How Rio de Janeiro Used an Electronic Invoicing Program and the Participation of Stakeholders to Streamline and Increase Service-Tax Collection

PROJECT DATA

PARTNER ORGANIZATION: World Bank

ORGANIZATION TYPE: Multilateral

DELIVERY CHALLENGES:
Capacity and skills; Citizen participation and community engagement; ownership and stakeholder commitment

DEVELOPMENT CHALLENGE:
Tax collection

SECTORS:
Macroeconomics, growth, and fiscal management

COUNTRY:
Brazil

REGION:
South America

PROJECT DURATION:
2009–13

PROJECT TOTAL COST:
US$1.045 billion

CONTACTS

CASE AUTHOR:
Neil Fowler

PROJECT EXPERT:
Laura Zoratto

In Brief

• Development Problem: Rio de Janeiro needed to increase revenue from service taxes without raising tax rates or placing significant new burdens on either the public administration or businesses.

• Program Solution: The city introduced Nota Carioca, an electronic invoicing program developed with the participation of stakeholders including the city administration and business owners. Incentives were also provided to encourage the involvement of the consumers from whom the service taxes are collected.

• Program Result: Revenues and tax collections have increased in some sectors. Nota Carioca is designed to be integrated with other systems and serve as the foundation for further improvements to revenue administration.

Executive Summary

In 2009, Rio de Janeiro sought to increase revenue by reforming the collection of service taxes. To that point service taxes had been collected using a paper-based system that placed heavy administrative burdens on both public administration and businesses, but was inefficient in the collection of the taxes.
Municipal leaders hoped that a new system would reduce administrative burdens, broaden the tax base, and increase tax collection.

The city chose to implement Nota Carioca, an electronic invoicing program that would be used by business owners and consumers to record and monitor service-tax payments. An electronic invoicing program would eliminate some of the paperwork previously required and enable the government to more easily confirm that taxes were being submitted and paid. It would also enable the government to integrate service-tax collection with other revenue administration systems.

Electronic invoicing systems were already in place nationally and in other municipalities in Brazil. Rio was able to draw on the experience of these municipalities and at the same time tailor Nota Carioca to its specific needs. Rio also had access to people in both government and the private sector who had developed the electronic invoicing systems being used elsewhere in Brazil.

The leaders of the reform team were carefully chosen by the mayor. Finance Secretary Eduarda La Roque held a doctorate in economics, had been an investment banker, and had owned an information technology company. She was also responsible for restructuring the city’s debt with the support of a World Bank loan. Subsecretary for Taxation Marcio Luiz de Oliveira led the day-to-day operations of the national electronic invoicing system.

The reform team started with the national model, including the concept, layout of data, manuals for system integration, and information required for building the data archive, and adapted it to meet Rio de Janeiro’s specific needs. All the participants in Rio’s development team had clearly designated responsibilities and worked in the same room to ensure rapid communication and testing of changes to the software. The software was designed to be collaborative and responsive to changing needs.

Nota Carioca included incentives to increase participation by customers. Retail customers received cash payments paid directly to their bank accounts as a reward for submitting electronic invoices. They also received a lottery ticket for a cash prize in return for every transaction reported regardless of size.

Private sector allies in the business community were instrumental in encouraging the participation of business owners. The Accountants Union and the Commercial Association of Rio de Janeiro held meetings to explain the new system to business owners. This was especially important in the effort to ensure compliance by small, cash-based businesses.

The rollout of Nota Carioca was staged to enable adjustments to the software and to allow more time for smaller businesses to prepare. Nota Carioca was initially launched for voluntary company registration. Mandatory registration was subsequently phased in, beginning with the largest companies, until all remaining companies had to register.

Nota Carioca appears to have resulted in increases in revenue. Tax collections increased in the first three years after adoption, and those increases appear to be permanent. It is difficult, however, to distinguish between increases in revenue that stem from the implementation of Nota Carioca and increases that stem from economic growth. Tax collection increased in some sectors more than others, and the tax base was broadened by the addition of smaller businesses.

Nota Carioca led to several collateral benefits for Rio de Janeiro. By cross-referencing the information in the Nota Carioca database with the information in a registry of companies doing business in Rio, the city was able to collect service taxes from companies that were registered in lower-tax jurisdictions. The databases of sales tax receipts could also be linked to the government’s procurement processes providing revenue benchmarks for budgeting purposes and ensuring that the government’s costs are in line with those in the private sector. Nota Carioca was designed to be the foundation for further improvements to revenue administration.

Some of the efficiencies and revenue gains were offset by increased costs. Although the software was paid for by a private party and donated to the city, the municipal government was responsible for operating costs and ongoing development. In addition, the data storage requirements were significant and costly.

Additional areas of coordination remain to be explored. Problems arose from the division of responsibility for the separate taxes that Rio’s citizens pay on services and product sales. The city of Rio collects service taxes, for which customers could claim credits, but the state offers no credits to customers who pay sales taxes for products. A key advantage of São Paulo’s system was that the city and the state coordinated
their reforms so that consumers received rewards for purchasing both services and products, which likely increased awareness for both sets of rewards. If Rio de Janeiro were to establish a partnership with the state, both could achieve further efficiency and revenue gains. The information exchange between the city and the state could also be improved.

