
Your name: _____
Your position: _____

	Yes	No
Would you like to receive a summary of the results of this study?	☐	☐

If your answer was yes, please indicate: e-mail address _____
OR
Mailing address _____

Part 8 - Reasons for not using electronic commerce.

This section should be completed only if the company does not use any of the following in the process of selling its product: EDI, own Web Site, Industrial portal or Traditional reseller with on-line presence. Please use the space below to answer these questions. Should you need additional space, please attach one more page.

1) Please describe the reasons for which your company does not use EDI.
2) Please describe the reasons for which your company does not have a Web site.
3) Please describe the reasons for which your company does not use an industry portal.
4) Please describe the reasons for which your company does not use a traditional retailer that has on-line presence (Web Site).

Annex

Term	*Definition*
Industrial Portal	Web site that provides information and a variety of services to a particular industry. Some examples of the services provided are industry news, links to other sites, Web searching, product information, transactions. Industrial Portal URL for this industrial sector are: http://www.chipcenter.com/ http://www.need2buy.com/ http://www.netbuy.com/nbbuyer/default.asp http://www.questlink.com/ssuid:S8O9Dw00q0800016ek46v9s0F6 / http://www.usbid.com/ http://www.centralres.com/
Product information	Information about the characteristics of the product line, technical specifications, packaging, etc...
Product evaluations (reviews)	Evaluation of several characteristics, technical specifications and performance of the product line by an independent organization or person. Testimonials from customers are also forms of product evaluation.
Traffic generation	The process of directing a customer to your Web site. This is usually done via banner ads, hyperlinks placed on other Web sites, affiliate programs, etc...
Web site evaluations	Explicit reviews of the site and/or frequency of access information that direct customers to your web site.
Company information	General description of the product/services your company offers and contact information.
Company performance evaluation	Some example include financial statements, third party evaluations related to company performance as a supplier (how quick are the orders shipped, discrepancies between ordered and shipped quantities/products, after sale service quality...), third party financial evaluations or general company performance evaluation (articles in various publications, customers' testimonials...)
Comparison of your offer with competitors' offers.	Process that helps the customer to evaluate offers from several manufacturers using various terms of sale, product characteristics and technical specifications as criteria. This function is usually performed by special software called intelligent search agents.
Price negotiation using auctions	Price negotiation between independent sellers and buyers that is implemented via a system-wide standard auction that is open to all participants.
Return of goods	General information about the procedure of returning the product purchased. Includes the possibility of obtaining a Return Merchandise Authorisation Number (RMA#).
Marketplace infrastructure	Virtual place where buyers and sellers meet to transact.
Authentication	The process of verifying that customers are who they claim to be.
Aggregation	Total demand of many individual customers demand for the product.

APPENDIX 2 – Follow-up letters

FIRST FOLLOW-UP LETTER

August 15, 2000

Dear Madam / Sir,

We recently e-mailed you a request to participate in a survey. The objective of this research is to identify the factors that influence the electronic distribution channel structure.

We have already received some completed questionnaires. It is essential to obtain answers from as many managers as possible, in order to increase the accuracy of this study's results. If you have not filled out the questionnaire, we are kindly asking you for your cooperation. It takes only about 10 minutes to complete the questionnaire. Your responses will be kept confidential and will be used for statistical purposes only.

The questionnaire is located at http://dbonline.concordia.ca/chandra/questionnaire1.htm.

Thank you in advance for participating in this survey. Should you have any questions or comments about this study, please feel free to contact my supervisor, Dr. Chandra, Assistant Professor of International Marketing at Concordia University or me.

Sincerely,
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SECOND FOLLOW-UP LETTER

August 23, 2000

Dear Madam / Sir,

A couple of weeks ago we sent you a request to participate in a survey. We are kindly asking you for your cooperation. You will also benefit from the results of this study. By choosing to complete this survey, you will receive a summary of its results. This will constitute a good reference point in comparing what functions is your company offering to its clients through e-commerce with the statistical mean of the answers provided by the other respondents. Although using e-commerce is not per se a source of competitive advantage, its absence might shortly become a competitive disadvantage. Consequently, it is important to know what is going on in your industry in terms of e-commerce usage.

This is a rigorous academic research that looks only at companies from your industry (NAICS 33441 – Semiconductors and other electronic components). We want to provide you accurate information. This is why we are trying to collect as many answers as possible. SO, YOUR ANSWER REALLY COUNTS! The on-line questionnaire is located at http://dbonline.concordia.ca/chandra/questionnaire1.htm

However, if you do not have the time to complete the survey or if you are not the in charge of your company's distribution strategy, kindly please forward this letter to somebody in your company who would be able help us (Marketing Manager, Sales Manager, Product/Brand Manager, E-commerce Manager or any other person that makes decisions about distribution).

Thank you in advance for participating in this survey. Should you have any questions or comments about this study, please feel free to contact my supervisor, Dr. Chandra, Assistant Professor of International Marketing at Concordia University or me.

Sincerely,
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