Transforming Washington DC's Parking Meter Program
Using Lean Six Sigma Based Asset Management

by

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The District Department of Transportation (DDOT) is responsible for maintaining and operating over 18,000 metered on-street spaces in Washington, DC. The program went through significant changes in 2009 and 2010 including two rate adjustments, reintroduction of meter enforcement on Saturdays and extending hours of meter operation to 10 PM in some areas. These changes caused operational problems for the Department and frustration for the customers. This paper describes how DDOT applied lean six sigma (LSS) processes and techniques to dramatically transform its on-street parking meter program. The paper introduces the concept of LSS and discusses how some of the analytical techniques and concepts were applied. Techniques such as root cause analysis, process capability, mean testing, pareto analysis and process mapping were used to identify fundamental problems with the program and assets. Once the problems were identified, DDOT quickly developed a strategic vision for the future and aggressively implemented the vision. Applying lean six sigma techniques has reaped significant rewards for DDOT within a very short period of time. These benefits include higher customer satisfaction through enhanced payment options, lower number of service requests, better system uptime, more proactive management of assets, better executive visibility and increased revenue. Washington DC’s parking program is now recognized as one of the most innovative, forward thinking programs in the country. The success of applying LSS in parking has encouraged DDOT to apply this concept in other program areas as well.
BACKGROUND

The District Department of Transportation (DDOT) is responsible for developing and maintaining a cohesive, sustainable transportation system that delivers safe, affordable, and convenient ways to move people and goods—while protecting and enhancing the natural, environmental and cultural resources of the nation’s capital. As an agency, DDOT is very unique—it has attributes of both a state and municipal department of transportation (DOT). As part of this mission, DDOT manages and operates all the transportation assets in Washington, DC. These assets are valued at $44 billion [1]. Over the past few years, DDOT has gone through a paradigm shift in how it manages its assets. These techniques include performance based contracting (with incentive/disincentive and liquidated damages), application of data mining and process enhancement techniques such as lean six sigma (LSS) and participating in constructive partnering forums with the private sector for more cost effective service delivery.

The District Department of Transportation (DDOT) is responsible for maintaining and operating over 18,000 metered on-street spaces in Washington, DC. Until late 2010, these spaces were controlled by two basic asset types; (a) traditional single space meters (SSM) that each cover one space, and (b) multi space meters (MSM) that cover approximately an average of eight metered spaces. The MSMs are networked, while the SSMs are mechanical, non-networked assets. Moreover, the SSM are more than 10 years old and at the end of their useful life. From a customers’ perspective, credit cards were accepted as a payment option (in addition to coins) only at the MSMs. For the rest of the assets, only coins were accepted. Up until late 2010 customers could pay by credit cards at only 23% of the metered spaces.

Between March of 2009 and January 2010, the program underwent significant changes including two rate adjustments, lifting of the Saturday moratorium on parking meter fees and extending the duration during which meters are operational [2, Error! Reference source not found., 4]. These operational changes put significant stress on a system that had assets that were beyond their useful life.

The changes caused significant frustration amongst customers. Due to the rate adjustments, the number of coin transactions on the system increased. This increased failure rates for the meters. Consequently, customers were frequently encountered with broken meters [5]. The rate increase also necessitated customers to carry more change. This caused additional frustration [6]. Parking related service requests through Washington, DC’s centralized 311 system became the highest service request in DC. In 2010, the agency received approximately 200,000 parking meter related service requests [7]. Just to put things in perspective, in 2009 DDOT received more parking meter related service requests than the Department of Public Works (DPW) received as an entire agency [8]. Also, the perception gap (the difference between percentage on-time service delivery and customer’s perception about the level of service delivery measured through a sample survey), for parking meters was at 55% [9]. This was the highest amongst all DDOT service categories. The press picked-up on the negative customer sentiment as well [10,11]. The program became a burning issue for the Department and the District of Columbia. Consequently, there was significant pressure on the agency to enhance the program.
This paper discusses how DDOT adopted a lean six sigma (LSS) based approach to identify fundamental problems with its assets and the program, developed a strategic approach to enhance the program, implemented the recommendations and achieved significant enhancements. It discusses some of the analytical tools that were used in the process.