**Introduction: Confronting Revenue Shortfalls and Inefficiency in Rio de Janeiro**

The city of Rio de Janeiro faced significant economic and fiscal challenges in 2009. Between 1985 and 2003, the city’s economy had shrunk by an average of 1.1 percent per year (World Bank 2014). Although the city experienced moderate growth between 2003 and 2008, it had long suffered from high levels of poverty, including in slums (favelas) with scant infrastructure and poor security. Rio de Janeiro needed more growth, and to achieve that it had to invest more than the 3.5 percent of GDP invested in 2009. The administration was faced with a debt burden of 8.5 billion reais (equivalent to US$3.6 billion on January 1, 2009) and interest payments that absorbed 9 percent of annual revenues.

With taxes already high and limited popular patience for tax increases, the city’s options for raising revenue were restricted. Municipalities in Brazil rely on sales taxes on services and a property tax; other major revenue streams are generated by the federal government through the income tax and by the state governments through the value added tax on goods. Rio de Janeiro’s only option was to increase the effectiveness of its collection of existing taxes and broaden the revenue base.

One of those taxes—the service tax (Imposto sobre Serviços)—was administered using a paper-based system that placed a heavy burden on the staff of the city’s Finance Secretariat. In addition to the inefficiencies this created in the municipal administration, the system wasted businesses’ time. Marcia Tavares, President of the Accountants Union, noted the number of hours spent sitting in the heavy Rio traffic to obtain signatures and stamps from City Hall.

Marcio Luiz de Oliveira became the service-tax coordinator for Rio de Janeiro in 2007, and his first day on the job left an impact on him. He recalled arriving at Rio’s tax registry, the cadastre, to find an unpleasant surprise: unprocessed envelopes stacked up in piles around the office. The information inside was so out of date that he had to mobilize a team of 20 staff and 40 interns to call companies and request updates. His experience at that time proved to be emblematic of the problems with revenue collection and administrative efficiency that faced Rio de Janeiro’s Finance Secretariat in 2009, when Oliveira would play a key role in tackling these issues citywide.

**Framing the Development Challenge: Revenue Administration and the Social Contract**

Understanding the difficulties that Rio de Janeiro faced requires an understanding of the two main explanations of why taxpayers might or might not meet their tax obligations (Lewis 2008).

First, taxpayers might take a rational approach by weighing the pros and cons of payment. If they believe that they will receive benefits from paying, such as education or good roads, then they are more likely to pay. If they believe that there is a credible threat of being inspected by the tax authorities, then they are also more likely to pay. In Brazil, there was widespread skepticism about the ability of government to effectively deliver services, with one commentator describing the state as an “anemic leviathan” (The Economist 2004). The huge backlog of unresolved and outdated tax cases noted by Oliveira suggests that there was also no credible threat of inspection and audit in Rio de Janeiro.

Second, taxpayers might pay tax obligations because of a desire to be accepted by wider society. If taxpayers feel they will be judged positively for paying taxes (or will avoid being judged negatively), then they are more likely to pay. This need not involve explicit feedback from society; it might simply involve positive emotions that result from payment or feelings of guilt for tax evasion. Yet, this social norm was relatively weak in Brazil (Lewis 2008).

Rio de Janeiro’s revenue administration challenges mirrored those of Brazil as a whole. In 2008, businesses in Brazil took an average of 2,600 hours per year to comply with their tax obligations, more than any other country in the world (World Bank 2008). The administrative burden, along with high tax rates, created a challenging business
environment. Marcio Beck, economics correspondent for *O Globo* newspaper, commiserated with the private sector. "Many businessmen, especially the small and medium-sized businessmen, face tax evasion not as a detour. It's a matter of survival sometimes," he said. "They believe that they can't pay all their taxes and have a viable business."

Furthermore, "for the general population, the destination of our taxes here in Brazil is basically a black box," says Beck. The lack of public faith in both the revenue and expenditure capabilities of the government had worrying implications for the broader social contract—the willingness of citizens to trade their liberty for the benefits of governance.

**Delivery Challenges**

Rio de Janeiro’s administration needed to persuade service providers to pay their taxes while also improving conditions for business. Revenue administration reform offered a way to achieve this. The pressure on Rio was particularly acute because Brazil's largest city, São Paulo, had implemented an electronic invoicing system two years earlier, in 2007. Tavares said, "Rio had wanted to have something similar [to São Paulo] for years." Rio de Janeiro had fallen behind and needed to catch up. In 2008, Eduardo Paes, then a mayoral candidate, made a campaign promise to do exactly that.

Paes took office in 2009, and immediately moved to take action on his promise. Improving service-tax administration would be tough, for the reasons listed above, with four primary delivery challenges:

1. How to efficiently monitor service-tax payments? Rio de Janeiro needed a way to monitor declarations of service taxes by vendors that did not require large numbers of new staff or place an increased administrative burden on businesses.

