

Data-Driven Optimization in State Tax Administration:
Transition Challenges From Technological to Managerial Innovation

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Research Question: How are State Tax Administration Agencies Managing the Transition to Data-Driven Optimization?

In the private sector, the analytics strategies have required a long, often arduous journey. The UK Consumer Cards and Loans business took more than five years to implement the technological, process, and organizational tasks to exploit analytics in its credit card and other financial businesses¹. In the private sector, the majority of the time and expense is spent on the technological side – investments in data warehouse, data quality control, analytic software, assembling the hardware and communication infrastructure, etc². These same technological investments have to be made in the public sector but the public sector must also overcome political barriers and deeply routed institutional rules and practices. Historically, information technology (IT) applications that challenge the prevailing institutional logics are short-lived. Sustained long-term change will require revamping managerial processes in the public sector.

State tax agencies is one domain area that presents a large opportunity to exploit predictive modeling applications as a basis of data-driven optimization. The key goal of tax agencies is to reduce the “tax gap,” the lost revenue when overdue taxes are not timely and effectively identified, audited, and collected from citizens and businesses. Lost revenue in uncollected and underreported tax revenues leads to massive budget cuts in critical state and local services and resources, negatively impacting the public. The U.S. Internal Revenue Service estimates that tax agencies typically lose 15% percent of total revenues to underreporting, tax evasion, and other types of noncompliance. Predictive models have become important tools to manage the tax gap in the face of ever more dynamic flows of tax revenues. Changes in the economy, social norms toward tax compliance, and tax laws affect the dynamics of incoming tax revenues. Dynamic environments require dynamic compliance strategies that are based on the latest knowledge of tax payer behavior. Data driven optimization takes analytics beyond decision support to the area of strategy design.

¹ Davenport, T. “Competing on Analytics,” Harvard Business Review, January 2006, pp. 98-107.

² Ibid.

The strategic use of analytics, however, faces formidable challenges in state tax agencies. The agencies need to climb a steep learning curve and often do so within the short funding and political election cycles. The noncompetitive relationships among state agencies facilitate healthy knowledge sharing of general technical and analytical know-how through hosted visits, vendor conferences, and various professional association activities and online services. Yet, the predictive models still have to be developed to be specific to each state. Tax payer behavior varies greatly by locales calling for behavioral models by each state or even within regions of the state. This puts demands for the agencies to build the requisite capabilities to develop, operate, and maintain the analytical models. These skills are hard to recruit in the private sector; let alone the public sector.

Besides the knowledge base to manage model development and evolution, data-driven optimization requires the agencies to change key managerial processes. Data-driven optimization requires a commitment to a strategy of knowledge-based decisions, end to end process responsibility, and the ability to shape not just one's own organization but the eco-system of legislative bodies, etc.

Optimization yields higher returns but also requires new management principles that puts knowledge above politics in the state tax agencies. Those found to underreport or evade taxes may be large contributors to the political election campaigns. Data-driven optimization requires horizontal, process-based managerial innovation where knowledge and expertise provides the authority to act. This is in stark contrast to the realities of many state tax agencies that remain highly vertical, hierarchical, and reactive where political appointments and position-based authority rule.

What this means is that data-driven optimization requires managerial, not just technological innovation. Technological innovations are incremental and architectural innovations. Managerial innovations are those that require a change in the organization's key management processes of coordinating, controlling, rewarding, recruiting, and appropriating organizational assets.³ The managerial processes represent the necessary complementaries that must be changed to reap the value from data-driven optimization. Managerial innovations are complex as many external and internal factors can impede the necessary alignment of the complementary processes.

The research project examines how the state tax agencies are addressing managerial obstacles to leverage data-driven optimization. So far, the research approach has involved ten interviews with implementation managers and consultants of state tax agencies that have implemented predictive data analytics. The interviews explored the main barriers and enablers in leveraging data analytics. The interviews lasted one hour and were mostly conducted via telephone. We plan to conduct ten additional interviews prior to the conference presentation.

³ Hamel, G. "The Why, What and How of Management Innovation: Harvard Business Review, February 2006, 76-84.

