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**THE INTERNET'S IMPACT ON THE PURCHASE
FUNCTION OF BRAZILIAN MANUFACTURERS ¹**

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ABSTRACT: E-sourcing is claimed to have helped many companies reorganize corporate purchases lately, speeding up the sourcing process. In addition to the reduction of cycle times, the use of the web as a purchasing tool leads to substantial cost savings for those who embrace it, according to some of its early adopters.

This paper first reviews the literature about e-procurement, reverse auctions and other practices and technologies related to the use of the Internet to leverage procurement activities. It then presents the results of a survey, which included questions about the Internet's impact on the company's purchase function. The questionnaire was answered by 655 manufacturers from the state of Sao Paulo, Brazil, early in 2004. The analysis of such data offers support to the findings of previous studies and reveals the current status of adoption of the Internet by Brazilian industrial organizations, with respect to the procurement of goods and materials.

KEY WORDS: Internet, e-procurement, e-sourcing, survey, manufacturing industry.

INTRODUCTION

The research project that originated the data analyzed in this paper was developed with the purpose of providing a better understanding of the way Brazilian industrial organizations use the Internet to support their strategies and business practices. An electronic survey was sent to all industrial companies contained in a database of FIESP, the association that congregates manufacturers in the state of Sao Paulo, the most industrialized region of Brazil. All companies in that database that had a valid e-mail address were sent an electronic message with the invitation to participate in the survey. 655 usable responses were obtained, which represent about 8% of the population.

This paper, specifically, focuses on the evaluation of the responses that were provided by the participants, related to the use of the Internet, web-based technologies and electronic communication networks for the pre-contract phases of the purchasing process (*e-sourcing*) and the actual purchasing (*e-procurement*).

METHODOLOGICAL APPROACH

The structured questions used in the questionnaire followed a Likert scale. Respondents could choose one of the possible graded answers from a drop-down menu, which made selection easy, increasing the speed of filling in the form. The authors wanted the questionnaire to be simple enough to be filled-in at the time the respondents were checking their e-mail. If it were left to be answered at a later time, the authors believed chances of obtaining an answer would dramatically decrease.

The questionnaire was pre-tested, with respect to the content, having been presented to a group of executives working in the field, who conveniently happened to be taking a course where the authors were instructors. They gave important contributions in order to make the questions more accessible and understandable to the "actual" participants in a later stage. With respect to the format, the authors randomly separated one per cent of the whole database and sent the questionnaire to those companies a month in advance. No changes in format were found necessary, after the pre-test answers arrived and, by the time the larger group of companies was invited to participate in the survey, the researchers already had a reasonable idea of the return rate that could be achieved, based on the return rate of the pre-test sample.

Respondents belonged to a convenience sample formed by those companies that answered the questionnaire. Demographic data of the companies comprising the convenience sample were roughly compared to data for the population of manufacturing companies contained in FIESP's database, as a whole. The authors have no reasons to believe that the sample they obtained is not representative of the population.

USE OF THE INTERNET TO PURCHASE MATERIALS

(E-PROCUREMENT)

Researchers haven't reached an agreement on how far corporate procurement systems based on the Internet can be taken. It is, however, undeniable that the use of new Web-based procurement technologies is quickly spreading. There is also some controversy about the meaning of *e-*

procurement. Bannan (2003) considers it as any method used for the electronic interaction between the organization and its suppliers. Roche (2001), on his turn, believes that *e-procurement* is an evolving term, which is beginning to mean the automation of the purchase process as a whole, making information on orders and requests available along the entire supply chain. For Fisher (2000), the benefits of *e-procurement* relate not only to the reduction of direct costs, but also to the improvement of the procurement function's efficiency, resulting from the reassessment of the way organizations process their purchasing. In that author's opinion, when companies drastically reduce the number of suppliers, administrative costs fall and the company develops a much clearer strategic focus for the procurement function.

When stressing the benefits of implementing electronic procurement systems, Unisys (2001) states that savings of 10% in material purchasing costs have the same impact on the company's financial results as an increase of 12% in sales or a 42% reduction on labor costs. A survey that was mentioned by Unisys with IT executives indicated that most e-procurement projects, and those involving their integration to other functions' systems in the organization, provide return of the investment in less than a year. Fifty three per cent of the participants in that survey considered *e-procurement* as important as, or more important than, the actual sale of products through the Web.

Less enthusiastic about the positive impacts of *e-procurement* on the organizations, Gilbert (2000) fears that the implementation of corporate purchase systems through the Internet repeat the frustrations of many implementations of ERP systems in the 90's. He advises organizations to develop consciousness about the risks involved, when they embrace large projects, which promise spectacular results. In order to justify his concerns, Gilbert mentions the

problems faced by several companies during the implementation of their corporate purchase systems and their integration to other pre-existing systems. Bannan (2003) is also concerned with the problem of *e-procurement* methods being accepted by suppliers. After all, no organization enjoys having its products and services turned into commodities, which many times ends up happening in the environment of a transaction exchange. In addition to that, *e-procurement* systems usually require an extra amount of effort by the suppliers, who need to feed them with product and price information, for each customer, independently.