2. How to incentivize consumers to participate? The technical solution adopted by the municipal government would require action by citizens. Most customers in Rio de Janeiro did not ask for a receipt when they paid for a service, so there was little pressure on vendors to record transactions accurately (Lewis 2008).

3. How to gain buy-in from service providers? Although the municipal government had the authority to mandate a new approach to service-tax administration, rejection by businesses would make implementation a great deal more difficult, if not impossible.

4. How to successfully implement a large-scale IT system? Government IT projects are notorious around the world for failure (Heeks 2003). It was essential that the system chosen have the confidence of the public, especially because it would support revenue management—a core competency of any government. Oliveira, subsecretary for taxation since 2009, recognized that “the greatest challenge was to find a product that was good enough to substitute for the previous system, which was bureaucratic but trustworthy. We didn’t want to have a system that would be fast, but insecure or unreliable.” The new system also needed to serve the wide variety of businesses operating in a major city. That meant it had to work for small companies as well as for the local offices of national and multinational firms with established internal accounting practices and systems.

**Contextual Conditions**

**Existing Electronic Invoicing in Brazil**

After Mayor Paes took office at the start of 2009, his administration did not need to look far for a policy solution to the problem of service-tax administration. Electronic invoicing had existed in Brazil for six years, giving Rio de Janeiro a second-mover advantage in overcoming its challenges.

Angra dos Reis, a small city just two hours’ drive from Rio, had pioneered a system of electronic invoicing in Brazil in 2002. Pedro Arroyo, a consultant who worked for Rio’s Finance Secretariat, had worked with the Angra dos Reis administration and an IT company called TIPLAN to implement the system. In 2007, São Paulo had adopted a similar system as the basis for an ambitious implementation. Although the systems were not identical, they followed the same basic approach. Instead of writing paper receipts, vendors entered service invoices into an online system operated by the government.
Customers were able to log in to the system and check that their receipts and their service-tax payments had been filed and that the numbers were accurate.

A key challenge was to ensure that customers took the time to use the system, because this was the primary check that vendors were doing what they were supposed to do—charge the required tax and report it. To encourage customers to do so, the system in Angra dos Reis rewarded customers for collecting electronic receipts by giving them a discount on their property taxes. When other cities implemented electronic invoicing, they modified this approach to fit their own needs. For example, some cities switched from offering property tax rebates to paying money directly into customers’ bank accounts. In all cases of modification or local innovation, incentivizing customers to act as a control on vendors remained a central principle.

An additional and important incentive in the electronic invoicing model was adopted in São Paulo. Not only did customers receive a rebate in the form of a property tax discount or money paid into their bank account, they were also entered into a lottery to win cash prizes. The rebate offered customers a reward that could be accurately predicted, but the lottery created a different incentive. Lotteries leverage a concept known as availability bias: people are motivated not by all information, but by the information that is more available to them (Ly et al. 2013). Individuals tend to be highly aware of lottery winners, but less aware of the many people who lose. This leads individuals to overestimate their own chances of winning. A lottery system therefore offered an additional incentive for customers to collect electronic receipts, beyond the incentive of the rebate. Excitement about lottery winners would also help to publicize electronic invoicing.

This history of electronic invoicing gave Rio de Janeiro’s Finance Secretariat a number of possible models to draw on, while also creating a pool of experienced participants that the Finance Secretariat could draw on in designing Rio’s own system. With the broad contours of a policy solution already identified, the Finance Secretariat would be able to adapt it for Rio de Janeiro and then implement it.

### Learning from Brazil’s National Model of Electronic Invoicing

Design of a solution had actually begun two years before Paes took office. In 2007, Brazil’s Association of Secretaries of Finance of Capitals (Associação Brasileira das Secretarias de Finanças das Capitais, or ABRASF) brought together representatives from across the country to create a standard national model for electronic invoicing. Rio de Janeiro’s Finance Secretariat sent two representatives to these discussions: Oliveira, then service-tax coordinator, and Adriano Cereja, IT manager.

Eugenio Eustaquio Veloso Fernandes, who represented the city of Belo Horizonte at ABRASF, explained that a standard national model would reduce costs for the many businesses that operated across jurisdictions and make it easier for different tax authorities to exchange information, thereby paving the way for improved enforcement.

The ABRASF group had the advantage of being able to study the successes and shortcomings of São Paulo’s implementation. The members used São Paulo as a starting point for the national model “to choose the best things of the system and use it to construct the national model,” Cereja said.

Antonio Arantes da Cruz, system manager for Rio’s Nota Carioca system, said the ABRASF standards were extremely useful in Rio’s system. Universal file formats (.txt and .xml files) allowed easy communication of data, which meant the system could tackle “the two extremes of the bell curve.” Large companies with high volumes of transactions could easily integrate their systems with Nota Carioca, so that data flowed to it automatically. Small businesses that lacked Internet connections could upload their files to the system on an occasional basis, issuing temporary paper receipts in the meantime. At the implementation stage, the Finance Secretariat also took a phased approach that allowed small businesses more time to prepare.

