Fuel Reselling: Electronic Documents and Tax Surveillance

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Abstract: - Considering fraud and the challenges related to the surveillance of gas stations in Brazil, this paper aims to present models of electronic tax documentation and scenarios studied for the development of SAT-RP-e (Authentication and Transmission System of Electronic Pulser Register), an Internet of Things solution that aims to introduce a new electronic document and to transmit data collected from the fuel pumps to the tax surveillance bodies via the Internet. This paper also aims to show how electronic documents and automation, when used together, can enable the government to validate different data declared at different points in the supply chain and to indicate the most efficient allocation of government fiscals to determine points of fraud in the distribution of fuel, and the importance of a source of data that can be collected automatically, without human intervention.

Key-Words: - fuel pumps, gas stations, tax surveillance, electronic documents, frauds

1 Introduction

In the supply chain of fuel distribution, there are multiple opportunities for fraud to be introduced. At gas stations, fraud can occur at the fuel tanks, pumps, point of sale, etc. As a result, lack of confidence and credibility are frequent complaints about these establishments in many countries around the world.

In addition to the examples previously introduced by the authors in a previous publication [1], contacts with fuel industry representatives and access to content published by international news media, have revealed the expansion, advancement and development of new frauds, as well as concern regarding accurate identification of fraud occurrence.

But even though they are installed in a common environment, which are the gas stations, frauds do not always pursue the same goals (quantity, quality, etc.), are not necessarily implemented in a single point (pumps, tanks, etc.) and neither requires the same technological resources.

While most of the fraud in the United States is related to identity theft from credit/debit cards utilized by consumers at the payment modules of the pumps [2]; and in India some consumers pay for more fuel than they receive [3]; in Brazil, the scenario appears more complex and challenging, with fraud that ranges from the sale of fuel without issuing the required tax document, to pumps that deliver less than the amount of fuel displayed, to electronic systems installed in pumps that can remotely turn off fraudulent systems when the surveillance team inspects the gas station.

Increasing the complexity of the situation in Brazil, there exists an extensive number of gas stations distributed across the 8.516 million km2 area of the country. According to a survey conducted by ANP (National Agency of Petroleum), in 2015 there were 39.763 gas stations active in the country, of which 8.849 were concentrated only in the State of São Paulo, who leads the ranking, followed by the State of Minas Gerais, which has a significantly lower number (4.346 gas stations).

The diversity of fraud and the use of increasingly advanced technological resources requires celerity from the government surveillance bodies to identify evidence of irregularities. In other words, this means that controlling the taxes exclusively based on paper documents and visits to establishments is a procedure that has become obsolete, introducing a gap capable of being filled by technology, specifically by automation and electronic documents.

Especially in regards to automotive fuel reselling, electronic tax documents have significantly contributed to the efficacy of tax surveillance bodies in Brazil, specifically in the State of São Paulo. With the help of electronic documents arising from projects already implemented, such as NF-e (Electronic Invoice), the

CT-e (Electronic Bill of Lading) and the SAT-CF-e (Authentication and Transmission System of Electronic Receipt), surveillance teams are able to monitor business operations in real time, such as the sale of fuel by the distributor to the gas station; the fuel transportation; and the resale to the final consumer.

Thus, this paper aims to present some of the major electronic documents involved in the operational model of liquid fuel reselling, as well as the scenarios studied for the implementation of SAT-RP-e in the State of São Paulo, which was developed from an initiative of the Secretary of State Treasury of São Paulo and briefly exposed in a previous work [1].

The SAT-RP-e consists of a solution, applying the concept of the Internet of Things, that introduces a new electronic document (RP-e), not fiscal, that gathers data collected from the fuel pump, such as the volume provided, the kind of fuel, etc. The RP-e is transmitted over the Internet, from pre-defined parameters, so that their data can contribute to the analysis undertaken by the tax surveillance teams.

2 Considerations about the operational model from the reselling of liquid fuel and the government surveillance bodies

The operational model of liquid automotive fuel reselling occurs in a very similar way in several countries around the world. In general, a gas station must be legally established, purchase fuel from authorized distributors, have adequate and safe place to store the fuel and resell the fuel only through pumps with appropriate installation conditions and pass regular inspection.