The Butler Group, quoted by Fisher (2000), points out four major reasons for the adoption of *e-procurement*:

- the possibility to aggregate purchases of different departments or divisions, increasing buyer's power during the negotiation with supplier, which may lead to volume discounts and the reduction of transaction costs;
- reduction of purchases from unaccredited sources or suppliers that do not meet required quality standards;
- creation of a more conservative procurement policy, balancing price and quality concerns among all available suppliers;
- development of better understanding of differences in price, quality, speed and delivery reliability.

In addition to those benefits, *e-procurement* may also provide several other advantages, in the opinion of the authors of this paper:

- faster and more accurate transaction processing, allowing for lower inventory and quicker response to replenishment needs;
- improvement of order information tracking;
- elimination of unnecessary or redundant purchases, as well as purchases that are carried out by unauthorized personnel;
- improvement of managerial information made available by the procurement function and the information flow along the supply chain, allowing for the identification of demand trends, making forecast more accurate and reducing the devastating consequences of the Forrester effect².

Next, the use of the Internet tools to source suppliers, for the actual purchase of indirect materials (those that do not become a part of the final product) and of direct materials (which are incorporated to the product) will be discussed.

² This effect, also known as “bull-whip” effect, consists on the magnification of the variation in the demand for a product or its parts along the supply chain, when there is any oscillation in the demand downstream (SAAB e CORRÊA, 2004). Such magnification results in increased financial costs to keep enough inventory to respond to unpredictable floating demand or, alternatively, the costs of having to turn customers down, for not having the product to deliver. The “Forrester effect” results from the organizations' difficulty in fulfilling their customers' orders in a diligent way, associated to poor information flow along the supply chain (GRAEML e MARQUES, 2004).

E-sourcing

Internet search engines have turned the Web into a powerful source of easily accessible information about potential suppliers, which can be located directly by means of their own Web-sites, as links from the Web-sites of their customers or suppliers, in discussion or service lists or other Internet resources. Ozer (2003) considers that the Internet reduces the required time to locate a possible supplier, significantly. He mentions the example of a cut-device manufacturer that needed to source a supplier for a very specific part, for the construction of a prototype, which demanded very strict quality standards. Having it been impossible to locally locate a supplier, the company performed a Web search, which resulted in four potential suppliers sending their quotations in less than a week, all of which having been considered technically capable of producing the required item. Ozer says that the same company used to spend at least two months, in the past, to identify possible local suppliers and had to wait a few more weeks until it could receive a quotation, as a response to its request.

Purchase of indirect materials

Indirect materials are products and services that are used to support a company's operation, such as office gear, furniture, computers for the administrative area, business trips, entertainment etc. (SCHENECKER *et al.*, 1998; REID e SANDERS, 2004).

As such materials do not have direct impact on the quality of the product/service, organizations are, in general, less strict about the adopted purchase procedure. For those products, price is usually the major purchase decision factor. Therefore, companies are always looking for means

of establishing the competition among possible suppliers, so they can decide on the one that offers the best momentary conditions for the purchase. As indirect materials are not essential to the production process, they offer little risk to the company's performance in the market, in case there is any problem. Thus, they are the first ones organizations feel comfortable to buy through the Internet (or any other new means) (FISHER, 2000).

Although there are companies that choose to create their own Internet hub³ to concentrate their transactions with suppliers, avoiding the risk of performing their purchases through an external hub⁴, electronic exchanges have spread throughout the Web.

For the majority of the companies, the solutions that are made available through the Internet are considered safe enough, including exchanges and reverse auction tools provided by external hubs, which will be discussed next.

³ Hubs or electronic exchanges are intermediary operations that connect possible suppliers to customers, for more efficient transactions, usually involving large volumes of goods.

⁴ Aware of the customers' fear about critical information being made available to competitors, in the case of a security fault, specially when the hub is also being used directly by competitors, electronic exchanges are doing everything they can to ensure the separations and protection of each of their customers' data, individually. Sometimes, they even provide separate servers for each of the clients (BABCOCK, 2003).

Electronic exchanges

The appearance of electronic markets promises to cause great transformation in corporate procurement procedures. Unisys (2001), for example, estimates that 55% of companies' purchases refer to cheap non-strategic products (indirect materials), which are bought in bulk.

In some industries, even competitors are creating or stimulating the use of electronic markets to carry out purchases of indirect materials as a group, in order to achieve scale economies, which would not be possible if companies performed on their own (BANNAN, 2003). One such exchange, which received a lot of exposure lately, is Covisint, used for business transactions and collaboration among companies in the car making industry. Covisint is supported by the large automobile assemblers and is in operation since 2000. Participating companies in the Covisint initiative expect to reduce their purchasing and development costs in 16%, which may represent savings of ca. US\$1,000.00 per car, according to Reid and Sanders (2004). Those authors remind us, yet, that, in January 2003, Covisint already had more than 76,000 suppliers as members.