WHAT IS LEAN SIX SIGMA

Lean and six sigma are process improvement methodologies. Lean is a set of tools that is geared to improve process flow. Lean primarily focuses on the elimination of waste or non-value added activities from all business processes. Lean arose as a method to optimize auto manufacturing (initially at Ford and Toyota). Lean focuses on eliminating seven sources of waste [12]:

- Overproduction (manufacturing items ahead of demand)
- Inventory (excess material and information)
- Defects (production of off-specification products)
- Transport (excess transport of work-in-process or products)
- Motion (human movements that are unnecessary or straining)
- Over-processing (process steps that are not required)
- Waiting (idle time and delays)

Six sigma specifically focuses on process variation. It is a methodology driven by understanding of customer needs, and the disciplined use of data, facts and statistical analysis to improve and reinvent organizational processes by reducing variation. Six sigma evolved as a quality initiative to reduce variance in the semi-conductor industry (initially Motorola). From a purely statistical standpoint a six sigma process has 3.4 defects per one million opportunities [13]. The statistical roots of the term six sigma have become less important as six sigma has evolved into a comprehensive management system.

Lean six sigma (LSS) is a combination of lean and six sigma approaches. Despite their disparate roots, lean and six sigma share several fundamental commonalities including a focus on customer satisfaction, continuous improvement, identification of root causes, and comprehensive employee involvement [14]. LSS uses a data-based approach to enhance workflow and business processes.

Though used primarily in the manufacturing sector, the concept of LSS has been applied successfully in the service sector as well. LSS for services is a business improvement methodology that maximizes value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed and invested capital.

Lean six sigma is a five step process as shown in Figure 1 [15]. Each of these processes has sample tools and procedures as shown in Table 1 [16].
1. **FIGURE 1.** Lean Six Sigma Process

![Lean Six Sigma Process Diagram]

2

3

4. **TABLE 1.** Sample Tools in Lean Six Sigma Approach

<table>
<thead>
<tr>
<th>Define</th>
<th>Measure</th>
<th>Analyze</th>
<th>Improve</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Definition</td>
<td>Basic Statistics (Measure of central tendencies, Measure of variation, Distributions, etc.)</td>
<td>Hypothesis testing</td>
<td>Design of experiments (DOE)</td>
<td>Control plan</td>
</tr>
<tr>
<td>Process Mapping</td>
<td>Graphical techniques</td>
<td>Means testing</td>
<td>Means testing</td>
<td>Project closure</td>
</tr>
<tr>
<td>Cause and Effect Matrix</td>
<td>Confidence intervals</td>
<td>Power &amp; sample size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure Modes and Effects Analysis (FMEA)</td>
<td>Measurement systems analysis (MSA)</td>
<td>Regression analysis</td>
<td>2k factorial design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capability analysis</td>
<td>Analysis of variance (ANOVA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statistical process control (SPC)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
LITERATURE REVIEW

Lean six sigma has been used extensively in the private sector. There are several documented uses of LSS across different levels of government as well. Federal agencies such as the Department of Defense (DOD), Environmental Protection Agency (EPA), Department of Energy (DOE); state agencies such as Florida Department of Revenue; and municipal agencies such as City of Fort Wayne (Indiana), City of Hartford (Connecticut) and City of Irving (Texas) have applied six sigma techniques to various components of their programs [17,18,19]. Most of the documented applications of lean six sigma in the transportation industry have been in the area of logistics and supply chain for humanitarian relief, airlines, rental car and rail operations [20,21]. Lean techniques have been used for delivery and construction of infrastructure projects [22,23]. However, as a concept, LSS has not made significant inroads into the mainstream transportation engineering profession.

APPLICATION OF LEAN SIX SIGMA TO DC PARKING PROGRAM

This section discusses how some of the tools in the LSS framework were applied to gain valuable information and knowledge about DDOT’s parking meter assets.