In Brazil, ANP has the legal competency to supervise and regulate the activities related to the oil industry, biofuel and national fuel supply [5]. For this reason, the Agency regulates the criteria that permits the constitution of a gas station; lays down the rules to be observed in a gas station's installation; lists the conditions for the purchase of automotive fuel; determines the fuel products that can be marketed; establishes standards for the display of prices to consumers; etc [6].

Furthermore, the National Institute of Metrology, Quality and Technology (INMETRO) is the responsible governmental organization to supervise, regulate and approve the metrological parameters that should be followed by the fuel pumps. The inspection is made by INMETRO in all Brazilian gas stations, with the operational support of its delegates bodies, such as the Institutes of Weights and Measures (IPEM).

In order to ensure proper tax collection, free market competition and the prevention of illegal practices, the Secretariats of the Finance of the States are also responsible for the surveillance of the gas stations. In São Paulo, since December 2004, the Secretariats of the Finance of São Paulo carries out a special operation ("De Olho na Bomba"), having closed at least 1.000 gas stations, which marketed adulterated fuels [7].

3 Electronic Documents and Fuel Reselling

Brazilian law determines the issuance of different tax documents to protect tax collection during activities inserted in the operating model of reselling liquid automotive fuel. Following, this paper will present some of the main tax documents inserted in the operational model of a gas station located in São Paulo:

- electronic Invoice (NF- e);
- electronic Bill of Lading (CT- e); and
- CF-e–SAT.

The implementation of tax documents in electronic format adds significant efficiency to the processes, as it simplifies the taxpayer's obligations and also facilitates the monitoring and the analysis by tax surveillance teams [8]. In Brazil, the interchangeability of tax documents on paper by tax documents in electronic format, became possible since 2005 [9].

3.1 NF-e

Since June 2008, the fuel distribution companies operating in Brazil are required to issue the Electronic Invoice (NF-e), an exclusively digital document, issued and stored electronically, with a purpose of documenting the movement of goods operations or provision of services between corporations [10].

The NF-e replaces an invoice standard, previously adopted in the country (models 1 and 1-A), which was exclusively based on paper, with XML (eXtensible Markup Language), which is digitally signed by its issuer and needs an authorization concession by the competent tax government agency for its utilization.

Specifically in the case of fuels and lubricants, the legislation of the NF-e established, in March 2013, a specific requirement to the issuance of the NF-e: the Recipient Manifestation [11].

The goal is to enable the recipient of the NF-e to confirm the information provided by the issuer of the NF-e, through events. These events are important to guarantee the legality of the commercial operations involving gas stations, as well as to avoid tax liabilities from being fraudulently imputed to inexistent taxpayer's, complicating simulations in the operation of gas stations.

Since the establishment of the NF-e, in October 2005, until the submission of this paper (June 2016), the NF-e has recorded over 1,318,000 issuers and 14.283 billion authorized documents. Among the main advantages offered by the model stand out, for taxpayer's, the reduction of printing and storage costs; and, for the surveillance teams and governmental bodies, greater control over fiscal operations, with expectations of decreased tax evasion and increased revenue, without raising taxes [12].

3.2 CT-e

The Electronic Bill of Lading (CT-e) was established by Brazilian law in October 2007, among others, in order to replace existing document standards, with the same purpose, implemented on paper. Until this submission, the CT-e had 1,539,000,000 authorized documents and 74,033 issuers [13].

Brazilian law imposes the obligation to issue the CT-e to all companies providing transportation freight services, regardless of the mode of transport used, which includes transportation of fuel by tanker trucks provided by third parties.

Similar to the NF-e, the CT-e is also an exclusively digital document, issued and stored electronically and digitally signed. It consolidates tax information about the transportation, the data of the NF-e corresponding to it, and its use must be authorized in advance by the tax bodies.

The operating model of the CT-e is based on events, understood as the record of actions or situations that may occur during transportation of the goods, after a grant of authorization to use the CT-e, such as cancellation of service, problems with modal transportation, etc. It is the duty of the service provider keep all events updated, which enables government bodies to monitor all the situations that occur during the supply chain of the goods [8].