Reverse auctions

Another Internet resource, with which companies are experimenting for the purchase of indirect materials, is the reverse auctions, which follow an opposite logic to the auctions most people are familiar with. In the case of reverse auctions, companies stimulate their suppliers to bid and wait until they get the best offer. They inform the maximum price they are willing to pay for the product or service and potential suppliers respond with their proposals, in the form of successive bids, issued in a short period of time, until one of the bidders proposes a value that cannot be lowered by the

competitors (OZER, 2003; MENEZES, SILVA e LINHARES, 2004). The auction is concluded after a set period of time without new bids or in case of expiration of the overall time for the auction.

As this kind of purchase arrangement concentrates on the price, it is useful for items that do not present great variability and for which there are plenty of possible suppliers⁵. It is also important that suppliers clearly understand the specific requirements of a request, according to Ozer (2003).

As a purchase strategy, reverse auctions only make sense for items of little impact on the company's product, which are manufactured by companies with which the organization doesn't intend to establish a long term relationship, based on trust and commitment, typical of a 'win-win'⁶ relationship.

⁵ Menezes, Silva and Linhares (2004) studied the possibility of using multiple attributes in reverse auctions, particularly in biddings carried out by the government, in an attempt to evaluate other decision factors such as quality of the product or service, delivery lead time, payment terms, warranty and technical assistance, avoiding the decision to rely only on the price variable, which, in their opinion, doesn't make use of the full potential of the tool.

⁶ Type of relationship in which everyone who is involved is better off participating of an agreement or partnership than in the case of being left out of it.

Purchase of direct materials

Direct materials are those that are used directly as raw materials or components in the organization's production process (SCHENECKER *et al.*, 1998; REID e SANDERS, 2004).

Although companies still resist using electronic exchanges to purchase raw materials, it is possible that the level of acceptance of this procedure increases in the future. That may happen if electronic exchanges prove to be a safe and reliable means for trading goods. Many researchers, however, among whom Fisher (2000) and Bannan (2003), believe that electronic exchanges may never become the best way of purchasing products for which there is a great level of specification, demanding a closer relationship between buyer and seller. Gilbert (2000) mentions Texas Instruments' case. That company considers that the problems that need to be solved for the purchase of direct materials are completely different to those related to the purchase of indirect materials. Checking operational costs, negotiating discounts with suppliers and ensuring that purchases are carried out according to the contracts is something that was well resolved long ago for the purchase of direct materials, in the opinion of Alan Daniel, Texas' e-procurement manager, who was interviewed by Gilbert. The challenge now is, according to him, to improve the communication with suppliers about levels of inventory, cycle times and delivery dates, i.e., it involves intensifying the integration and collaboration with business partners.

Companies will achieve better results from their *e-procurement* systems if they are integrated to the other participants of the supply chain, allowing for better communication among partners and the exploitation of the advantages related to the more efficient information flow, with direct impact on the level of inventory. Fisher (2000) reminds us, however, that, such integration is

“easier said than done”. The problem is that there are many cultural, organizational and technological barriers to be overcome, before the organizations are able to adopt complete integrated e-business solutions along the whole supply chain.

The issues related to the improvement in the coordination and integration of business partners will be discussed in the next section.

COORDINATION AND INTEGRATION OF BUSINESS PARTNERS FOR MATERIALS' PROCUREMENT

Companies have been carrying out massive investments in technology, in an attempt to improve their coordination with business partners and, therefore, the efficiency of the supply chain as a whole.

The ideal situation would be (or will be) to rely on real-time information of consumer sales to determine the next actions to be taken by the manufacturer (COTTRILL, 2003). That demands:

- agility in the information flow, in the direction consumer → manufacturer and
- manufacturing and logistics flexibility, in the direction manufacturer → consumer,

in order to get closer to the SOMO⁷ performance goal, which is so desirable when the customer dictates the rate of consumption and determines the specifications of the goods he/she will consume.

⁷ *Sell one, make one*: only produce a new item when the previous one was sold.

Electronic Data Interchange (EDI)

One very important technology used by organizations to ensure quick information flow with suppliers is the so called electronic data interchange (EDI) or its variations for the Internet, according to Schaffer (1998). However, companies need to be taken to understand the benefits of digital data interchange and the elimination of manual procedures (TRAN, 2002), which may not seem so clear at a glance.

EDI has been around in the market for over 20 years, as a standardized way of transmitting business forms and documents among suppliers and customers, such as purchase orders, invoices, shipment notices and delivery schedules (SWEET, 1999; BEDNARZ, 2004). Such technology is responsible for 80% to 90% of the information flow among companies, according to Sliwa (2004), who doesn't believe it is going to be replaced, in the short run, by any other means of trading information, such as the XML standard or the AS2 protocol, for example (see ahead).

There are many reasons for the use of EDI in order to transmit transactional data among business partners, among which the following deserve to be highlighted (COYLE, BARDI e NOVACK, 1999; SWEET, 1999; REID e SANDERS, 2004; SAAB e CORRÊA, 2004):

- possibility of quick access to the information in a standardized way;
- elimination of human transcription and interpretation errors;
- reduction of transaction costs, as a result of the elimination of most labor costs related to the manual filling out of papers;
- improvement of inventory control;

- reduction of telephone and fax costs;
- improvement of service to the customer, quickly warning about any problems with shipments, reducing the negative impact of the situation;
- possibility of auditing the transactions that were carried out;
- reduction of purchase batch size and increase in frequency, as a result of the reduction of transaction costs;
- a customer's demand that the technology be used for the transmission of operational and billing information.