Root Cause Analysis

There are several techniques that can be used for root cause analysis such as fishbone diagram, cause and effect mapping, failure modes and effects analysis (FMEA), etc. DDOT utilized cause mapping to identify the “root causes” of the problems associated with the program. During this process, it was important to distinguish between symptoms and causes. During the analysis it became apparent that symptoms such as increase in number of broken meters, broken meter call volumes and customer dissatisfaction were driven by four fundamental causes - aged assets, non-communicating meters, increase coin transactions (because of the rate increases) and limited payment options for customers (shown in Figure 2). Identifying the root causes was fundamental in charting a future course for program enhancements.
Establishment of High Level Program Goals

Based on the root cause analysis, DDOT developed three high level goals for the parking meter program. Each goal was sub-divided into more detailed sub-goals. These included [24]:

- Improved customer service
  - Multiple payment options
  - Maximize convenience
  - Real-time parking availability
  - Fewer broken meters

- Enhanced operational efficiency
  - Dynamic pricing
  - Real-time operational status
  - Better uptime
  - Lower operating cost

- Better revenue management
  - Minimize coin transaction
  - Real-time auditing
Parking Pilots

In the summer of 2010, DDOT evaluated the state-of-the-art in meter hardware, payment options and real time occupancy sensing through a series of pilots. The pilots were conducted using a competitive procurement process. DDOT tested two different configurations of multi space meters (pay by space and pay by license plate), credit card accepting single space meters, occupancy sensors and new payment options such as pay by cell. The pilots were evaluated against the program goals as shown in Table 2 below [25].

<table>
<thead>
<tr>
<th>PROGRAM GOALS</th>
<th>PAY-BY-CELL</th>
<th>SMART SSM</th>
<th>SMART MSM</th>
<th>SPACE OCCUPANCY</th>
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</thead>
<tbody>
<tr>
<td><strong>IMPROVED CUSTOMER SERVICE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple payment options</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Customer convenience</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real time parking availability</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fewer broken meters</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>ENHANCED OPERATIONAL EFFICIENCY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Pricing</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real-time operational status</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better uptime</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Lower operation cost</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>BETTER REVENUE MANAGEMENT</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Minimize coin transaction</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Real-time auditing</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Control Chart for Call Volumes

Control chart is a tool that helps detect any extraordinary variation in the process — variation that may indicate a problem or fundamental change in the process. Figure 3 shows a control chart for the number of broken meter 311 calls received between February 2007 and April 2011. The control chart shows the overall process mean ($\overline{x}$) as well as the upper control limit (UCL) and lower control limit (LCL). The UCL and LCL are three standard deviations from the mean. The chart also annotates policy changes that likely impacted call volumes – the rate changes in April 2009 and January 2010 and installation of networked single space meters in November 2010. It appears that the process has 4 distinct means:

- Between February 2007 and March 2009, the mean appeared to be between the overall mean ($\overline{x}$) and the LCL.
- Between March 2009 and January 2010, the mean jumped to between the overall mean ($\overline{x}$) and the UCL.
- Between January 2010 and November 2010, the mean jumped to above the UCL.
- After new assets were introduced in November 2010 the mean dropped again to between the UCL and the overall process mean ($\overline{x}$).
Individual mean testing was conducted for each of the four time slices and indicated that the means during the four periods were statistically different. This shows that external influences such as policy changes and asset refresh affected the process.

**FIGURE 3.** Control Chart for Call Volumes

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**Pareto Analysis/Bad Actor Report**

All service request calls to DC’s 311 system are fielded by the Office of Unified Communications (OUC), entered into a service request system and routed to appropriate agencies. DDOT analyzed parking meter related service request calls from the 311 system and performed a pareto analysis. The analysis (referred to within DDOT as the bad actor report) revealed that the worst 1,500 meters (8% of assets) accounted for 40% of the call volumes. The 1,500 worst performing assets averaged 25 calls per year. This implies technicians were dispatched to investigate these meters an average of 25 times during the course of one year. The worst performing meter was “called-in” 95 times. Ninety five percent (1,425 of the 1,500) of the assets in the bad actor report were the oldest asset types (SSM). Figure 4 shows the distribution of call volumes for the 1,500 worst performing meters [26].