By the end of 2008, the group had established the national model, including the concept, layout of data, manuals for system integration, and information required for building the data archive. This laid the foundation, but the hard work for Rio de Janeiro remained ahead. Oliveira and his team had to build their own system that accommodated

5 In addition to São Paulo and Rio de Janeiro, versions of the original Angra dos Reis approach have been implemented in other cities in Brazil, including Recife, Macae, Resende, Barra Mansa, Rio das Ostras, Americana, Mangaratiba, Itaguaí, Pirai, and Duque de Caxias.

6 Author interview, March 2014.

7 Author interview, March 2014.
the city’s particular tax regulations and processes and fit well with its IT infrastructure and other systems. Although the national model was completed before the end of 2008, it was not immediately implemented in Rio de Janeiro, falling afoul of municipal politics. “The main issue was it was the end of the previous administration, so there was not so much interest in implementing the electronic invoicing system, because only the next mayor would take advantage of the results,” said Oliveira.8

Tracing the Implementation Process

Recognizing the breadth and complexity of the challenge he faced when he took office in January 2009, Paes initially moved to gather the kinds of people he needed to succeed. Helped by the experiences of other Brazilian cities and a national model, they would prepare the ground for implementation of a radical improvement in service-tax collection.

Establishing a Reform Team

The two key leaders of the reform were Finance Secretary Eduarda La Roque and Subsecretary for Taxation Marcio Luiz de Oliveira.

Setting a higher value on career competence than political background, Paes recruited La Roque to be finance secretary, the person who provided the high-level leadership for the project. Although she had no experience in government, La Roque held a doctorate in economics, had worked for 11 years as an investment banker, and had owned an information technology company. In addition to presiding over the development of Nota Carioca, La Roque was also responsible for restructuring the city’s debt with the support of a World Bank loan of US$1.045 billion (equivalent to 1.88 billion reais on the date of loan approval). This was the first such loan that the World Bank had ever made to a municipality (World Bank 2010), and it would save the city about 25 percent on interest payments.

La Roque needed somebody to take charge of the nuts and bolts of implementation, and she placed her faith in Oliveira, who delayed retirement from his job as service-tax coordinator to become subsecretary for taxation. La Roque was impressed by his deep knowledge of revenue administration and the electronic invoicing solution. “Marcio had everything ready,” she said.9

After leaving school, Oliveira worked in the construction industry, sacrificing a university education in order to contribute financially to his family. He eventually completed an engineering degree during 16 years of service in the armed forces and then took a competitive public examination to join the Finance Secretariat. Oliveira was passionate about improving the tax system. He noted that he had quit positions in the Finance Secretariat four separate times out of frustration at not being able to get things done, but he always stayed on in another capacity.

As subsecretary for taxation, Oliveira led the day-to-day operations of the electronic invoicing implementation. He also filled a key role as the primary intermediary between the city administration and politicians. He recognized that a change of this magnitude required strong and effective communication.

“If you don’t have both sides speaking the same language, you cannot implement anything,” he declared. “The whole process represents a change in the culture of taxation. My job was to convince everybody that the new system was good and reliable.”10

Oliveira recognized that La Roque had placed a great deal of faith in him. “For the first time, a subsecretary had access to the mayor,” he said.11 As Rio’s service-tax coordinator, Oliveira already had engaged with counterparts in other state capitals on the issue of electronic invoicing, so he had in effect been preparing for this moment for years. Together, La Roque and Oliveira offered a winning combination: strong awareness of the macro-level challenges facing Rio, deep understanding of the specific challenges in service-tax administration, and a motivation for reform.

Selecting and Buying the Software

As a municipal government agency, the Finance Secretariat had to follow government procurement procedures, but it sought to bolster them by investigating options carefully in advance. The Secretariat researched potential software providers online, consulted contacts in other tax jurisdictions, and invited 15 companies to a presentation on the national model and Rio de Janeiro’s

---

8 Author interview, March 2014.
9 Author interview, March 2014.
10 Author interview, March 2014.
11 Author interview, March 2014.
particular needs. Oliveira and Cereja invited shortlisted companies to present their software solutions and interviewed each using a standard set of questions. The business-process and IT members of the team then jointly evaluated the software providers.

When the Finance Secretariat opened formal bidding, two companies offered proposals. One of them was TIPLAN, which had designed the software for the first system in Angra dos Reis and in São Paulo.

A number of those involved in Nota Carioca implementation highlighted cumbersome public procurement processes as a key hurdle to be faced during implementation, reflecting a challenge often faced by government agencies around the world. They appreciated the importance of a transparent and competitive process to ensure impartiality and low cost, but had concerns about the ability of the process to deliver the best solution for Rio’s specific needs. In addition, the city’s procurement process in the past had sometimes become bogged down in litigation, which risked delaying implementation. With a skeptical public watching, planners wanted to reduce the risk of a botched rollout.

Given the uncertainty about the normal procurement process, the team turned to an alternative approach offered through the private sector. Antanor Barros Leal, president of the Commercial Association of Rio de Janeiro (an organization of businesses that operated in the city, also referred to simply as the Commercial Association), was a strong supporter of the service-tax reform effort. Under Leal’s leadership, the Commercial Association borrowed funds from Santander Bank to purchase electronic invoicing software from TIPLAN, and then donated the software to the government.