However, due to its high implementation and maintenance costs, traditional EDI was confined to large companies and their major suppliers, among which there was enough information sharing to justify it. The traditional EDI technology demanded that its users had access to a VAN (value added network) and, therefore, had to cope with the costs of maintenance of such service. In addition to that, a sophisticated IT infra-structure was required, involving complex proprietary software (BEDNARZ, 2004).

Most EDI applications concentrated in the manufacturing industry, whose processes, involving the supply chain, demand more information sharing (ALBERTIN, 2003). Legey (apud ALBERTIN, MARQUES e MOURA, 2003) also mentions financial services, transportation and commerce fields as users of some expression of the technology, representing, together with the automotive industry, ca. 80% of the transactions volume.

Marques and Di Serio (2000) say that the Internet has provided a public infra-structure through which transactions could be performed, allowing for the electronic integration of companies of

all sizes. In fact, the more recent possibility of carrying out EDI transactions via Web is democratizing its use, considering it only requires a Web navigator and the installation of basic software. The new possibility reduced the cost per transaction of adopting EDI (SLIWA, 2004).

Thus, the EDI technology starts to spread also to the service industry and smaller industrial manufacturers. According to Meta Group's data, mentioned by Bednarz (2004), the EDI transactions via Web are growing 50 to 60% a year, while traditional EDI, based on VANs has stagnated. That means that companies that implemented traditional EDI systems in the past continue to use and benefit from the technology, simply because it works. Newcomers, however, adopt internet solutions, instead (SWEET, 1999).

Extensible Mark-up Language (XML)

Companies from different industries got involved in the development of the new XML standard for inter-organizational communication, which defined interface procedures to be carried out for the electronic communication between partners, including purchase orders and inventory information (BABCOCK, 2003). Some of the world leaders in the software market are among the supporters of the XML initiative, such as IBM, Microsoft, Novell, Oracle and Sun. Those companies have been working together since 1999 in the definition of the XML standard, designed to allow access and management of large volumes of transaction data related to the communication needs of companies involved in a supply chain, via Web (RIBEIRO, 2004).

The XML standard intends to provide the same flexibility to the information exchange between applications and business partners that the HTML standard brought to the publication of Web pages, in the mid 90's.

Instead of using VANs to send information related to a transaction, as it happens for traditional EDI, XML-based systems are able to convey business documents using Internet's usual protocols, such as HTTP (*HyperText Transfer Protocol*), SSL (*Secure Sockets Layer*) or FTP (*File Transfer Protocol*), which is much cheaper.

That is why Sweet (1999) believes that companies that didn't implement traditional EDI systems up to now won't find any good reason to do it anymore. Most likely, they will go straight to a B2B solution, which may involve the use of technologies such as XML, even though the use of the EDI standard with the AS2 (*Applicability Statement 2*) protocol also represents a strong trend for the Web. Wall Mart, for example, requested that its suppliers stopped using VANs for their transactions with the organization and started using AS2, still in 2002 (SLIWA, 2004).

Intranets and extranets

Organizations started using the Internet to visualize content that was being openly made available by other companies and in order to publish information about themselves that they considered to be convenient and relevant for general access. But the Web soon started being also considered a good platform for the publication of content of restricted interest, as users became acquainted with its environment and available resources, reducing the cost and need of additional training. As a result, many organizations started to structure internal networks using tools and

services that are similar to those of the Internet, only protecting them from external access. Such internal networks, used to make information available and to share it among the company's employees are the so called intranets.

After developing intranets, the next step was to allow business partners to have access to part of such network, or networks developed specifically for them, with the purpose of improving the communication and integration of the supply chain links. That is how extranets came about. They are networks that use the Internet's infra-structure and services, congregating the organization and its suppliers/customers, in a protected way, preventing the access of other parties (O'BRIEN, 2001).

ACTUAL USE OF THE INTERNET FOR E-PROCUREMENT BY BRAZILIAN MANUFACTURERS (RESULTS OF THE SURVEY)

According to what was said before, the Internet can be used for sourcing, i.e., searching for new suppliers, as well as actually performing corporate purchases. The advantages of the use of such new technology (or infra-structure) have been discussed, as well as the reasons why its adoption tends to be quicker for the purchase of indirect materials (that have little or no impact on the company's product) than for direct materials. This section will present the results of the survey that was carried out with Brazilian manufacturers, related to procurement tasks that can be carried out over the Web.

Changes in the way indirect materials are purchased

The survey indicated that large companies use the Internet more intensively than smaller ones to carry out purchases of indirect materials, something that was already expected after reviewing the literature. Among large companies, with more than 500 workers, 63.6% consider that the Web caused moderate, significant or very significant change in the indirect materials' purchase procedure, as can be seen on **Figure 1**. For mid-size companies, that percentage was 44.5%, while for the small ones, it was 31.0%.