Among the advantages from the use of CT-e by the surveillance bodies, it's important to highlight the improvement of tax control processes, greater access to information about goods in transit and the simplification of the procedures for exchange tax information between governmental bodies.

3.3 CF-e-SAT

Unlike the tax documents previously presented, which are related to commercial transactions between taxpayers with equivalent tax obligations, the CF-e-SAT registers a specific electronic receipt regarding information about the sales made to final consumers. According to Brazilian law, the tax document shall be issued, among others, to each fuel sales operation [14].

The CF-e-SAT, just as the previous ones, exists as a digital document, issued and stored electronically and digitally signed. However, unlike the others, it is generated from a specific hardware, called SAT (Authentication and Transmission System), which is able to generate documents offline and transmit them to the competent tax government agency, whenever there is availability of Internet.

By the time a CF-e-SAT is generated, the device also provides to the taxpayer an extract, that should be printed and delivered to the final consumer. With this document, the consumer is able to use a specific application ("De Olho Na Nota") to read the QR-Code available on its layout and check the integrity of the device from which it was generated, and consequently of the electronic document generated. In São Paulo, the fuel gas stations are required to issue the CF- e- SAT since July 2015.

4 Contribution of electronic documents with the gas stations tax surveillance

Electronic documents are present in significantly sensitive stages of the operational model of the gas stations, for example, the purchase, transportation and fuel resale. All these stages have experimented the installation of different frauds identified in the country, as the examples extracted from Brazilian communication media [15-18].

Above all, one of the greatest advantages that has been introduced by the electronic documents to the governmental bodies was, among others, the possibility to know the commercial operations while they are happening or after a short interval of time. This means that, with the information updated,

governmental bodies are able to act more effectively, even preventing illegal practices.

The analysis of electronic tax documents as NF-e, CT-e and CF-e-SAT, crossing sensitive information, enables to identify evidence of fraud to facilitate better performance from tax surveillance teams. By comparing the NF-e issued by a fuel distribution company to a particular retail gas station, with the CF-e-SAT issued by the gas station to the consumers, surveillance teams are able to identify, for example, incidents as the resell of a volume of fuel different than the volume that have been acquired from the distributor, which, in theory, would suggest fraud in the acquisition and the need for directing the surveillance activities to a determined taxpayer.

Moreover, electronic documents enable the tax inspection teams to increase in tax collection, without raising the tax burden, as mentioned before. That is, the inspection is directed to taxpayers with evidences of irregularities, without burdening taxpayers that act regularly, and neither discourage others who obey the law, which consequently will end up being benefited by a more equal competition in the market.

However, it was realized in São Paulo that, despite all the facilities introduced by the electronic tax documents, there still exists the need of verifying the volumes effectively delivered by the fuel pumps. This information could reveal irregular practices such as simulations of buying and selling fuel or even the installation of electronic fraud that changes the real fuel volume delivered to consumers.

But more than knowing the volume of fuel delivered by the pumps, the Secretary of State Treasury of São Paulo realized that, to prevent data manipulation, the data should be necessarily collected and sent automatically, without any human intervention. With a deployment like this, the tax surveillance teams would be able to know exactly the volume of fuel manipulated by the gas station and compare with the NF-e from fuel acquisition, CT-e of the fuel transported and CF-e-SAT indicating the volume sold.

The information captured automatically and without human intervention introduces a different and relevant aspect to the tax surveillance work at gas stations, that is the possibility to compare the information declared by the taxpayer with those that have been collected automatically by the automation system. When there's no divergence, the actuation of the gas station can be presumed as legal and correct and, when the divergence is verified, a surveillance work must be done to identify the reason.

This means that, even if a gas station eventually decides to buy a certain volume of fuel without a corresponding NF-e, or sell without issuing the CF-e-SAT to consumers, the tax surveillance teams would be able to notice this illegal practice through the data automatically collected from the fuel pump, among others, by trying to locate the corresponding NF-e, for example.