Leal explained that Nota Carioca was an opportunity to contribute to his mission of “working with the government to reduce government” by helping streamline the bureaucracy and ease the burdens that government placed on his group’s members. In addition, he viewed Nota Carioca as another way to further the Commercial Association’s aim of formalizing Rio’s business community, which was heavily populated by small, low-key operations that operated outside the legal and regulatory framework.

This private-sector support was key to Nota Carioca’s implementation because it circumvented the cumbersome government procurement process and assured the choice of the favored supplier for the best solution. The Financial Secretariat, however, remained deeply involved in defining the work that TIPLAN would carry out to ensure that it fitted the city’s needs. La Roque was able to bring her private sector experience to bear. “I had my own IT company,” she said. “I could say that my experience as an IT provider helped us in defining the contract with the company.”

Securing Data Storage and Processing Capacity

During the software procurement process, the Nota Carioca team came across another challenge. The team originally hoped that the provider of the software would also be able to provide a packaged solution that included data storage, but team members soon became aware that software providers could not offer this kind of hardware capacity.

Nota Carioca needed to “offer society a service seven days a week, 24 hours a day,” which made data processing and storage capacity critical elements of the system, said Cereja. The system required powerful and secure servers to handle the processing and storage of sensitive data, as well as a vault to ensure that data would be safe from fire, water, and theft. The importance went beyond technical concerns to government credibility. Cereja recognized that “people would evaluate our services based on the availability of the system.”

The team decided that the best available option was to increase the capacity of the municipal government’s own IT service provider, called IPLANRIO, at a cost of 14 million reais (equivalent to US$8 million on May 1, 2010). IPLANRIO managed the IT needs of many municipal processes, including property taxes, budgeting, and internal accounting. Working with IPLANRIO also had the advantage of ensuring that private data would be stored within a government institution, rather than in the private sector. Fernando Braga, technical director of TIPLAN, said that splitting responsibility for software design and data storage had an additional security benefit: TIPLAN would develop the system but would have no access to data, and IPLANRIO would have access to data but incomplete knowledge of the development of the system. The split made it more difficult for any one individual in either organization to tamper with sensitive information.

---

12 Author interview, March 2014.
13 Author interview, March 2014.
14 Author interview, March 2014.
15 Author interview, March 2014.
Adapting Policies and Customizing the Software

In early 2010, the team began customizing the electronic invoicing software to fit Rio’s needs. Alexandre Calvert, a tax auditor at the Finance Secretariat who was deeply involved in the process, explained that customization was important because ABRASF’s national model had established some “general norms, but each city has its own particular norms, and customization changes from city to city.”

The Rio Finance Secretariat made a number of adaptations from earlier examples, particularly that of São Paulo:

- **Size of rewards**: São Paulo offered 30 percent of the service tax as a reward to customers, while Rio de Janeiro offered only 10 percent. La Roque reported that the lower incentive allowed them to avoid the fiscal difficulties that befell São Paulo, but Fernando Braga of TIPLAN noted that Rio’s fiscal conservatism reduced the incentive for customers to collect receipts.

- **Payments into bank accounts**: Rio de Janeiro and São Paulo both offered to pay cash directly into customers’ bank accounts, which was an adaptation from the original model in which customers had to take their rewards in the form of discounts on their property taxes. Payments into bank accounts allowed rewards to be distributed to a wider population, not just to property owners.

- **The lottery**: Both Rio de Janeiro and São Paulo offered lotteries as additional incentives for customers, but with an important difference: São Paulo offered customers one lottery entry for every 50 reais (equivalent to about US$32 in August 2011) spent on collected electronic invoices. Oliveira decided that Nota Carioca would offer a lottery entry for every purchase recorded regardless of value. In addition, lottery prizes were given in Rio from the inception of Nota Carioca, while in São Paulo lottery prizes were introduced five years after the project started. The Rio decision was important because it created an immediate incentive to collect electronic invoices for small purchases from businesses that otherwise might avoid issuing invoices and paying taxes. The aim was to bring public pressure on such businesses and broaden the city’s tax base.

- **Incentives for vendors**: Rio de Janeiro did not offer rewards to service vendors that complied with electronic invoicing requirements. São Paulo, on the other hand, offered a 10 percent rebate to all companies enrolled in a national-level program for small companies.

- **Knowledge exchange**: Although the São Paulo state and São Paulo municipality programs were not implemented at the same time, the fact that both were carried out under the leadership of secretary Mauro Ricardo Costa allowed for exchange of experiences from one government level to another and also allowed the state to take advantage of the lessons learned by the municipality. The administrations of Rio de Janeiro city and Rio de Janeiro state were not able, as of mid-2014, to reach a similar agreement.

Working to customize the software to Rio’s needs required significant coordination among agencies and the private sector. Rio’s development team included members of the Finance Secretariat, who had overall responsibility for the reform and brought knowledge of tax policy and process; representatives of IPLANRIO, who were responsible for data processing and storage and for integrating Nota Carioca with the existing IT infrastructure; and people from TIPLAN, who were responsible for providing the software and tailoring it to the city’s needs. Although such a diverse working group might be expected to struggle with dissension and disagreement, members said it functioned smoothly for three main reasons.