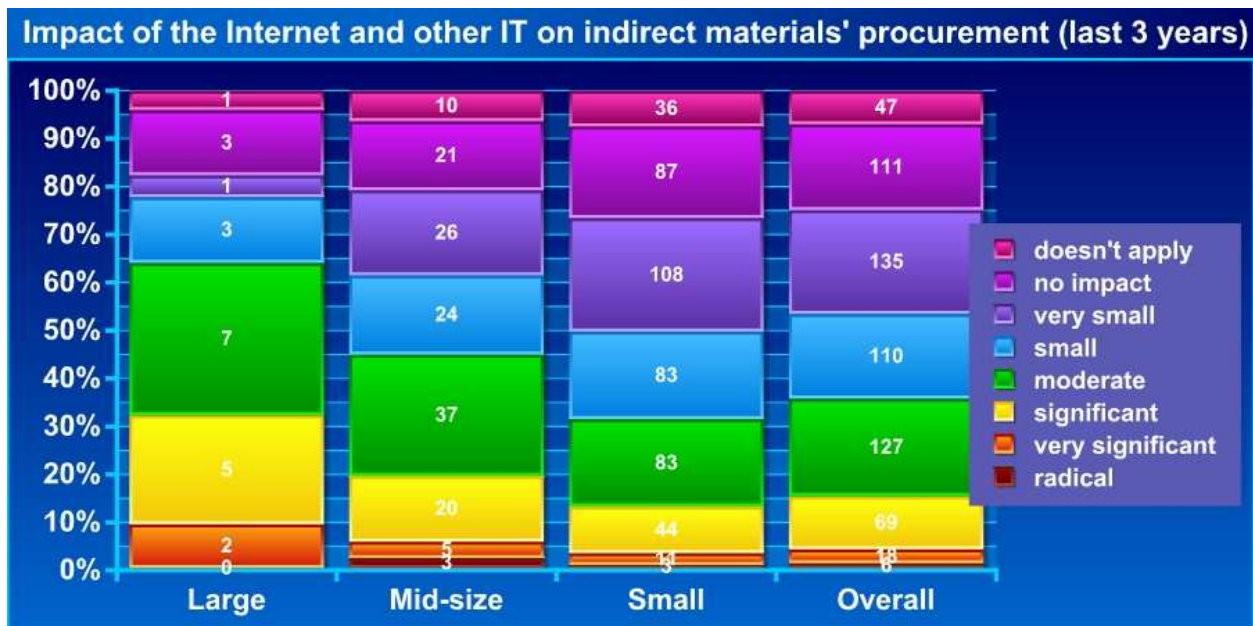


Figure 1 Impacts of the Internet and other IT on the procurement of indirect materials, during the last 3 years, depending on the size of the company

Changes in the way direct materials are purchased

Similarly to what happens in the case of indirect materials, large companies use the Internet more intensively than the others also to purchase direct materials. Fifty per cent of them claim to have

gone through at least moderate changes as a result of the use of the Internet and other TI, during the last 3 years. The percentage of mid-size companies that indicated change of that same magnitude was 39.6% and, among small companies, 28.3% (see **Figure 2**).

