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eProcurement by the Brazilian Government: Some Findings from a Case Study

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Abstract

The scope of this paper is to discuss the use of Internet Technology in the process of procurement currently employed by the Brazilian Federal Government. The focus of this analysis is on the Internet-Based Reverse Auction system employed by the Federal Administration to purchase goods and services from the standpoint of efficiency, efficacy and accountability. An explanatory single case study methodology addressing web-based purchase of pharmaceutical products by the Ministry of Social Security is used to answer the research questions raised in this paper. Technical, human and structural obstacles, as well as legal constraints that must be overcome, are also addressed. Conclusions detailing some findings and the advantages and disadvantages of this new modus operandi are also presented in this work.

1. Objectives

At this point in time, it is still difficult to grasp the meaning, opportunities and limitations of the “electronic government” concept fully (Prins, 2001). This does not mean that important steps have not been set in motion to achieve an information-based government. To date, governments have widely recognized the potential of new Information and Communication Technologies (ICT) to bring about fundamental renewal, not only in their operation but also in their position vis-à-vis other organizations, societal groups, or individuals (Fountain, 2001).

The intention of this study is to identify, in a general way, how electronic government can contribute to constructing a more agile, flexible and responsible State for its citizens.

In a more specific way, this study discusses Internet-based reverse auctions staged by the Brazilian Federal Government, analyzing the Electronic *Pregão*¹ no.12/00 – conducted by the Ministry of Social Security (MPAS) for the purpose of acquiring pharmaceutical products –, from the standpoint of efficiency, efficacy, and accountability.

Hence, the main questions this research purports to answer are:

- How has the e-procurement process of the Brazilian Government improved in terms of efficiency?
- How has the e-procurement process of the Brazilian Government improved in terms of efficacy?
- How has the e-procurement process of the Brazilian Government improved in terms of accountability?

2. Contextualization of the Problem

According to Mc Hale (1972), we live in an era of critical transformation, revolution and change. The rethinking of organizations and their productive processes has been triggered by the increasing development of Information and Communication Technology (Joia, 1994).

This was precisely the focus of a survey carried out by Symonds (2000), which stated that after electronic commerce and electronic business, the next Internet revolution would be electronic government. By electronic government, in its simplest form, we should understand it to involve the application of information and communication technology (ICT) to the process of public administration. There are

¹ *Pregão* is the Portuguese expression used in Brazil for “Reverse Auction staged by the Federal Government”

advantages that can be clearly verified both by government and by the citizen. For government, even though some data is lacking, savings of approximately 20% are estimated if the private sector patterns are accomplished. According to the survey, as per the U.S. budget, savings could be in the order of US\$110 billion per year.

In Brazil, the Federal Government's requirement is US\$4 billion. The changes are also significant for the citizen. Besides being able to access a 24 hour-a-day service, 7 days a week, with no lines and none of the usual bureaucracy, the technological and management innovation not only changes the way the government provides its services but also allows for re-structuring the role of the state in relation to society as to transparency, democratic procedures and citizenship participation, in accordance with a document published by the Organization for Economic Cooperation and Development (OECD, 1998). The same is true of corporations, as they have created real value for changing their processes, creating business models and redefining structures in their industries (Maira & Taylor, 1999).

The public administration's view can be judged from the opinion of the team coordinator of the Brazilian Electronic Government's site (Osório, 2001), who argues that the State's relationship *vis-à-vis* society becomes clearly defined in two segments as a result. Firstly, through government, the State pursues the objectives, as perceived by citizens, to be attained in the form of public policies such as those relating to monetary, fiscal, sanitary, social security, transportation development and consumer's right aspects, among the many areas in which it must interact. In the second segment, mainly through public policies adopted by the government, the State executes or creates conditions for the public administration to ensure that society may obtain the services desired by various groups: citizens, corporations, other governments (sub-national or supranational) and insiders – by the administration itself.

In both cases, the intensive use of ICT during the second half of the 90s has allowed for an effective increase in efficacy in the former segment, and efficiency in the latter.

The second segment includes the provision of services to society, which can be done via the government/citizen channel - G2C, the government/corporate and financial market - G2B/G2I, as well as the government/government (G2G) interface at different levels and spheres. The scope of this research is the study of the G2C channel established for the purchase of goods and services by the Government (G2B).