Moreover, with the data collected from the fuel pumps being available to the tax surveillance teams, different kinds of analysis could be made. With the help of specific software, surveillance teams could set different alerts for events previously defined and be notified in every occurrence. An alert could be generated every time a certain gas station sell more than a predetermined volume of fuel, for example.

By seeing all the benefits that the automation and electronic documents, when used together, can bring to the job of tax surveillance teams, the Secretary of State Treasury of São Paulo motivated the development of a research work, that resulted in the SAT-RP-e.

5 SAT-RP-e

By pursuing similar goals, including the availability of tools which allow the remote work of tax surveillance teams, the SAT-RP-e was developed on the pillars of the Project SAT- CF-e, as discussed by the authors in a previous publication. The biggest challenge assigned to the SAT-RP-e was to provide to the tax surveillance teams, via the Internet, and in a configurable time interval per taxpayer, the liquid flow and sales collected from each fuel pump from the State of Sao Paulo [1].

The SAT-RP-e is an automation solution, consisting of an armoured hardware with embedded software, which collects data from deliveries of fuel from the pumps (volume, fuel type , date, time , etc.), consolidating them into a new electronic document, not fiscal, that observes the XML standard, called RP-e.

In every flow of liquid fuel at the pump, whether as a result of sales or tests (measurement), the SAT-RP-e generates a RP-e, digitally signed, to be transmitted to the tax

surveillance bodies, according to parameters previously defined and Internet availability.

To achieve its purpose, the SAT-RP-e has considered three different deployment scenarios. They had in common the premise of the installation of the hardware responsible for the collection of data inside the electronic head of fuel pumps and the transmission of signed XML over the Internet, but have significant differences with respect to the receiver, processing of information and impact that could potentially be introduced in the activity of gas stations.

5.1 Scenario 1

The first scenario has considered replacing the fuel supply data (volume, fuel type, date, time, etc.), collected from the pumps by the SAT -RP-e, for a "new" SAT- CF -e.

Thus, at the time of generating the CF- e- SAT, the "new " SAT-CF-e would be responsible for conciliating the data collected by the SAT- RP- and those reported by the software from the selling point.

During conciliation, if discrepancies between the data collected by the SAT-RP-e and those reported by the software from the selling point are identified, the "new" SAT-CF-e would be responsible for sending an alert to the software from the selling point and inserting an error registration in the CF-e-SAT's XML.

The SAT-CF-e is “new” because the conciliation routine idealized in this scenario would imply the need of replacement of all SAT-CF-e devices that are already being used at the gas stations in São Paulo because the current hardware configuration does not allow for this.

Another significant impact linked to the scenario is that the data collected by the SAT-RP-e, without a corresponding CF-e-SAT, would not be transmitted to the tax surveillance bodies.

5.2 Scenario 2

In the second scenario, the SAT-RP-e would be responsible for conciliating the data collected from the fuel pump (volume, fuel type , date, time , etc.) with those that have been computed by the pump's motherboard and displayed to the consumer for payment.

If there is divergence between the data, tax surveillance bodies would be able to remotely command a lock procedure to prohibit the fuel pump's usage and operation. In addition, the SAT-RP-e would responsible for transmitting all RP-e’s generated, through the Internet, not depending on the issuance of the corresponding CF-e-SAT.

5.3 Scenario 3

In the third and last scenario, SAT-RP-e would be responsible for collecting the data from the fuel pump (volume, fuel type, date, time, etc.), generating the RP-e and sending it to the tax auditing bodies, signed digitally, without any preliminary conciliation.

This means that, in this scenario, the conciliation routine of RP-e data and tax documents data would be made by the tax bodies and would not be a function of the equipment. This would simplify the implementation process, thereby reducing the costs when compared with the others scenarios.

6 Conclusion

Considering the interests pursued by the tax auditing bodies, especially the need to identify only evidence of irregularities that will later be audited, as well as the intention to not impact the gas stations operation, and the concern to not to overtax the taxpayers, the optimal scenario chosen for the SAT-RP-e deployment was the third.

Adding to the list of electronic documents available to support tax auditing, the RP-e will provide an additional source of information, enabling Brazilian auditing teams to be better and more effectively directed to fraud identification at the liquid fuel reselling model.