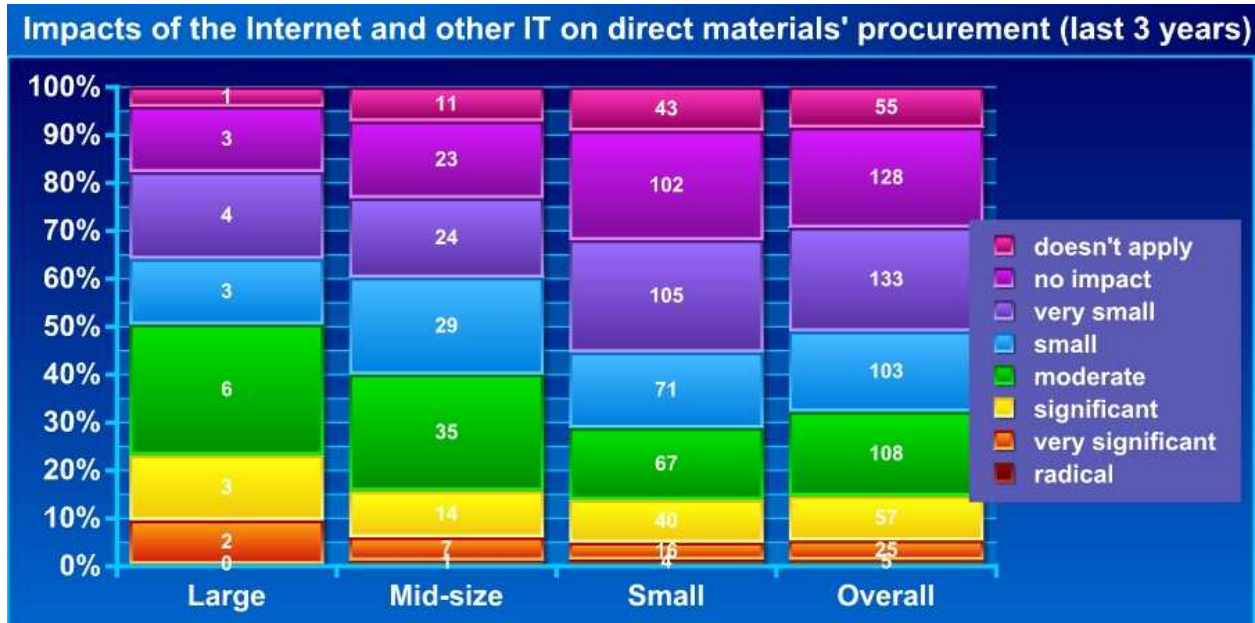


Figure 2 Impacts of the Internet and other IT on the procurement of direct materials, during the last 3 years, depending on the size of the company

The participants were less enthusiastic about the use of the Internet to buy direct materials than indirect ones, which can be depicted from the comparison of the data contained in **Figure 1** and **Figure 2**. This finding supports the literature, which says that companies first experiment with the purchase of indirect materials and, only when they already feel confident about using the new media, they start trading direct materials. That is so, because indirect materials have less impact on the company's operation, in case something goes wrong, as has already been discussed.

An interesting finding of the survey was that the difference between the percentage of participants who claimed to have incurred changes in procurement procedures for indirect and

direct materials was higher for large companies, intermediary for mid-size companies and smaller for small companies, as shown in **Table 1**, below.

Table 1 Percentage of companies which claimed at least moderate changes in their purchase procedures during the last 3 years

Size	Indirect Materials	Direct Materials	Difference
Large	63.6%	50.0%	13.6%
Mid-size	44.5%	39.6%	4.9%
Small	31.0%	28.3%	2.7%
Overall	35.3%	31.8%	3.5%

That could, eventually, indicate that larger companies are more conscious of possible (negative) impacts of the introduction of a new technology on their product and, therefore, are more reluctant about changing procurement procedures that interfere with their regular operation. This is something that would need to be studied in more detail, representing an interesting topic for further studies.

E-procurement

Figure 3 presents the results for the question about the use of *e-procurement* by manufacturing organizations. Circa 31.8% of the large companies stated that they use *e-procurement* at least moderately. The same opinion is shared by 22.9% of the mid-size companies and 15.6% of the small ones.

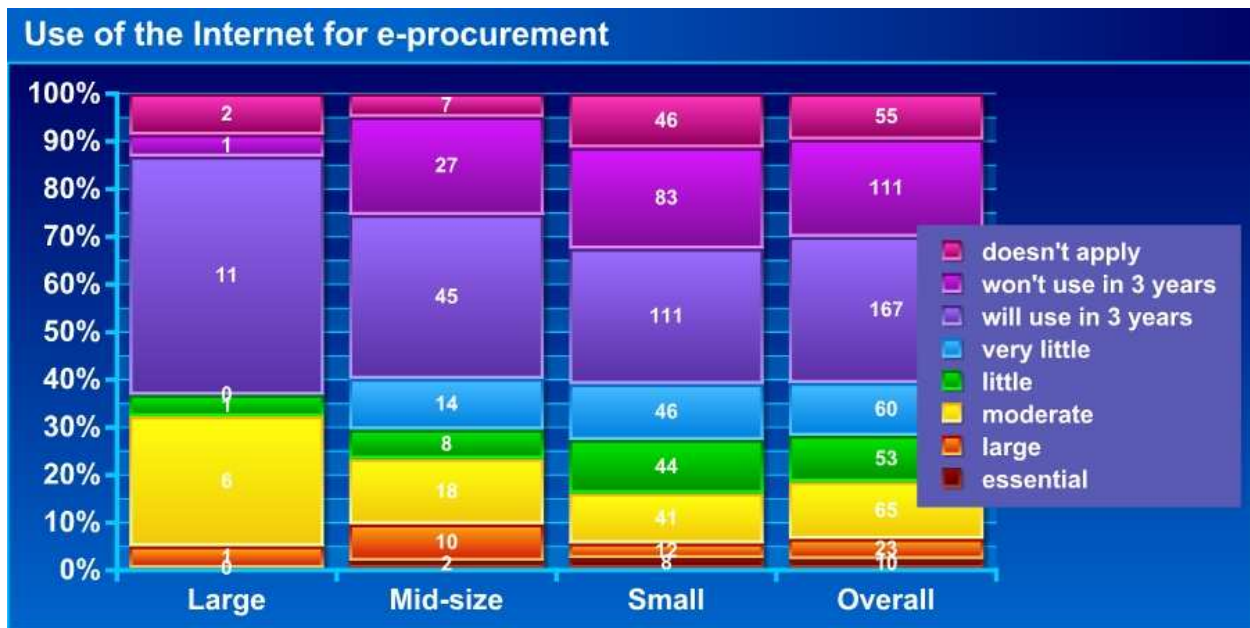


Figure 3 Current use of *e-procurement*, depending on the size of the company

The survey also attempted to assess the intensity of use (or intention of future use) of some procurement tools made available by the Internet, more specifically. Thus, respondents were questioned about the use of reverse auctions, exchanges (external hubs) and the company's extranet to relate to suppliers. Results are presented below.