Starting in 1993, several Ministries began using the Internet to transmit information of interest, mainly the Ministry of Finance and the Ministry of Science and Technology that coordinated the Brazilian academic Internet, or RNP. From 1994 onwards, the impact of the Internet provoked the acceleration of the review process of the model that had previously been adopted. Several local companies succeeded in implementing a marked process of technological and even administrative modernization, for it was at this point that the renovation process of the State apparatus was initiated. In 1995, the quantity of federal government sites increased exponentially on the Web. In more recent years, the variety of sites has increased

not only in the federal area but also in the state sector with a focus on systematization of information in federal government by the Ministry of Planning through the site located at: <http://www.redegoverno.gov.br>.

An important step towards instituting more modern and efficient tools as well as transparency in governmental procedures was the creation of “Net Purchase” (net shopping), an on-line system which permits access to notices with invitation to bid, price determination and public tenders conducted by federal and all other levels of administration. In addition to all the initiatives outlined above, the Electronic Auction (*Pregão Eletrônico*) came on stream at the end of 2000, in a clear attempt to reduce costs incurred by the State when staging public tenders for contracting products and services from private companies.

The Planning Ministry is considering adopting the *Pregão* for all acquisitions whenever required, although it will be used exclusively to buy goods and contract services, the performance and quality of which can either be objectively appraised by “government issue” through standard market specifications, or can be offered by several suppliers and easily compared, in order to permit decision based on the lowest price. It does not apply, for example, to engineering works and services, which will continue to abide by the rules of public tender law N. 8666/93, as will be presented later in this paper.

2.1 Traditional Process of Government Public Tenders in Brazil

Machado (2001) analyzes the statute on public tenders in Brazil and its evolution over time, clearly illustrating the trajectory of Brazilian legislation concerning public sector purchases.

He singles out the law of 08/29/1928 as a landmark in legislation and states that some references are still in effect such as, for example, the definitions of the types of competition, the publishing deadline of the invitation to bid and other examples. He points out that during the period in which the country was under military rule, law number 4401/64 – which consolidated the public tender concept – was enacted, in addition to Decree-Law 200/64, which constituted a key aspect of the administrative renovation proposed by the government. This renovation aimed at creating an agile, decentralized and de-concentrated state, in order to implement the agility of the private sector in the public sector. However, it is common knowledge that there was a great deal of abuse.

The next step was Decree-Law 2300/86, which remained in force until the drafting of the 1988 Constitution.

Law N. 8666/93 was elaborated for regulating art. 37, paragraph XXI, of the Federal Constitution, and it was passed within a singular historical context marked by public concern in relation to accusations of corruption. This gave rise to a wealth of detail in relation to procedures in an attempt to wrap up the subject conclusively, leaving little room for self-regulation or adaptation of procedures to specific

circumstances. Still, according to Machado (2001), the text of this same law stipulates the following form of tender procedure for purchasing and contracting.

- a) Public Bid – Those interested shall fulfill the qualification prerequisites required by government edict; this applies to purchases in excess of R\$650.000,00² – or R\$1.500.000,00 (in the case of engineering works and services)
- b) Price Determination – This allows for previously registered suppliers bidding to supply amounts up to the limit mentioned above.
- c) Invitation to Bid – This form involves the selection and invitation to bid of a minimum of three suppliers in the same region for the desired product or service. It can also be adopted for purchases over R\$80.000,00 or R\$150.000,00 (in the case of engineering works and services)
- d) Public Competitive Examination – This form is adopted for choosing technical, scientific or artistic work through a prize or earnings, according to the criteria defined in the government issue.
- e) Auction – This is the method adopted for sale of discarded goods and impounded or pawned products through bids.

For judgment criteria, the law stipulates that the alternative with the lowest price, best technical aspects or lowest price combined with best technical aspects be the winner.

2.2 The Electronic Pregão in Brazil

It was the recent Provisional Measure N. 2 - 026/2000 of 04/05/2000, regulated by Decree 3555/00 of 08/08/2000, which established the *Pregão* as being the chosen procedure for the acquisition of basic goods and services up to any amount throughout the Federal Union, including the state legislative and judiciary. Purchases that must be conducted on the basis of technical aspects and price criteria will be excluded from this option.

The Electronic *Pregão* in Brazil was regulated by decree of 12/21/2000, which controls the utilization of Information and Communication Technology.

According to Braga (2001), there are two mechanisms under scrutiny that characterize the Electronic *Pregão* as a tool for speeding up services and eliminating bureaucracy, namely the definition of the lowest price and the straightforward qualification of a winning contestant

The Electronic *Pregão* can be adopted for the same types of purchase and contracting operations conducted by competitive bid. It can be conducted in public session through a system that uses communications via the Internet. Furthermore,

² US\$ 1 equals nearly R\$ 2.5 (circa March 2002) – R\$ (real) is the Brazilian currency

the contestants may place electronic bids making use of encryption resources, thereby guaranteeing information security. Consumer goods and services may be acquired via the Electronic *Pregão*, once the patterns of performance and quality are clearly defined by an invitation to bid using specifications in current use on the market.

