KPMG
cutting through complexity

KPMG TOLL BENCHMARKING STUDY 2015

An evolution of tolling

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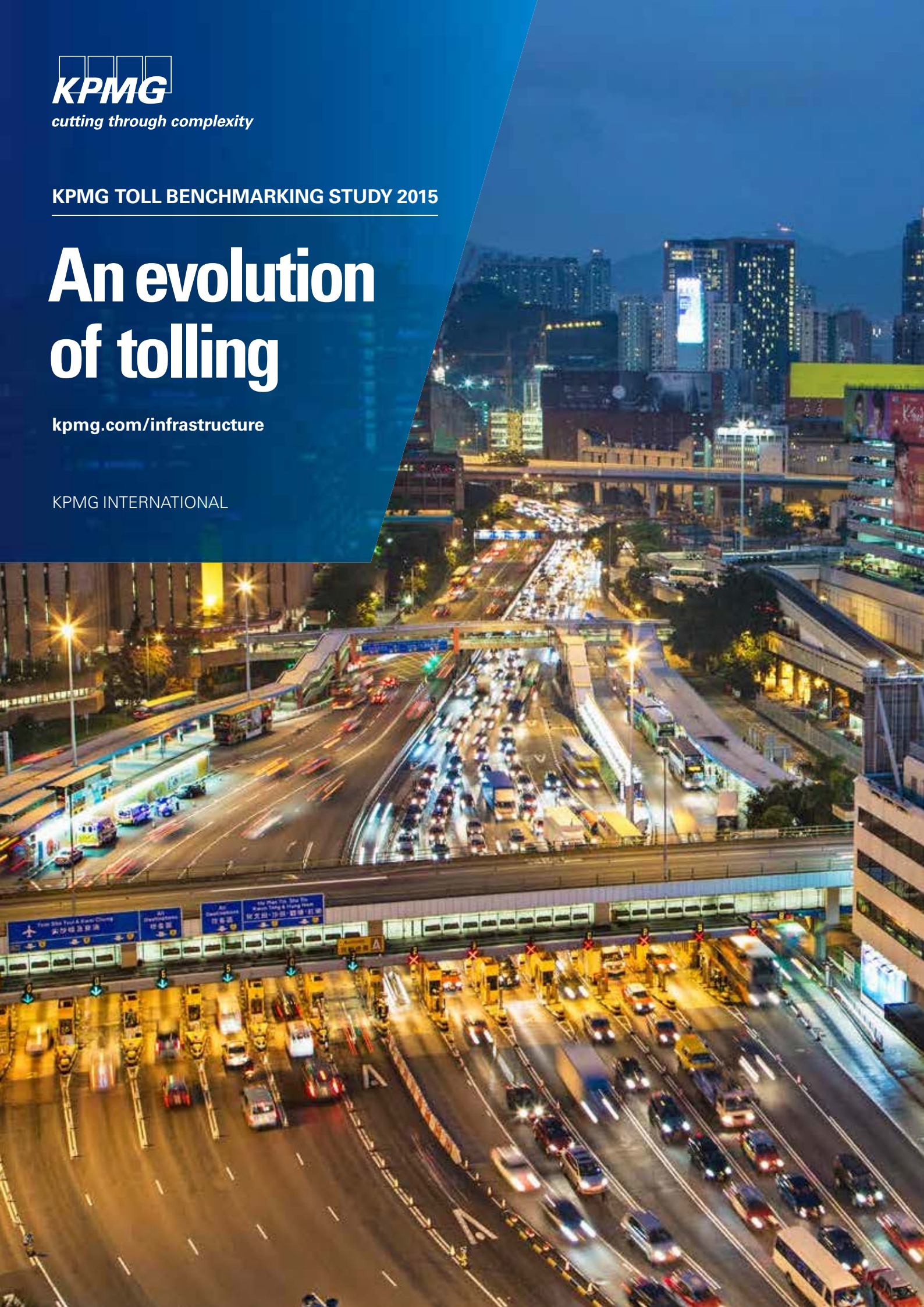


Foreword

Let's face it; everyone wants to extract more value from their infrastructure assets. And rightfully so; demand for new capacity is rising – oftentimes faster than resources – and governments are struggling to find the right balance between managing their growing maintenance backlogs and delivering system expansion to address the needs of the public. Not surprisingly, therefore, the focus has shifted towards optimizing the use of existing assets.