Transition Challenges

It is still a minority of tax revenue offices at the state level in the U.S. and other countries that use data analytics for predictive behavioral modeling at the level of individual tax payers. As one industry consultant remarked, “Analytics is still a niche market with few states taking it seriously.” Many remain skeptical whether data-driven optimization yield better outcomes than traditional methods such as random audits. The skepticism is particularly surprising given that many parallels exist to managing credit risk in the retail sector. Analytics transformed credit risk management and today no lender would make decisions without relying on data analytics.

The predictive modeling applications in state tax agencies address one or more of the following areas: (1) discovery of nonfiling businesses and individuals with potential tax liabilities, (2) selecting those tax payers for audit who are likely to underreport, and (3) developing a tax collection strategy for each collection case. Whereas in the U.S. and the Canada, many of the applications focus on identifying nonfilers and developing a tax collection strategy, the emphasis in European tax authorities have been the application of analytics to auditing of tax returns. Besides the refund fraud, the preparer fraud is also an area of increasing use of analytics. U.S. State tax agencies have developed predictive modeling applications that evaluate returns in near real time to look for preparation patterns (e.g., high deductions) and audit questionable returns.

The preliminary analysis of interviews suggest that perhaps the greatest challenge to exploiting data-driven optimization relates to the issue of how the innovation is framed and made sense of. The agencies continue to frame data-driven optimization as a technological (or analytical innovation), not as a managerial innovation that changes the key coordination and control processes, and reshapes the relationships with their various stakeholders. Next, we describe the salient themes that emerged from the interviews.

Data-Driven Optimization as a Technical Innovation

The interviewees portrayed their use of predictive analytics as an innovation that relies critically on high data quality, user friendly software packages, modernized hardware platforms, and the integration of different internal and occasionally external databases. The descriptions emphasize the technical core of the innovation.

The applications focus on operational level targets such as dollars assessed and recovered per audit hour. For the most part, the analytics projects have been hugely successful recovering tens of millions of dollars in unpaid taxes annually. This is particularly true in collections, the earliest area of application for analytics in the tax agencies. However, this still represents a tip of the iceberg. These gains have been mostly achieved without managerial process or institutional changes.

The projects are driven by middle level managers. In many states, optimization models only directly drive desk audits and self-cure collections. Field auditors and collectors have autonomy to decide whether to use the output from the optimization models or rely

on their traditional methods. Some agencies described the push back from field auditors and collectors to follow the model recommendations. The funding models rely heavily on short-term self funding decreasing the possibilities for adequate investments and learning processes.

In the U.S. agencies, the implementation is often instigated by a political leadership change. For example, in the State of Iowa, a democratic governor was elected after 33 years of republican leadership. Similarly, in 2002, Illinois elected a first democratic governor in over 30 years coupled with a major wave of retirements. Such external changes are shown to lead to abrupt but nonsustained managerial and organizational changes.⁴ The new leadership fails to align or runs out of time to align all the complementary processes that are needed to reap value from analytics. In one agency making major early strides had an abrupt ending as the leader of the effort died and the two other key individuals left the organization.

In state tax agencies (with a few exceptions), there was generally no dedicated full time inhouse modeling expertise or an organization structure where the analytical expertise resided. The agencies heavily relied on outside consultants for model building. Those that had more success were engaging themselves in long-term relationships with the same consultancies. Swanson (2007) argues that consultancies (excluding ongoing business service relationships) may contribute more to the innovative process, than to the new capabilities achieved.⁵ As one interviewee noted, “Consultants can not lead these projects....”

Lack of inhouse capabilities threaten the long-term sustainability of the models. There is a need to manage dynamic changes to the analytical models. Changes in the economy, in the makeup and organization of the collections department and in tax law affect the performance of analytical models. As a result, there is a danger that models would go unmaintained and degrade in performance over time. The models also might fail to take advantage of new data sources and latest analytical advancements.

Data-Driven Optimization as a Managerial Innovation

Few agencies highlighted themes consistent with the frame of managerial innovations. In these agencies, the interviewees described mutual adaptations to policy or strategy from leveraging analytics. For example, in one U.S. state tax agency, analytics has began to have impact on the strategy design of the agency. Analytics is used to improve customer service in addition to compliance. This also accompanied structural changes to leverage the knowledge more efficiently between the areas of auditing, collections, and customer

⁴ Davidson, E. “A Technological Frames Perspective on Information Technology and Organizational Change,” *Journal of Applied Behavioral Science*, 2006, 42 (1), 23-39.