3. Research Methodology

A single case study methodology will be used in order to analyze the efficiency, efficacy and accountability of the Electronic *Pregão* developed by the Brazilian Government. The main focus is on the procurement process elaborated by the Ministry of Social Security, hereinafter called the MPAS, to purchase pharmaceutical products from several potential suppliers.

The research methodology used in this article, as stated above, was the single case study approach. Case studies are particularly suitable for answering “how” and “why” questions, and are ideal for generating and building theory in an area where little data or theory exists (Yin, 1994). It also enables the researcher to use “controlled opportunism” to respond flexibly to new discoveries made while collecting new data (Eisenhardt, 1994). Embedded single case research methodology (Yin, 1994) was used in this paper, as multiple units of analysis were taken into account and measured. Yin’s tactics (construct validity; internal validity; external validity; and reliability) were carefully considered in this research. In particular, construct validity was dealt with in the study through the use of multiple sources of evidence – as several bids relating to different pharmaceutical products were examined and collected –, the establishment of a sequence of evidence, and having the members of the group review the draft case study report. Internal and external validity in the findings was also taken into account, mainly by applying statistical analysis and replication logic respectively. Finally, the reliability of the results was ratified using a case study protocol and developing a case study database.

An explanatory approach was applied in the case study. Explanatory case studies are useful for assessing how and why an intervention is working. The methodology verifies whether problems and modifications are needed in the intervention, and try to explain the causal effects found. Different sites are needed in order to develop a comparative analysis. (Morra & Friedlander, 1999).

Then, as presented earlier in this paper, the main questions this research purports to answer are:

- How has the procurement process of the Brazilian Government using the Electronic *Pregão* improved in terms of efficiency?
- How has the procurement process of the Brazilian Government using the Electronic *Pregão* improved in terms of efficacy?

- How has the procurement process of the Brazilian Government using the Electronic *Pregão* improved in terms of accountability?

4. Theoretical Reference

4.1 E-Procurement

According to Kalakota & Robinson (1999), there is great confusion between purchasing and procurement. Purchasing refers solely to the process of buying goods and services, whereas procurement is a macro-process involving not only the process of purchasing of services and goods but also the logistics, storage, reception, inspection and monitoring processes.

E-procurement might be interpreted as the procurement macro-process developed with the help of Internet technology. According to Neef (2001), there are three types of e-procurement:

- buy-side desktop requisitioning – the employees, themselves, through their desktops and using the corporate intranet and its link with the Internet, undertake on-line purchase, complying with the company's buying routines and procedures;
- buy-side centralized procurement management – purchasing managers (for instance), on behalf of the company, control the whole procurement process, analyzing transaction data and undertaking the management of the suppliers;
- sell-side applications – solutions developed by potential suppliers to help them negotiate their products and services on the web.

The E-Procurement solution adopted by the Brazilian Federal Government is based on the buy-side centralized procurement management model. Hence, this will be the type of e-procurement analyzed in this paper.

4.2 Performance Measurement

According to Ballantine & Cunningham (1999), increasing recognition of the need to monitor multiple dimensions of performance has led to the development of a substantial body of Performance Measurement literature (see, for example, Brignall *et al.*,1992 and Fitzgerald *et al.*,1991, to name only two). Among the earlier contributors to the literature, Checkland *et al.* (1990) conceptualized Performance Measurement by using the concept of a system and the measures necessary for it to remain stable over time. Their research led to the recognition of three levels of

performance which, they argue, should be used to monitor a system's performance (see also Checkland, 1981):

- *Effectiveness*: Is the right thing being done?
- *Efficacy*: Does the means work?
- *Efficiency*: Is resource usage minimum?

Roebke (1990) largely concurs, recognizing the need to monitor effectiveness, efficacy and efficiency. He suggests that the three criteria constitute a hierarchy, within which measures of effectiveness are of more importance than measures of efficacy, which in turn are more important than measures of efficiency.

According to Morkate (1999), something is efficacious if it succeeds or does what it should do. He defines efficacy as a way to establish an objective to be met, which must include the quality of what is proposed. Further, he states that this objective must delimit a time at which one hopes to generate a determined effect on the product. For this to occur, an initiative becomes efficacious if one meets the expected objectives at a programmed time with the expected quality.