From a business and customer service standpoint it made more sense to systematically replace these aged assets with newer assets.

**FIGURE 4.** Call Distribution for 1500 Worst Performing Meters

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1 Worst meter is defined as the meter that had the maximum number of 311 calls/service requests
Mean Testing

Based on the Pareto analysis and the findings of the pilots, DDOT started replacing its worst performing assets with newer networked assets. Figure 5 shows how the call volumes on the routes dropped after new assets were installed. Mean testing of the call volumes was conducted before and after the installation and the means were found to be statistically different.

Similar before and after mean testing was conducted on revenues for routes where new assets were installed. The analysis revealed that asset refresh resulted in higher revenues as well [27]. This was most likely driven by two factors; (a) newer meters had better uptimes and were less likely to break down, and (b) the newer networked assets accepted credit cards, hence customers had two options to pay at these meters – coin or credit/debit card.

**FIGURE 5.** Mean Testing for Routes with New Assets
DDOT manages and operates the parking meter program using a performance based asset management contract. The contract requires the contractor to fix SSM within 72 hours and MSM within 24 hours. It also requires an operability rate of 99% for MSM and 97% for SSM. The contract allows incentives for exceeding the performance metrics and liquidated damages for failing to meet the performance measures.

A capability analysis was conducted to ascertain whether the process was capable of meeting the 72 hours requirement. As shown in Figure 6, the contractor’s mean repair time was significantly below the upper specification limit (USL) for the contract (72 hours). The contractor was also meeting the 97% operability requirement. Yet the program had a negative perception.
In examining the issue more closely, the team realized that there was a “measurement error” built into how performance was being measured.

**Measurement Error**

Given that most of the assets are non-networked, operability and repair time was based on a work order/service request system. This is largely a reactive system in that broken meters factor into the operability equation only if it is “called in”. A broken meter that is not reported does not factor into the operability calculation.

DDOT conducted some field observations based on a statistical sampling. The 95% confidence interval for meter operability was between 82% and 90% with a mean of 86%. This is significantly lower than the 97% operability calculated through the work order system. Two independent “touch a meter program”, where DDOT staff assesses operability of its entire meter inventory, estimated operability at approximately 80% to 85%. The measurement error helps explain the difference between the “ground truth” and work order based operability and helps explain the public frustration.
Process Flow Charts
DDOT also spent a considerable amount of time mapping out the various processes related to parking and curbside management. The parking function in DDOT is very fragmented with individual groups responsible for policy, operations, signage, permitting and enforcement. Process mapping techniques revealed inefficiencies such as hidden factories, bottlenecks and non-value added activities. It was also apparent that there were delays whenever there was a hand-off of responsibilities between different groups in DDOT. Process mapping allowed DDOT to get a common understanding of the process and responsibilities and identify inefficiencies [28].

IMPLEMENTATION
Based on the LSS analysis and the findings of the parking pilots in 2010, DDOT implemented a series of changes to its parking meter program with dramatic results. These included:

- Significantly increased the number of networked assets by implementing new networked, credit card accepting single space meters and increased the coverage provided by MSMs.
- Launched a citywide pay by cell program – Following two very successful pilots, DDOT launched a citywide pay by cell program in July 2011. The program turned out to be the most successful pay by cell program in the country. In less than two years since launch, the program has 600,000 customers and has resulted in over 7 million transactions accounting for over 40% of the annual parking revenue [29].
- Issued a new RFP for the next generation parking asset management – DDOT issued a new RFP for maintaining and managing its parking meter assets for the next five years. The contract is structured as a performance based contract with liquidated damages and incentive/disincentive clauses. It is also structured to make sure that the City is not locked into paying for services that it does not require. Recognizing that the asset mix and revenue mix would change substantially over the next five years, the contract has fixed price elements, fixed unit prices by asset type for maintenance, and percentage fee for items such as coin collection and credit card processing. It also requires use of LSS techniques for program management and an integrated back-end system for asset monitoring and management [30].