Reverse auctions for service/materials' procurement

According to previous discussion, reverse auctions are a type of auction in which suppliers agree to provide a specific product or service and get into a competition to see who offers the smallest price, or the most favorable terms for the customer. Of course, competition tends to focus on the variable price, which can be easily compared, restricting the use of the tool to products that do not present significant quality diversion.

The percentage of companies which currently use reverse auctions at least moderately is small (9.5% among the large, 4.3% among the mid-size and 2.5% among the small ones).

Figure 4 presents the results for the question about the use of reverse auctions. Most small and mid-size companies do not consider this kind of purchase suitable to their businesses, or do not intend to use it within the next 3 years (68.1% and 74.5%, respectively). Among large companies, resistance to the new tool falls to 33.3%. If, on one hand, the rejection rate is smaller for large companies, on the other hand (as one could expect), the intent to use reverse auctions is significantly higher among large companies: 47.6% of them intend to start using reverse auctions to purchase materials within the next 3 years (compare to the 19.6% of mid-size companies and 13.2% of small companies that share the same intention).

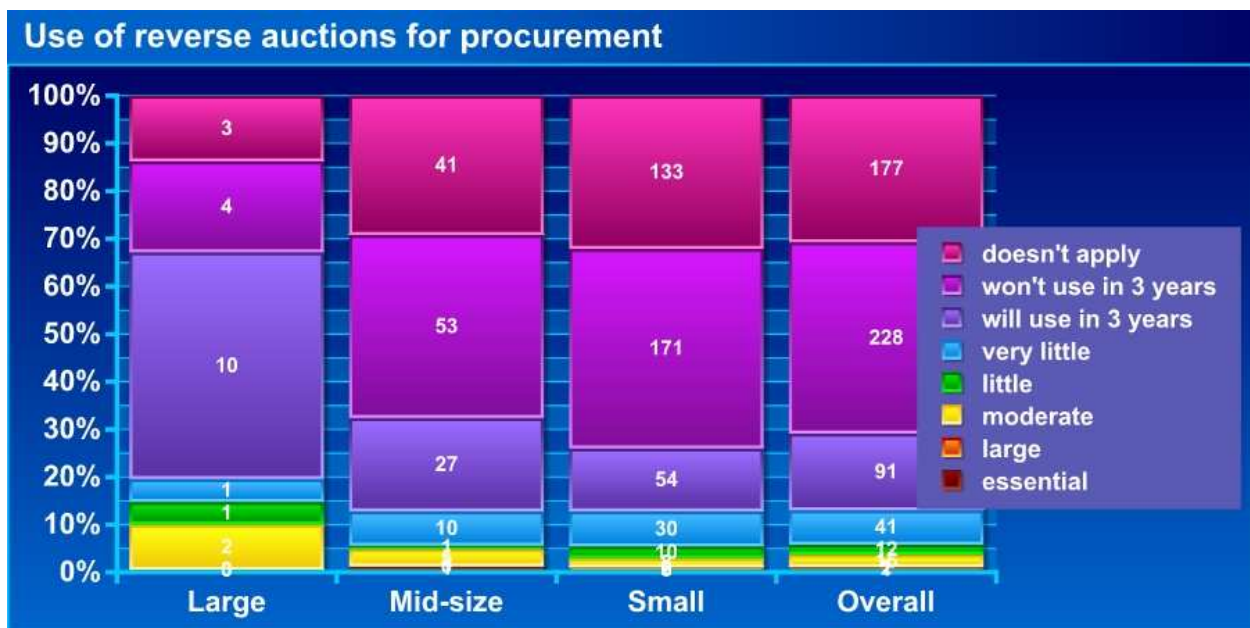


Figure 4 Current use of reverse auctions for procurement, depending on the size of the company

E-mail messages that were spontaneously sent to the authors of this paper by some participants, along with the answers to the survey, demonstrate their concern with the evolution of their customers' procurement initiatives involving electronic auctions. Two of those messages were particularly skeptic about the use of reverse auctions, fearing that the focus on the price will prevent companies of exploiting other competitive edges, with possible quality deterioration. That had already been anticipated by Bannan (2003), who warned companies about the risk of "commoditization" of products and services sold that way.

Exchanges

Although there is high expectation about the performance of electronic exchanges, used for corporate purchases, the level of use of this kind of external hub is still low in the Brazilian industry, as seen on **Figure 5**. Twenty per cent of large companies say they use electronic exchanges in (at least) a moderate way. Among mid-size and small companies, only ca. 5% reach that level of use. On the other hand, there is a great interest in using exchanges within the next 3 years, which somewhat confirms the trend that had been depicted from the review of the literature. Among large companies, 35.0% say they intend to start using electronic exchanges within the nest 3 years. For mid-size companies, that percentage is 37.3% and for the small ones, 30.1%.