Accountability is an expression which originated from the English language to designate mechanisms of charging, billing, or, in other words, procedures of public responsibility of the governors (Campos, 1990).

To Campos (1990), this concept may be understood as a question of democracy. The more advanced the democratic stage, the greater the interest in democracy. And government accountability tends to follow the advance of democratic values such as equality, human dignity, participation and responsibility.

4.3 Reverse Auction on the Web

Auctions are an age-old mercantile practice, namely the public sale of objects to whomsoever places the highest bid. For Turban *et al.* (2000), auctions offer opportunities to buyers and sellers that are not available using traditional means; however, whatever the type, they have many limitations. When they are conducted on the Internet, they allow access to a greater number of both individual and corporate participants at a lower cost. According to the author's own prediction, this market is expected to hit the US\$ 52 billion mark in 2002.

Turban *et al.* (2000) further shows that electronic auctions have been around for many years like the one for pigs in Taiwan and Singapore, automobiles in Japan and the flower auction in Holland which was already using information technology resources back in 1995 (Kambil & van Heck, 1996). It was during the course of that same year that auctions began being conducted on the Internet.

Electronic auctions are broadly similar to traditional auctions except that they are conducted with the use of a new tool – the computer. On the Internet, host sites

function as intermediaries offering services to anyone wishing to sell their merchandise and, for those seeking to buy, it's the ideal way of placing their bids.

There is no lack of information. It is available on-line or can be obtained by e-mail for items of greater value. Offers can be submitted via e-mail or by filling out electronic forms. Those that remain for longer periods are shown on the site. However, the names of bidders are kept secret. It has been noted that some sites demand codes of conduct that participants must abide by in order to conclude their transactions.

According to the author (Turban *et al.*, 2000), there are several ways of classifying auctions. He emphasizes the U.S. model, which is used when sellers offer many identical items simultaneously. In this category, offers are increasing exponentially and products are sold to the highest bidders. In the Dutch auction, generally open to the public and patented by Bid Com International of Ontario, Canada, the prices drop until buyers make an offer.

In Brazil, the Federal Government adopted the Reverse Auction based on the Dutch model for acquisition of goods and services, whereby the Government defines a base price, a maximum duration for the auction is established and companies place their bids via the web until the auction is finalized.

From the legal standpoint, the Brazilian Federal Government has decided to call this new form of public tender *Pregão*.

5. Case Study Analysis

The case study analyzed in this paper is that of *Pregão* N. 21/2001 conducted by the Coordination of General Services of MPAS, in line with the terms of the Electronic Auction Paper available on 08/18/2001 at the following address: <http://www.comprasnet.gov.br/pregão.asp> and opened at 3:00 p.m. on August 9, 2001, in accordance with legal precepts for purchase of pharmaceutical products, in order to supply the needs of the Ministry's Medical Assistance Pool.

As previously stated, the auction was opened at 3:00 p.m. on 08/09/2001 and suspended at 7:15 p.m. of the same day. It was re-opened at 8:00 a.m. on 08/10/2001 and closed definitively at 9:25 a.m. on 08/10/2001, with a total duration of five hours and forty minutes.

5.1 Data Collection and Analysis

- The *Pregão* included 164 items to be auctioned, 34 of which were not adjudicated.

- The reference value offered by the Ministry amounted to R\$1.427.894,40 relating to 130 items auctioned.
- The total acquisition value relating to the 130 adjudicated items amounted to R\$1.004.952,95.
- The 34 items canceled because of lack of offer had been allocated R\$143.030,15 (reference value).
- There is no record of appeals as the *Pregão* was closed at 9:25 a.m. on 08/10/2001
- The *Pregoeiro* (The Auctioneer in the Electronic *Pregão*) excluded some proposals either due to discrepancy or impracticability.

As seen above, the variation between the total budget allocated for acquisition and the total budget spent, after discount, for 134 acquired items was of -29,62%, as follows:

Total allocated: R\$1.427.894 (approximately US\$571,000)

Total spent: R\$1.004.952 (approximately US\$401,981)

Therefore, the difference in its favor between the reference price used by the Ministry and the product acquisition value attained the impressive figure of nearly 30%.