However, there’s an important aspect that must be highlighted that is the possibility to export this model of integration between automation and electronic documents, mentioned before, to all the countries in which frauds at gas stations are present. The difference in each implementation can be parametrized to answer various kinds of problems that may be identified.

Lastly, although the integration with electronic documents is important, even when the countries does not have this implementation, the SAT-RP-e remains a useful and relevant tool, because with the data collected from the fuel pump, the auditing teams can, for example, proceed an analysis of the taxpayers behavior and conduce the work to those that deviate from the normality. For example, all the gas stations, located in similar places, sells an average amount of fuel, except one, that is the one

that must be audited to reveal what justifies the different behavior.

References:

[1] A.L. Beteto, V.A.Z.C. Melo, M.S. Pokorny, M.L.R.P. Dias, F.R.Oliveira, E.M.Dias, *A Brazilian Model of Electronic Monitoring of Liquid Automotive Fuel Retailing: Authentication and Trasmission System of Electronic Pulser Register (SAT-RP-e).* Available at http://www.wseas.us/e-library/conferences/2013/Nanjing/SCIE/SCIE-06.pdf. ISBN 978-960-474-356-8. WSEAS, 2013, p. 50-58.

[2] USA Today. *Thieves skim credit card data at fuel pumps.* Available at http://usatoday30.usatoday.com/money/industries/energy/2008-08-04-gaspumpskimming_N.htm.

[3] The New Indian Express. *Officials confirm pretol pump fraud in city.* Available at http://www.newindianexpress.com/cities/hyderabad/article185681.ece.

[4] Folha de São Paulo. *De 14 bombas de gasoline em SP, uma cobra mais do que deveria.* Available at http://www1.folha.uol.com.br/mercado/2015/08/1663447-numero-de-postos-interditados-por-fraude-na-bomba-cresce-23-no-pais.shtml.

[5] BRASIL. Lei n.9.847, de 26.10.1999, Art. 1.

[6] BRASIL. Resolução ANP n. 41, 05.11.2013.

[7] SEFAZ/SP. *Operação De Olho Na Bomba atinge marca de 1000 postos fechados por venda de combustível adulterado em SP*. Available at http://www.fazenda.sp.gov.br/publicacao/noticia.aspx?id=1788.

[8] SEFAZ/SP. *Manual de Orientação do Contribuinte (CT-e).* Available at https://www.fazenda.sp.gov.br/cte/Manual_CTe_v2.00a.pdf.

[9] BRASIL. *Protocolo de Cooperação ENAT 03/2005.*

[10] BRASIL. *Protocolo ICMS 24/2008.*

[11] BRASIL. *Ajuste SINIEF 07/2015.*

[12] Portal da Nota Fiscal Eletrônica. Available at http://www.nfe.fazenda.gov.br/portal/principal.aspx.

[13] Portal do Conhecimento de Transporte Eletrônico. Available at http://www.cte.fazenda.gov.br/portal/.

[14] BRASIL. *RICMS – Decreto 45.490/2000.*

[15] Polícia Civil de Pernambuco. *Polícia Civil apresenta o resultado da Operação Avaxi.* Available at http://www.policiacivil.pe.gov.br/index.php/noticias/5510-policia-civil-apresenta-o-resultado-da-operacao-avaxi.html.

[16] Portal G1. *Caminhão-tanque com 20 mil litros de gasolina é apreendido no Rio.* Available at http://g1.globo.com/rio-de-janeiro/noticia/2015/06/caminhao-tanque-com-20-mil-litros-de-gasolina-e-apreendido-no-rio.html.

[17] Portal BAND. *Postos de gasolina fraudam quantidade de combustível*. Available at http://noticias.band.uol.com.br/cidades/noticia/100000784869/postos-de-gasolina-fraudam-quantidade-de-combustivel.html.

[18] Rede GLOBO. *Postos fraudam bombas de combustível com controle remote.* Available at http://g1.globo.com/fantastico/noticia/2012/01/postos-fraudam-bombas-de-combustivel-com-controle-remoto.html.