Improved operating efficiency can lead not only to direct cost savings but also to increased usage, extended asset life, and enhanced customer satisfaction. More importantly, perhaps, improved asset efficiency can also lead to improved revenues for asset owners. And for governments, this means more money to invest into existing and new infrastructure.

Roads in the crosshairs

Our experience suggests that one of the first places governments tend to look for improved efficiency is in their roads. Recognizing that the public is often willing to pay more for improved service, we have seen a dramatic increase in the number of toll roads[1]. Some are government owned and operated. Others have been transferred to the private sector under public-private partnership (PPP) arrangements.

At the same time, technology has enabled a gradual – but profound and sustainable – shift in the way that toll roads are operated. And as a result, every element of the value chain has been affected, from the users' driving experience to the core operations of the back office. Open Road Tolling (ORT), Electronic Toll Collection (ETC), Global Positioning System (GPS) and new back office systems and technologies are revolutionizing the industry and streamlining operational efficiency.

Looking for the 'next level' of efficiency

While many public and private asset owners have made great strides in getting more out of their road assets, most are now looking for new opportunities to wring further efficiencies out of their operations. Asset management has become a hot topic in the road sector and owners want to learn about leading practices and understand how they compare to their peers around the world.

Unfortunately – until today – there has been no reliable global source of comparative data for the toll road sector. Few truly know what 'good' performance looks like and no global benchmark exists to help compare key metrics such as cost to collect or operational efficiency.

This report aims to bridge that gap. Based on in-depth survey data collected from more than 40 tolling entities worldwide, it provides public and private tolling organizations with an unprecedented view into the challenges, risks, costs and opportunities facing the tolling sector today.

The process of creating this comparative review has been challenging. Data sources and metrics are often inconsistent; wide variations exist in the way operators report their costs; and there is little consistency in the terminology and definitions applied across the sector. As the first in a series of ongoing surveys, we recognize these challenges and will strive to improve and expand our scope to ensure that data remains relevant and valuable.

However, we believe this report provides important data for the sector. And, when combined with the practical insights and context offered by KPMG's top roads and tolling professionals, this report aims to provide owners and operators with the information and advice they need to become more efficient and drive improved results from existing assets.

To learn more about these findings – or to benchmark your own operations against our extensive survey data – we encourage you to contact your local KPMG member firm or any of the contacts listed at the back of this report.

Stephen Beatty
Americas and India Head
of Global Infrastructure
KPMG in Canada

1. According to the International Bridge, Tunnel and Turnpike Association (IBTTA), the US has added more than 500 miles of new toll roads since 2011.

CONTENTS

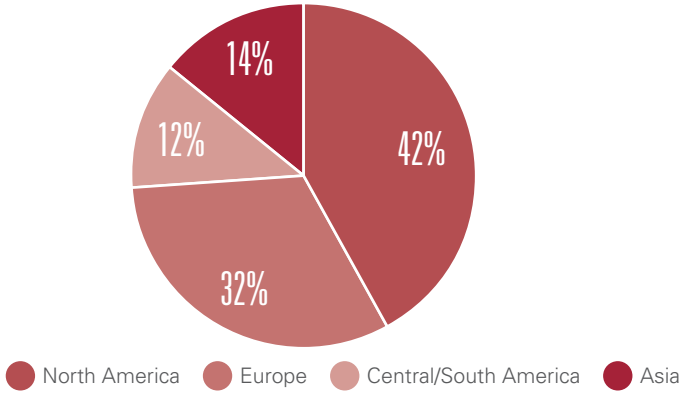
Respondent demographics: A world of tolling

Today's road tolling sector is diverse and evolving. That is why – for this, our first survey of toll road operators – we focus on capturing a diverse sample of respondents from around the world. Collectively, the respondents represent more than 30,000 kilometers of roads and more than 500 toll plazas.