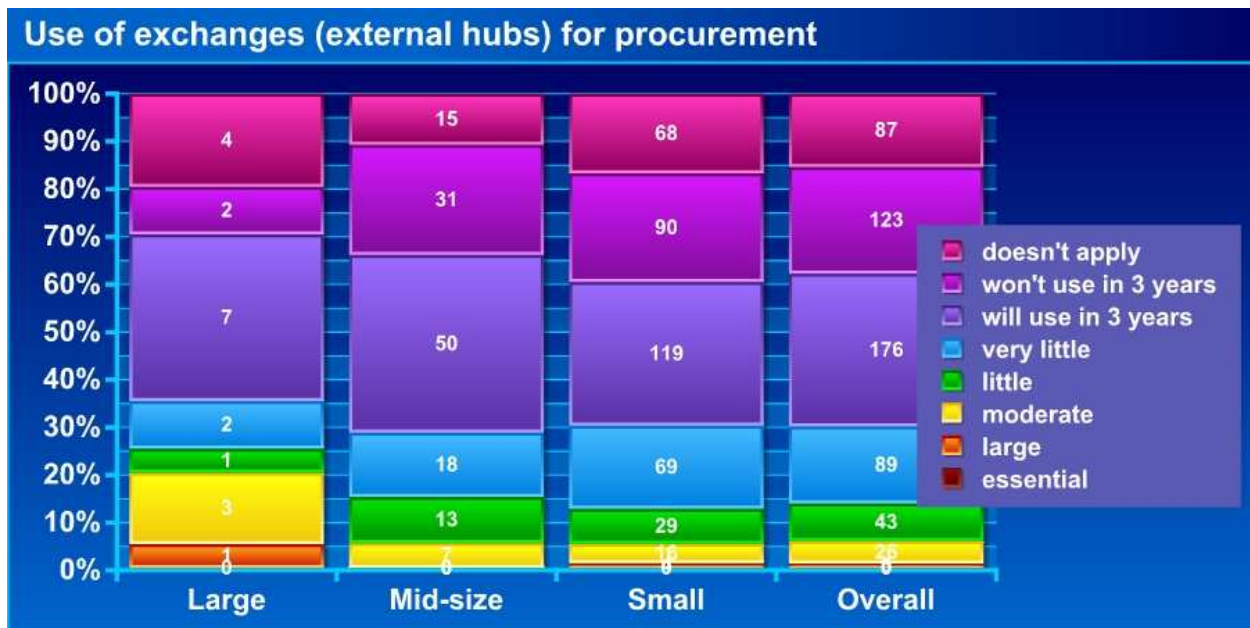


Figure 5 Current use of exchanges (external hubs) for procurement, depending on the size of the company

Extranets for suppliers

The same way as it happens with the exchanges, extranets are still not used to a great extent with the purpose of coordinating activities with suppliers. Large companies have a performance which is, again, a little better than smaller ones in that sense.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The study reveals that manufacturing companies have gone through considerable change, during the last three years, in the way they perform their procurement activities, as a result of the use of the Internet and other IT. The analysis of the answers to the questionnaire also indicated that the

Web is used more intensively for purchasing indirect materials than for direct ones, as expected. An interesting finding, though, was that the pattern of use of the technology (and intention of future use) changes, as a function of the company's size. This became particularly clear in the case of reverse auctions, which 65% of large companies intend to be using within the next 3 years, but which call much less attention of the mid-size and small manufacturers.

If the survey is carried out once again in a couple of years, it will be able to show if larger companies making more intensive use of the Internet is a definite trend or if they just started using the technology before and are, therefore, in a more advanced stage than smaller organizations.

The success of *e-procurement* isn't a direct consequence of the automation of existing procurement activities. Those practices have to be re-thought and adapted in order to benefit from the new technologies. The Internet allows companies to communicate and interact with suppliers to an extent that had never been considered possible, until just a few years ago.

One of the required cultural changes is to allow suppliers to have greater access to corporate data, such as inventory levels. In the past, such information was considered strategic and kept as a secret. Being aware of the customer's actual demand at all times, suppliers can adopt a more active role, offering their products at the time they are actually needed. It may even happen that the supplier assumes control over its customers' replenishment activities. However, that will only happen if (and when) the participants of a supply chain understand that they are better off when they behave as just "*one big firm*", establishing truly collaborative relationships with their customers and suppliers.

Among the organizational changes that have to take place so that companies can benefit the most from *e-procurement* is the need to increase the number of employees who are entitled to deal directly with suppliers, releasing the employees of the purchase area from most of their operational load and allowing them time for more strategic tasks. If that happens, the traditional procurement function tends to disappear. The new department will focus on understanding business requirements, establishing the coordination of the information interchange and improving the relationship with suppliers. Procurement staff will spend less time dealing with the bureaucracy of transaction processing and more time developing and improving negotiation strategies, selecting and evaluating the performance of suppliers.

Such changes demand, however, shifts in the power structure of the organizations and, therefore, face the resistance of those who consider the current situation comfortable, which may delay their introduction or even make it unfeasible, in practice, if not well conducted by those in charge.

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