First, the three groups all worked in the same room every day. When the members of the Finance Secretariat or IPLANRIO team identified a change that was required in the software, the need could be communicated and explained to the IT specialists immediately. In turn, changes could be tested right away.

Second, members of the Finance Secretariat had specific responsibilities that took advantage of their particular backgrounds and talents. Calvert explained that the tax auditors were each “responsible for one issue within the ratification of the system. So, one would be responsible for who was consulting the system, one other would be responsible for registration in the system, another one for the information flow…each one would have one responsibility.” In this way, experts in tax policy and process were able to use their specific knowledge to drive the system forward.

---

16 Author interview, March 2014.

17 Author interview, March 2014.
Third, TIPLAN took a flexible and iterative approach to software development. Braga, the technical director, explained that his company worked according to the tenets of the *Agile Software Development Manifesto* (The Agile Manifesto 2014). The approach placed a priority on individuals and interactions, working software, customer collaboration, and responding to change. Braga credited this flexible and solution-centered approach for TIPLAN’s success. Staff from the Finance Secretariat and IPLANRIO both praised TIPLAN’s software engineers for anticipating and implementing changes to the system.

### Rollout of Nota Carioca

In May 2010 the team launched Nota Carioca for voluntary company registration. Mandatory registration was subsequently phased in, beginning with the largest companies as defined by their 2009 revenues. On August 1, 2010, the Finance Secretariat made registration compulsory for all companies with a revenue equal to or greater than 240,000 reais (equivalent to US$136,000 on January 1, 2010). On November 1 of that year, mandatory registration was extended to companies that had lower revenue and no tax exemption. Finally, by December 1, 2010, all remaining companies had to register (see Figure 1 for the numbers of companies registered in the months following the launch).

The phased approach allowed the team to fine-tune the software design in the early stages. The software engineers tackled issues as they arose, again working closely with team members from the Finance Secretariat and IPLANRIO, as they had done during the development of the system.

Those involved in the implementation of Nota Carioca reported no major problems, and they cited the design process that benefited from ABRASF’s national model, lessons learned from previous implementations of TIPLAN’s software, and Rio’s effectiveness in customizing the process.

The rollout involved an extensive communication program. Oliveira recalled roughly 100 meetings with different business groups, at which he and his colleagues explained how to access the system and how to issue invoices.18

Calvert noted that not all companies were easy to bring on board, especially smaller businesses that dealt mainly with individuals, such as beauty parlors and for-pay parking lots. Business-to-business companies, he said, tended to be larger and more sophisticated, and immediately saw the benefits of an electronic system.

Oliveira, however, found an important ally for the Finance Secretariat in communicating the change to businesses: Tavares, who was first vice president and then president of the Rio de Janeiro Accountants Union at the time of implementation. Tavares was enthusiastic for change but also recognized that small businesses might oppose Nota Carioca.

Tavares expressed these doubts to Oliveira, who responded by asking her, in her role as the head of the Accountants Union, to help spread the word among her members’ employers. As Calvert of the Finance Secretariat explained, “[I]f you have one accountant, you reach many companies.”19 Because accountants worked with businesses across the city on a daily basis, they were in an ideal position to explain the benefits and workings of the new system. Tavares also accompanied Oliveira and Finance Secretariat staff to many of their meetings with businesses. These meetings were well attended—Tavares

---

18 Author interview, March 2014.

19 Author interview, March 2014.
recalled that she addressed 700 attendees at a single meeting in August 2010.20

It was also important for the government to inform private citizens about the new system. Although many companies performed work for other businesses, many others delivered services directly to individual consumers. Citizens needed to know how to get into the new system, how to request invoices when buying services, and what rewards they would receive for doing so. Citizen education took place “by a media plan—through TV, through billboards, newspapers,” Calvert said.21

Rio’s Finance Secretariat had less success with problems that arose from the division of responsibility for the separate taxes that its citizens paid on services and product sales. The city was responsible for collecting service taxes, for which customers could claim credits, but the state offered no credits to customers who paid sales taxes for products. The definition of a service purchase was not always clear. For example, one might expect to receive credit for a restaurant meal, which was typically considered a service, but in Brazil a restaurant meal was defined as a product for tax purposes. This made it difficult to communicate to consumers—especially individual citizens—when they should expect Nota Carioca incentives and when they should not, because these incentives were available only for some purchases.

Additionally, the city’s service tax was set at around 5 percent, while the state’s sales tax for products was much higher. Rewards based on the service tax were therefore much lower than they would be on the sales tax. Lower rewards provided less incentive for consumers to request invoices when they purchased services. Rio’s government could have chosen to raise rewards to a higher level, but that would have eroded the revenue-raising purpose of the tax.

São Paulo did not face this problem, as the city and state administrations had similar programs, for both service taxes and taxes on products, so that the municipal and state-level programs reinforced each other and increased the incentive for citizens to request an invoice, as they were assured that they would receive a tax credit from either the city or the state. By mid-2014, Rio de Janeiro had not been able to achieve the same level of coordination.