This survey reflects the data collected from 43 different private and public entities involved in toll road operations across the Americas, Europe and Asia. The majority – more than eight in ten – reported being responsible for the operation and maintenance of both short-term assets (such as tolling equipment) and long-term assets (such as bridges and pavement). The remainder reported being focused only on short-term assets.

Slightly more than half (51 percent) of our respondents are public agencies – largely influenced by the large number of respondents from North America where public agencies continue to be the predominant owners of toll roads. More than two-fifths are private organizations operating under a concession contract.

Geography of participants



Source: KPMG International, 2015

Our survey also suggests that road tolling continues be primarily a local endeavor. Only 14 percent of the respondents said they have a regional or global presence and just over a quarter of respondents (28 percent) said they do not belong to any national or international forums or associations (such as ASECAP or IBTTA). Perhaps not surprisingly, 89 percent of those that do participate in these forums say they are effective in defending their interests and in involving members in broader discussions.

The survey was conducted through in-person interviews and supplemented with secondary research in late 2014 and responses were collected and analyzed by KPMG infrastructure professionals from around the world in early 2015.

Setting rates
and collecting tolls

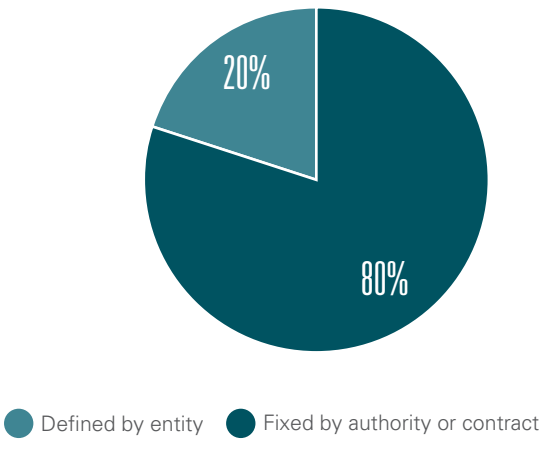
Owners and operators of toll facilities have two levers for improving operating results: increase revenues or decrease costs. However, the vast majority of respondents say they have little to no flexibility in driving new revenue by adjusting toll rates. As a result, many are now focusing on the cost side of the equation, where new collection and back office technologies are creating opportunities as well as challenges.

Moving to market-based pricing

According to our survey, just 20 percent of tolling agencies and operators are currently free to set their own toll rates and discounts based on market acceptance and competition. The other 80 percent say their rates are fixed by either an authority or by contract.

Yet our survey suggests that tolling organizations are increasingly looking to move towards more market-based approaches for setting toll rates. In fact, when asked what approach would best allow them to improve the cost efficiency of their road assets, 60 percent recommended a change towards greater rate setting flexibility, albeit within certain limits. Only one respondent suggested that changing to a regulated asset base (RAB) system would improve efficiency.

Is your agency free to set toll rates and discounts or are they fixed by a government authority or by contract?