⁵ Swanson, B. “Consultancies and Capabilities in Innovating with IT.” Workshop on *How Emerging Technologies Are Shaping and Are Shaped by Strategy*, sponsored by the *JSIS*, Montreal, December 9, 2007. Originally presented at the Workshop on *Innovative Capabilities and the Role of Consultants in the Information Economy*, ZEW Mannheim, November 19-20, 2007.

services. Other agencies noted changes in tax legislation because of the knowledge gained from analytics.

A tax agency within the European Union was perhaps most clearly framing the data-driven optimization as a managerial innovation. The efforts were strategically directed with a new broadened agency mission and centralization of the formerly decentralized tax organizations. The agency had an aggressive goal of reducing the tax gap by 10% whereas most efforts they were aware of internationally had at most reached 5% target. The agency invested in analytics as part of its knowledge-based strategy. The goal of the analytics investments was to increase the agency's knowledge of tax payer behavior.

The knowledge was not only used to change the agency processes and interactions with tax payers, not also shape the broader ecosystem. One of the agency's studies revealed that about 35% of the sales of international share funds were declared incorrectly by private persons in their tax returns. The errors were largely due to oversight or lack of information how to declare the sales. The agency engaged in a communication campaign to educate the tax payers. The errors continued and even increased even after the agency's communication campaign. A followup study was undertaken to understand more deeply the tax payer behavior. The root cause was in lazy compliance attitudes of tax payers. The agency convinced the Ministry of Finance to change the legislation to avoid the problem. The legislation meant that the sales of foreign funds were automatically populated to the tax return without any involvement of the tax payer. The agency was concerned of raising fears of "Big Brother" and deliberately used media to portray an open and transparent organization with integrity in its actions.

The agency set a broad goal of improving the confidence of tax payers in the tax authority. Studies had helped it to determine that the confidence in the tax authority is the most effective and efficient way to improve compliance. The analytics activities rendered knowledge about tax payer behavior and their common errors. This knowledge was used to change the tax forms so that taxes are done right from the start. Because the analytics activities are linked to a larger agency initiative of tax payer confidence building, the analytics activities are visible and of interest to the highest levels of the agency leadership.

The tax agency illustrates how data-driven optimization can serve as a managerial innovation. As a managerial innovation, data-driven optimization requires coordination of complementaries of strategy, organization structure, policy, processes, etc. Managerial innovations require direct involvement of the highest level of agency management, commitment to a long-term big strategic initiative, and adopt new institutionalized values, processes and practices (Stieglitz and Heine, 2007).

Data-Driven Optimization as a Foundation of Dynamic Capabilities

Data-driven optimization can also be seen as a key engine of a dynamic capability of the agency to match the dynamicity of the environment. Dynamic capabilities allow organizations in fast changing environments to sense, shape, and seize opportunities and

address threats.⁶ Teece describes analytical systems that help generate knowledge to sense, filter, and calibrate opportunities as the foundational element of dynamic capabilities.⁷ Although the concept of dynamic capabilities is often applied in the private sector, it is increasingly relevant in executing government functions and delivering government services.⁸ This is particularly true in the state tax administration where dynamicity and unpredictability of revenues are increasing within the ever globally interconnected economy. This new reality requires foundational changes in the collective learning and knowledge processes of agencies. Data-driven optimization can be a key component of such knowledge processes, but it also requires leadership that takes responsibility for the end to end process, have the knowledge and authority to act, and is able to shape resources outside of its own organization to respond to unforeseen opportunities and threats.

⁶ Teece, D.J., Pisano, G., and Shuen, A. "Dynamic Capabilities and Strategic Management," *Strategic Management Journal*, 18(7), pp. 509-533.

⁷ Teece, D.J. "Explicating Dynamic Capabilities: The Nature of Microfoundations of (Sustainable) Enterprise Performance," *Strategic Management Journal*, 28, 2007, 1319-1350.

⁸ Dawes, S.S. and Eglene, O. "New Models of Collaboration for Delivering Government Services: A Dynamic Model Drawn from Multi-National Research," *Proceedings of the 2004 Annual National Conference on Digital Government Research*. Seattle, Washington, 1-11.