After careful analysis of the bids placed for all the items auctioned (128 observations), applying statistical tests for internal validity of the case study (Yin, 1994) and working with LN (bid)³, in order to verify whether there is any statistical correlation between the number of bids for a product and the discount obtained by the Federal Government in the purchase of this specific product, it was seen that:

- Simple regression gave us $R^2 = 0.33$; which for a simple regression is significant ($p \sim 0.6$). Hence, there was a positive correlation between the number of bids and the price discount (as a percentile) on the items auctioned, i.e. the greater the number of bids, the lower the price paid by the Government for the corresponding item auctioned.
- The adjusted regression found was: $\text{Discount} = 7.5635 + 11.0856 \cdot \text{LN}(\text{bid})$.
- For each variation unit in LN (bid), we found an average discount of 1.0856% in the item auctioned.

³ Neperian logarithm of the number of bids as a reference variable

6. Closing Remarks

As stated above (Prins, 2001), at this early stage, it is still difficult to grasp the meaning, opportunities and limitations of the “electronic government” concept fully. However, one major conclusion can be drawn, namely that there is a pressing need to integrate e-government and e-commerce (Kubicek & Hagen, 2001), and e-procurement is the ideal link to make such integration feasible.

On the basis of what has been outlined above and answering the research questions, it is possible to conclude that:

As to efficiency, it has been demonstrated that through the Electronic *Pregão* model it is possible to achieve:

- A reduction of nearly 30% in product acquisition costs for the public sector, without factoring in savings in procedural costs, since they are not available for research.
- A reduction in the number of intermediaries, as the system makes it possible for the producer to sell directly to the consumer (in this case, the Federal Government); an almost certain increase in the number of suppliers as technological innovation removes geographical limitations by making the process available to the entire country via the Web. Hence, as argued by Turban *et al.* (2000), in Web-based reverse auctions, the admission barriers are far less than for traditional auctions, thus leading to lower acquisition prices for the auctioneer.
- As a ripple effect, product prices tend to fall the greater the number of participants involved, and also, due to the transparency of the process, making it possible for suppliers to analyze whether they can bid a lower amount than the one listed on the Web, by lowering their bottom-line.

Efficiency involves achieving more for less; therefore this acquisition model is clearly efficient. However, only after an evolution in scale would it be possible to make a comparison between this procedure and others to be established in the future.

As regards efficacy, it is also possible to see that the on-screen procedure meets the desired objective, as it has brought about a drastic reduction of time involved, which is highly relevant as we are dealing with acquisition of pharmaceutical products. Usually, a public tender of this kind would last several weeks. In this case, only five hours and forty minutes were needed to accomplish the targets set by the MPAS.

Where accountability is concerned, the transparency of the procedure adopted is indisputable, as it guarantees access to information and real-time follow-up to all citizens, making it easier for society to control the application and use of public resources. All data is available on the Web and anyone may monitor any auction staged by the Government.

Regarding effectiveness (Checkland, 1981), the authors understand that the right thing has been implemented, though this implies a value judgment, so we will not dwell on this aspect.

Another highly significant result was the actual cost reduction of nearly 30% for acquisition of pharmaceutical products, in addition to the marked correlation between the number of bids placed and the cost reduction percentage, with a price reduction of nearly 1% for each bid entered.

Although presented as a single case study, 128 observations were recorded addressing auctions of different goods, so it can be said that an embedded single case study was undertaken, as multiple units of analysis were taken into account and measured. Construct validity was ratified by using several data sources; internal validity was achieved through the statistical analysis of the case; external validity was ensured as several auctions were analyzed, proving that these results can be replicated - *ceteris-paribus* - in other situations; and finally, the reliability of the case was confirmed by using a case study protocol, developing a data base and asking other people to review the paper.

As previously stated, an explanatory approach was applied in the case study. Explanatory case studies are useful to assess how an intervention is working and why. The methodology verifies whether problems have arisen and modifications are needed in the intervention, and tries to explain the causal effects found. Different sites are needed in order to develop a comparative analysis (Morra & Friedlander, 1999).

From the legal point of view, the *Pregão* is an improvement on the rules of participation for the Federal Public Administration. This new model opens the market up for increased competition and broader participation of players in public tenders, thus contributing to the overriding effort to cut expenses in line with the goal of fiscal adjustment. The *Pregão* guarantees an immediate saving in the acquisition of goods and services, especially those involved in the costs of the federal administrative machine. This model also permits agility in acquisitions as bureaucracy is removed from the legal procedures.

Finally, as said by Lenk & Traunmüller (2001:72):

“There are good reasons to believe that the public sector cannot stay aloof as commercial business is undergoing deep changes. The technology potential itself changes widely-held fundamental concepts of good practice.”

This research constitutes a clear illustration of this statement.

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