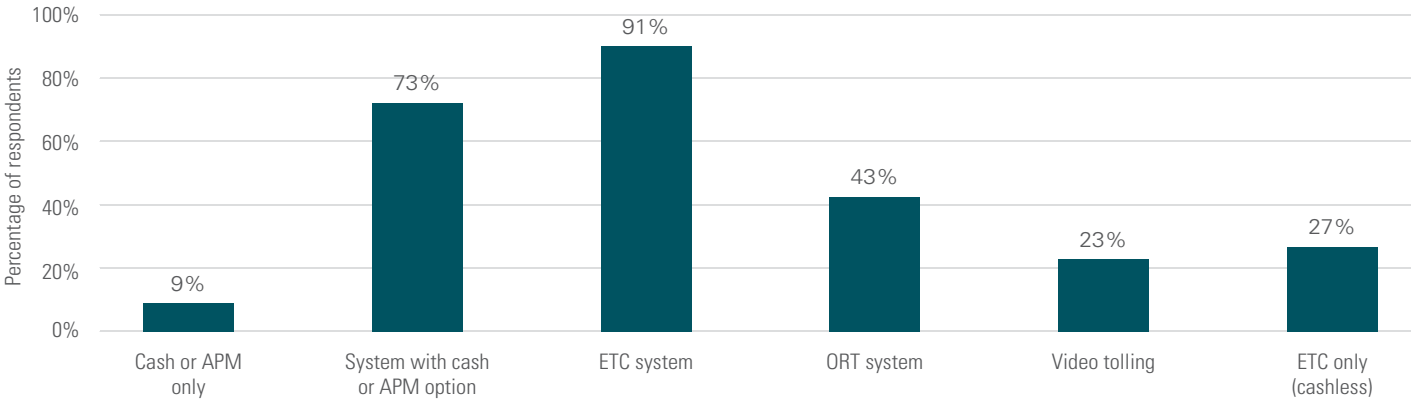


Source: KPMG International, 2015

An array of collection methods

Our survey also demonstrates that many are implementing a wide array of toll collection approaches. Indeed, 91 percent of all respondents said that they now offer some form of Electronic Toll Collection (ETC). Forty-three percent say their agency uses Open Road Tolling (ORT) and 23 percent said they use some form of video billing mechanism.

What is/are the types of toll collection approaches currently used by your agency?



Source: KPMG International, 2015

Interestingly, despite the widespread acceptance of electronic modes of toll collection, almost two-thirds of respondents said their facility still offered a cash option (whether on or off the main line or at walk-in centers) and more than one-third say they offer automatic toll payment machine (ATPM) options.

Two factors are likely saving the toll booth from certain demise. The first is that – in many jurisdictions – the provision of a 'cash option' is mandated through regulation in order to improve access to those without credit and to provide a level of anonymity for users. The second factor is the prevalence of trade unions within the sector (almost two thirds of respondents said they were either fully unionized or partially unionized), which often influences the ability of toll organizations to remove toll plazas entirely.

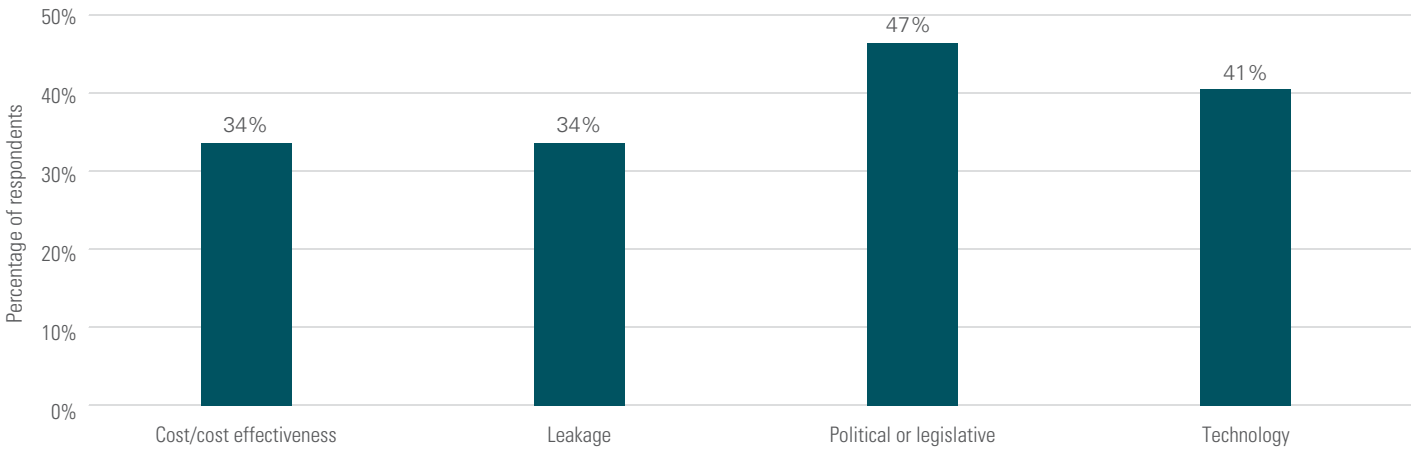
Collection faces continued challenges

While the range of approaches for collecting tolls has certainly increased, our survey suggests that operators continue to face some significant challenges when collecting tolls.