WASHINGTON, DC’S MIGRATION PATH
Non-Communicating Assets to Networked “Smart Assets”
DDOT started a systematic process of phasing out non-communicating meters with networked assets. The change out was done in a systematic manner based on the findings of the bad actor report. MSM meters were written into the standard specifications and incorporated as part of capital improvements such as streetscape projects. Table 3 shows how the asset mix has changed over the last three years. The number of spaces that are covered by credit card accepting, networked meters jumped from 23% in 2009 to 45% in 2013.

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Networked</th>
<th>Payment Options</th>
<th>2009 Asset Mix</th>
<th>2013 Asset Mix</th>
<th>2009 Asset Mix</th>
<th>2013 Asset Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Networked Single Space Meters</td>
<td>No</td>
<td>Coin</td>
<td>13,234</td>
<td>13,234</td>
<td>77%</td>
<td>10,238</td>
</tr>
<tr>
<td>Networked Multi-Space Meters</td>
<td>Yes</td>
<td>Coin Credit</td>
<td>514</td>
<td>3,923</td>
<td>23%</td>
<td>638</td>
</tr>
<tr>
<td>Networked Single Space Meters</td>
<td>Yes</td>
<td>Coin Credit</td>
<td>NONE</td>
<td>3,197</td>
<td>17%</td>
<td>3,197</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>13,748</td>
<td>17,157</td>
<td>0.80</td>
<td>14,073</td>
</tr>
<tr>
<td>% Spaces covered by networked, credit card accepting assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23%</td>
<td>45%</td>
</tr>
</tbody>
</table>

**Coin Transactions to Virtual Transactions**

With the introduction of credit card accepting, networked meters and the launch of pay by cell, DC’s revenue mix has undergone a significant transformation. In 2009, 80% of DC’s parking meter revenue was in the form of coins. Currently that percentage stands at only 30%. Therefore, a majority of DC’s revenues are through virtual transactions, which have a lower cost structure than coin revenues [31]. Virtual revenues also provides an easier audit trail and provides real-time visibility into revenue streams and meter usage.

**Reactive to Proactive Maintenance**

Operability of networked meters can be monitored in real-time through a back office system (as opposed to network assets where meter malfunctions have to be reported). Hence, with the increase in networked assets, the meter maintenance strategy can be shifted from reactive to proactive. This increases system uptime, revenue potential and customer satisfaction. It also enables real-time assessment of asset condition and a more realistic assessment of operability, repair time, etc. making it easier to manage and monitor a pure performance based contract. Proactive maintenance also reduces the cost associated with fielding parking meter related 311 calls.

**“Asset lite” Solutions**

As pay by cell adoption rates increase, DC can start considering removing meters from a block face in areas with high pay by cell usage. These meter-less blocks would be available to customers using pay by cell only. This can result in significant cost savings for DC, since an asset lite solution such as pay by cell costs significantly lower than meter-based payment methods (such as coins or credit cards). DDOT will be testing some of these asset lite strategies in a Federally funded pilot project in the Chinatown area [32].
RESULTS

Program performance can be measured across various dimensions. The parking meter program has gone through a transformation as a result of LSS analysis and follow-through. The following section discusses some of the accomplishments.