---

20 Author interview, March 2014.
21 Author interview, March 2014.
lower rewards allowed it to avoid the fiscal difficulties that La Roque said beset São Paulo, where reward payments were more generous.

A number of the Finance Secretariat staff noted that some small businesses, such as beauty parlors and parking lots, were reluctant to use Nota Carioca. La Roque said that the challenge stemmed from the fact that these businesses were informal by nature. Although these sectors represented only a small portion of service business activity in Rio, they highlighted the limits of Nota Carioca’s effectiveness in expanding the tax base. Nota Carioca may have changed the behavior of a vast portion of service businesses, but some continued to resist the new incentive structure.

Government and business praised the system. Within the Finance Secretariat, there was some initial opposition from the lower ranks of employees. “But it was in the beginning; nowadays they like the system very much, they use it because it makes their job much easier,” said Da Cruz. “It reduced paperwork, it reduced stress,” said Tavares, president of the Accountants Union. Leal, president of the Commercial Association, was enthusiastic about the initiative’s achievements in reducing the size of government and helping to bring more of the business community into the formal sector.

Tavares, president of the Accountants Union, spoke positively of the impact of Nota Carioca on business efficiency, but data showing time saved was not available. Although Nota Carioca alone could not solve Rio de Janeiro’s fiscal challenges, it made an important contribution. An analysis by the Finance Secretariat in August 2013 showed that the gains in revenue from Nota Carioca were 686 million reais (equivalent to US$393 million) between July 2010 and June 2013. This represented 0.24 percent of the city’s 2011 GDP, which was 163 billion reais (CEPERJ 2014). Importantly, the report judged this to be “a permanent change in the level of revenue” (Souza Boavista and dos Santos Silva 2013). However, it is difficult to disaggregate increases in revenue that stem from the implementation of Nota Carioca from increases that stem from economic growth. Tax collection increased in some sectors, such as mechanical car services, parking lots, private schools, hotels, conservation and cleaning services, and graphic arts, more than in others (Souza Boavista and dos Santos Silva 2011).

There is no like-for-like comparison with the municipality or state of São Paulo, but analysis of the latter system estimates a US$400 million increase in revenue over four years, net of consumer rewards (Naritomi 2013), representing 0.09 percent of São Paulo’s 2011 GDP (Ribeiro 2012). Naritomi’s analysis uses quasi-experimental evidence to show that the Nota Fiscal Paulistana has increased the revenue reported in the retail sector by at least 23 percent over four years.

Another important additional gain from the electronic system is the possibility of linking it to procurement processes. For example, in the municipality of Manaus, an analysis using data from state-level goods tax receipts showed that the municipality pays on average 42–49 percent more than the private sector for the same goods and services; the state government of Manaus pays on average 22–27 percent more. The federal government of Brazil pays on average 14–16 percent over prices paid by private companies. The use of databases of sales tax receipts can provide benchmarks for governments budgeting funds for specific procurements, and some states and municipalities are already doing so (such as Rio Grande do Sul, Amazonas, and Manaus).

There were also significant costs that offset some of the efficiency and revenue gains. Although the Commercial Association paid for the software, the municipal government was responsible for operating costs and ongoing development. In addition, the data storage requirements were significant and continue to grow, with a 10 million reais (equivalent to US$5 million on January 1, 2014) investment in IPLANRIO budgeted for 2014.

**Prospects for Improvements to Revenue Administration**

After the initial implementation, the Finance Secretariat continued to use Nota Carioca as a foundation for further improvements to revenue administration. As Calvert explained, “We realized that Nota Carioca is not just an issuing system, it is a system of tax administration. We’re trying to add value to the system by inserting more services. . . . [It] has been our mindset to reduce paperwork to zero”

The tax service assessment book, as well as the civil construction material registry and information...
concerning incorporation in the state of Rio de Janeiro, have been included within the Nota Carioca system. Additions and changes to Nota Carioca were communicated through messages within the system itself, making it easier to raise awareness among users. Plans for future improvements included the addition of the tax inspectors’ fiscal logbook and the financial institutions tax assessment logbook.

Lessons Learned

At the inception of Nota Carioca, the Rio municipal government faced four major delivery challenges and generally overcame all of them. As of mid-2014, speedy implementation, few reported problems, and positive feedback from the private sector indicated that Nota Carioca’s implementation was a success.

1. How to efficiently monitor service-tax payments
   The largest of the delivery challenges, this was met by the introduction of electronic invoicing. In this system, vendors entered service invoices into a government-operated online system. Customers could then log in to the system to check that these invoices had been filed accurately. This solution saved significant amounts of staff time and generated little of the extensive paperwork that had previously characterized Rio’s tax administration. But vendors and consumers had to be convinced to participate.

2. How to incentivize consumers to participate
   A combination of incentives was crafted to persuade consumers to utilize the electronic invoicing system. Customers who checked their invoices received cash payments, which were deposited directly into their bank accounts. In addition, customers whose invoices were submitted received one lottery entry per purchase regardless of size. By not restricting lottery entries to large purchases, Nota Carioca created an incentive to report all purchases. By offering not only payment for compliance, but also a chance to win a big prize, the program drew on important behavioral insights, such as harnessing availability bias in designing the lottery system.