Revenue leakage was cited as a major challenge by a third of respondents. While revenue leakage is often considered to be associated with technological issues or with users out of the jurisdiction, nearly half (47 percent) also pointed to legislative challenges associated with toll collection. Consider, for example, the leakage faced by operators in the US State of California where provisions exist for cars to temporarily operate without license plates when being transferred to new owners.

But a third of respondents also said they were challenged by rising toll collection costs which, given that most are operating tightly-controlled pricing schemes, suggests that margins are being squeezed.

What major challenges face your agency regarding toll collection?



Source: KPMG International, 2015

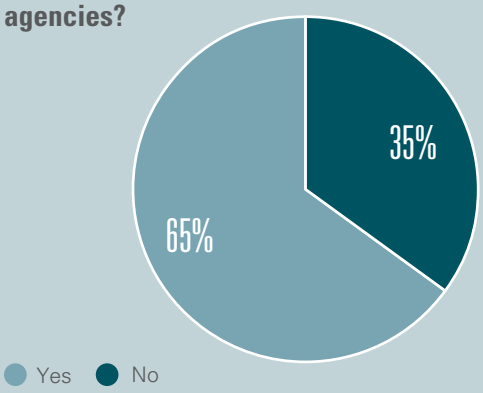
Interoperability becomes critical

With the increased prevalence of ETC approaches, focus has shifted towards improving interoperability with neighboring, interconnecting or jurisdictional systems; according to our survey, 65 percent of toll facilities are interoperable with other tolling agencies.

Our survey suggests that tolling organizations are entering into a number of different arrangements in order to better manage their interoperability and associated fee agreements. Around a quarter said that their ETC platform manages fee arrangements (likely reflecting respondents belonging to the E-ZPass Interagency Group); slightly fewer (16 percent) said they had entered into bilateral or fixed fee arrangements with other agencies. Somewhat surprisingly, 26 percent indicated that they had no fee agreement at all.

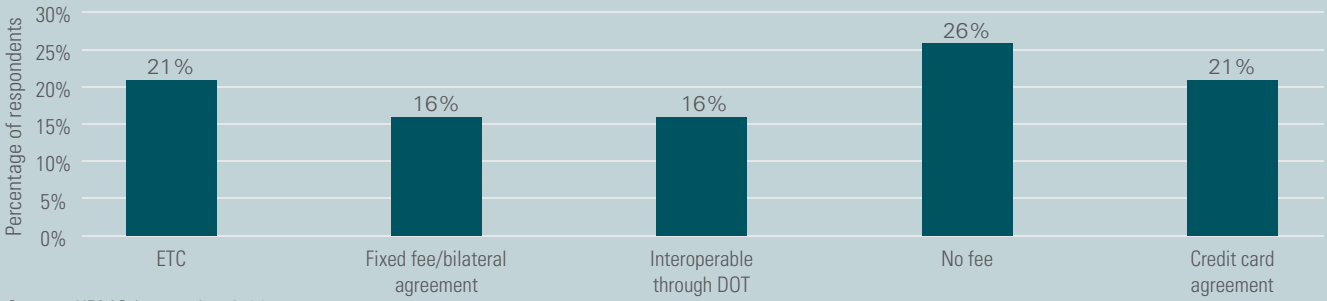
Not surprisingly, the majority of respondents (64 percent) indicated that they use some form of external platform (such as E-ZPass in the Eastern US) to manage interoperability while the remainder said they used some form of internal platform.