- Increased payment options for customers – In 2009, people had one mode of payment (coin) at 70% of the metered spaces. Now people have at least two options (coin and pay by cell) to pay at all locations. At 50% of the locations people have three payment options (coin, credit/debit and pay by cell).
- Increased revenues – In 2009 DC’s parking meter revenue was $20 million. The last set of rate adjustments occurred in January 2010. DC’s revenue in 2010 was $25 million. DC’s 2012 and 2013 parking revenues were $38 million and $40 million, respectively. This represents a 60% revenue increase with the same set of parameters or policy framework. This is a function of better management of the assets, more options to pay for metered parking and better system uptime.
- Drop in call volumes – Parking meter related call volumes can be considered as a surrogate for customer satisfaction. Call volumes have dropped significantly since an all-time high in 2009 and 2010. 2013 call volumes were 13% lower than 2010 levels.
- Public perception about the program has increased – If the sentiment in the press is a reflection of public perception, the program has undergone a sea-change over the last four years. From heading such as “Parking Meters a Bane to Mankind” the press sentiment has turned to “Government at its Best” after the launch of the successful pay by cell program [33,34].
- Enhanced Executive visibility - Recognizing the success of the program and the full potential, the Executive Office of the Mayor allocated $25 million in capital funds for asset refresh and modernization over next three fiscal year budget cycles.
- National Recognition - DC’s parking meter program is now widely acknowledged in the industry as a forward thinking program. In a recent survey conducted by the International Parking Institute, DC was ranked fourth amongst innovative parking programs in the country [35].

Figure 7 summarizes some of the performance trends in the parking meter program.
FIGURE 7. Program Performance Metrics (2009 to 2013)

Payment Options for Parking Customers

Annual Parking Revenue (in $ million)
Dey, S.S., Transforming Washington DC's Parking Meter Program Using Lean Six Sigma Based Asset Management

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**Parking Meter Related 311 Calls**

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
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<tbody>
<tr>
<td>Annual 311 Calls (Parking)</td>
<td>200000</td>
<td>190000</td>
<td>180000</td>
<td>160000</td>
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</table>

**Revenue Mix**

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tbody>
<tr>
<td>% Revenue</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- **Pay by Cell**
- **Credit Card**
- **Coin**

TRB 2014 Annual Meeting

Paper revised from original submittal.
LESSONS LEARNED

This section lists some of the key success factors/lessons learned for LSS applications.

Get Executive Buy-In – For a program such as LSS to work, there needs to be a commitment and buy-in at the executive level. At DDOT all key executives (the Director, Deputy Director, Associate Directors and Chief-of-Staff) went through six sigma black belt training. This “signaled” the agency staff about the importance of LSS and set the tone for the program within the agency. The executives in turn have deep appreciation of the process and its potential.

Develop a Core Group of Champions – Build a core group of LSS champions throughout the agency. This core group needs to comprise of individuals that can adapt to change, believe in the benefits of data-based decision making, are enthusiastic about applying the concept to their program areas and can mentor other people in the organization. At DDOT, this core group got subsequent training in a six sigma train-the-trainer course.

Institutionalize LSS – Develop training program(s) and provide infrastructure support for the concept to promulgate throughout the agency. LSS is now part of DDOT’s standard curriculum through the training office.

Apply LSS to “Right Projects” - It helps if LSS is applied to a project of critical interest. This ensures executive support, continuing momentum and sense of urgency. For DDOT, the parking meter program was one of the highest priority problems that needed to be fixed. In addition, black belt certification requires participants to work on a real-life project. Having executive leadership trained ensured that LSS was being applied to projects of critical interest to the agency.

Share Success Stories – Ensure that success stories are shared throughout the organization. DDOT (and the DC government) has a performance/data-based culture. Sharing tangible benefits achieved through application of LSS is part of the natural performance reporting process.

Be Patient, Maintain Momentum – Agency transformation through LSS is a marathon, not a sprint. Success requires patience, discipline and sustained focus over a period of time.

CONCLUSION

Application of LSS helped transform the parking meter program which used to be a source of frustration for DDOT and its customers. LSS helped identify fundamental issues with the program and helped DDOT to aggressively chart a path forward using a fact-based decision making process. Following the success of the parking program, LSS has been applied to other asset classes and programs at DDOT as well. The principles and tools from LSS have been successfully applied to streetlights, urban forestry, traffic control officers and safety service patrols.

The current trends in public sector transportation agencies towards increased use of performance management/measurement, higher level of citizen engagement and operating in a financially constrained environment can serve as a catalyst to adopt process improvement efforts such as LSS.
Applied correctly, it has the potential to provide the framework for achieving sustainable improvements to business processes and service delivery.
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