3. How to gain buy-in from service providers
   Buy-in was gained by reaching out to allies in a group that also stood to gain from reduced paperwork and a less cumbersome system: the Accountants Union. The head of the Accountants Union joined Finance Secretariat staff at meetings with businesses and helped to explain the benefits of the new system. Once the Commercial Association, representing the city’s business community, recognized the benefits of reducing red tape and paperwork, Nota Carioca benefited from its input and from its donation of a costly software system.

4. How to successfully implement a large-scale IT system
   Nota Carioca used its second-mover advantage (discussed below) to benefit from the previous rollout experiences of other cities, of the federal government, and of its software company, TIPLAN. It worked across stakeholder groups to implement the technical aspects of the rollout and ensured strong communication by having all members of the software working group in the same room. The software was developed using an approach that was purposefully collaborative and iterative, open to adjustment based on feedback from customers and changes to the overall system. The rollout was phased in, starting with the biggest companies, allowing for adjustments and fine-tuning as issues arose.

In addition to addressing the previously identified delivery challenges, several additional significant aspects of Rio de Janeiro’s reform help explain why the city avoided many of the difficulties commonly faced by administrations when they attempt reforms of this kind:

- The leadership commitment of Mayor Eduardo Paes and Finance Secretary Eduarda La Roque was essential in starting the Nota Carioca project, and crucial for its ultimate implementation despite challenges such as IT infrastructure investment and software procurement. Their commitment gave Marcio Luiz de Oliveira, subsecretary for taxation, the political clout and personal credibility to focus his team, partners, and allies on the task at hand. Oliveira’s own commitment and leadership were important in keeping Nota Carioca on track.
- Effective collaboration between multiple stakeholders played a key role in Nota Carioca’s success across multiple delivery challenges. Collaboration reached beyond contractual agreements and token support. The finance secretariats of cities across Brazil worked together in ABRASF to develop a national model; the Commercial Association...
provided vital financial support to procure the software, the Accountants Union lent its support to system rollout, and the tripartite team developing the software worked seamlessly together. Those involved spoke of a genuine shared sense of purpose.

- **Second-mover advantage** allowed Rio de Janeiro and other cities to build their success on the lessons learned by Angra dos Reis and São Paulo. That those systems were viewed as successful also created an appetite for reform within the business community. Through their participation in ABRASF, Rio's representatives were also able to gather evidence from other cities and use it to improve their design.

- A **focus on system design** meant that the Finance Secretariat was able to roll out a system that was robust and met the specific policy and process requirements of Rio de Janeiro, as well as one that used standards designed to allow integration with other systems in the future.

- **Leveraging its success** in implementing Nota Carioca, the Finance Secretariat began using the system as a foundation for further improvements to revenue administration, with the long-term aim of creating a paperless tax system.

### How the Case Study Informs the Science of Delivery

**Relentless Focus on Citizen Outcomes**

Although the reform team did not focus on a measurable gain in the overall welfare of citizens, team members did maintain a strong focus on the increased efficiency and effectiveness of the revenue management process. They also measured the increase in revenue that resulted from the reform.

**Multidimensional Response**

Nota Carioca was made possible by partnerships that crossed traditional institutional boundaries. Cities across Brazil worked together to develop the national model for electronic invoicing; Rio de Janeiro’s political leadership and bureaucracy worked together to start and maintain reform momentum; the Finance Secretariat partnered with the private sector to overcome financing and communication obstacles; and the Finance Secretariat, IPLANRIO, and TIPLAN worked together seamlessly to deliver the final system.

A key advantage of São Paulo’s system was that the city and the state coordinated their reforms so that consumers received rewards for purchasing both services and products, which likely increased awareness for both sets of rewards. Had Rio de Janeiro been able to establish this partnership with the state—or should it do so in the future—both could achieve further efficiency and revenue gains.

### Leadership for Change

Political leadership combined a democratic mandate for reform with faith in skilled technocrats. Those responsible for delivery demonstrated an ability to work with influential stakeholders (including the city’s business association and the accountants union) to generate trust in the program. Additionally, the Finance Secretariat benefited from active participation at the national level, through ABRASF.

### Evidence to Achieve Results

The reform team sought advice from civil servants in other cities, through the ABRASF design process and during their search for software providers. They were able to learn from previous implementation experiences, including those in Angra dos Reis and São Paulo, as well as from their own phased implementation. Strong design, informed by learning from previous experiences and by the piloting process, was important in ensuring Nota Carioca’s success and credibility.

### Adaptive Implementation

Reform leaders at the political and technical level maintained their commitment to reform even when they encountered serious practical obstacles, such as the need for a significant investment in IT infrastructure and a procurement challenge. They drew on partnerships to develop nontraditional solutions, including working with the Commercial Association to speed up a cumbersome procurement process.

Both the Finance Secretariat and IPLANRIO praised the flexible and solution-focused approach of TIPLAN, the private company providing the software. The process of “agile” software development was key in creating a strong system in a short period of time.
Bibliography