Are your toll roads interoperable with other tolling agencies?



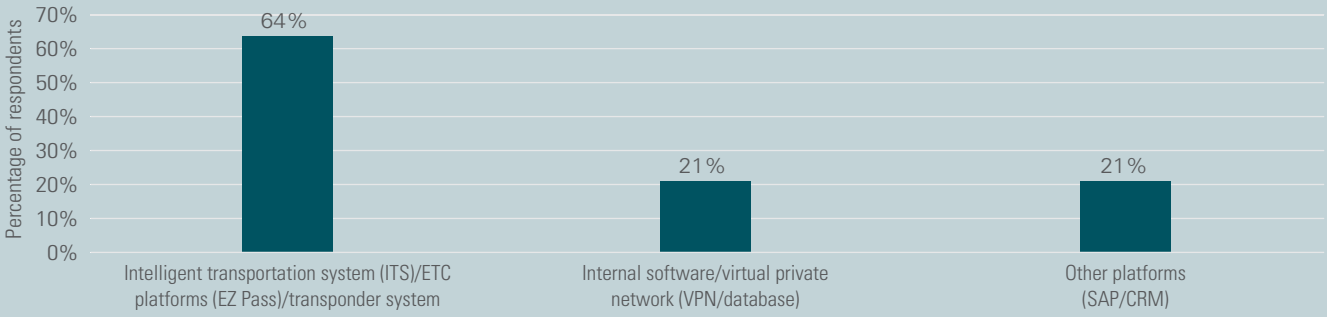
Source: KPMG International, 2015

What is the fee agreement for interoperability and is there a mark-up?



Source: KPMG International, 2015

What technology platforms do you use to manage interoperability and/or what changes did you implement to the existing technology?



Source: KPMG International, 2015

Interoperability also comes with a level of collection risk that is often delegated within the specific reciprocity agreement (in other words, who bears the risk for non-collection). According to our respondents, this risk resides with the 'home agency' (i.e. the agency that owns the user account) in one-third of the cases, and with the 'away agency' (i.e. the agency that owns the facility on which a user with a tag issued by another agency is circulating) for nearly half (44 percent) of the respondents.

At the end of the day, we believe that everyone in the tolling sector should be focused on improving interoperability. Not only will it potentially drive revenue growth and reduce leakage, it will also help improve efficiency across the network – a goal that everyone in the sector can agree upon.

The changing technology landscape

Like many other infrastructure sectors, the tolling industry has undergone significant change over the past two decades. Today, everything from the identification of a user driving on a facility to back-office systems is powered by technology and our survey suggests that investments in technology are only going to increase. Our results show that one of the best ways to drive continued efficiency gains is through technology enablement.

Our survey finds that 91 percent of respondents use some form of electronic toll collection in their operations.

In part, the shift seems to reflect societal demand. The reality is that road users in parts of North America and Europe have largely gone 'cashless' and therefore demand electronic options for paying tolls. At the same time, both users and owners recognize that electronic toll collection can significantly improve the throughput of the facility itself which, in turn, results in a better level of service for users without the need for large capital investment.

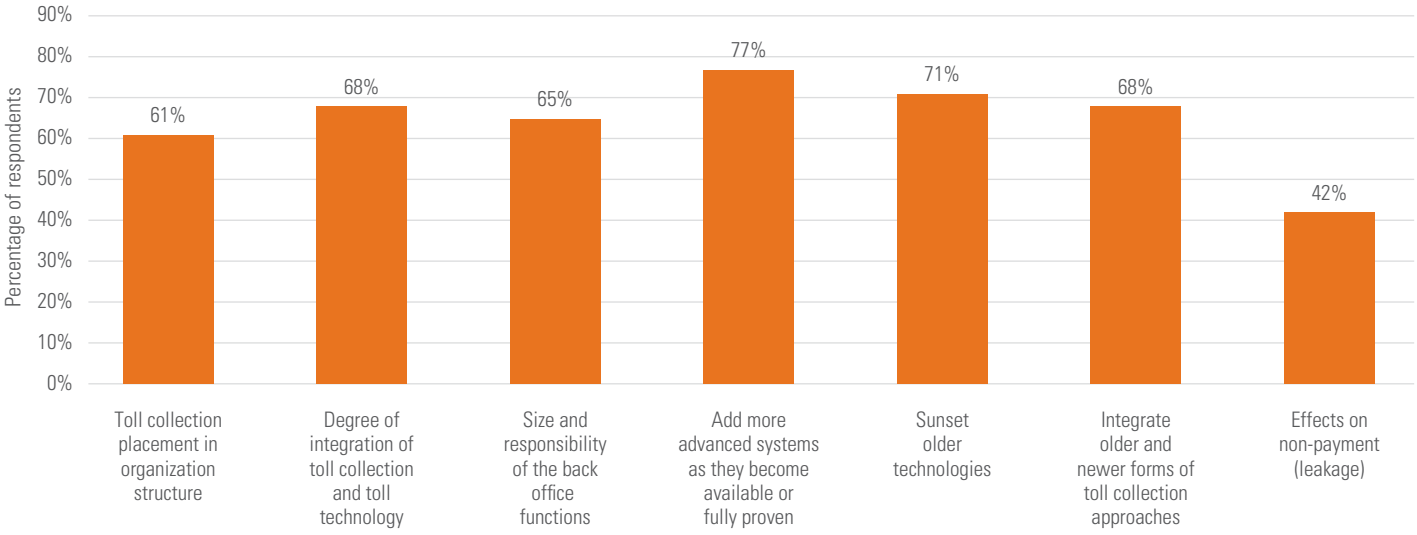
The availability of new technologies has also facilitated change as tolling agencies gain increased experience and comfort with new approaches. Whereas in the early 2000's, there were only a handful of ORT facilities in operation around the world, today 43 percent of respondents say they provide an ORT option on some or all lanes of their facilities.

Driving efficiency through technology

When asked what steps they have taken to enhance their toll collection operations over the past decade, the vast majority of respondents pointed to some form of technology enhancements. More than three-quarters said they had adopted more advanced technologies as soon as they were fully proven.

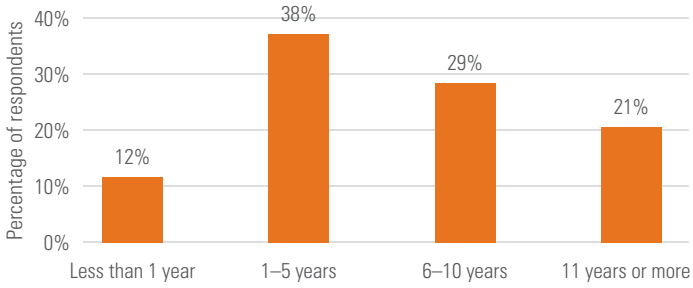
At the same time, our survey suggests that tolling organizations have been increasing their investment into technology. More than half (53 percent) said that they had upgraded their tolling system within the last five years and a further 18 percent said they are constantly upgrading their equipment and systems.

How has your agency's toll collection function evolved over the past decade?



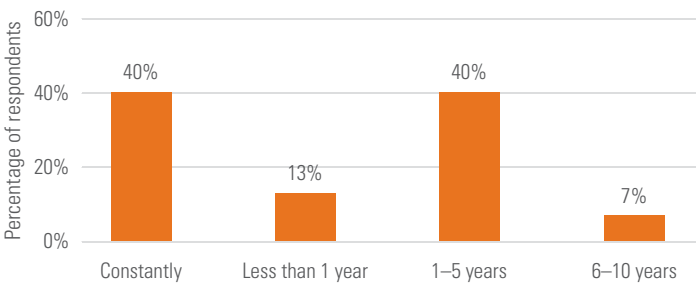
Source: KPMG International, 2015

How old is your tolling system/equipment?



Source: KPMG International, 2015

When was your tolling system/equipment last upgraded?



Source: KPMG International, 2015

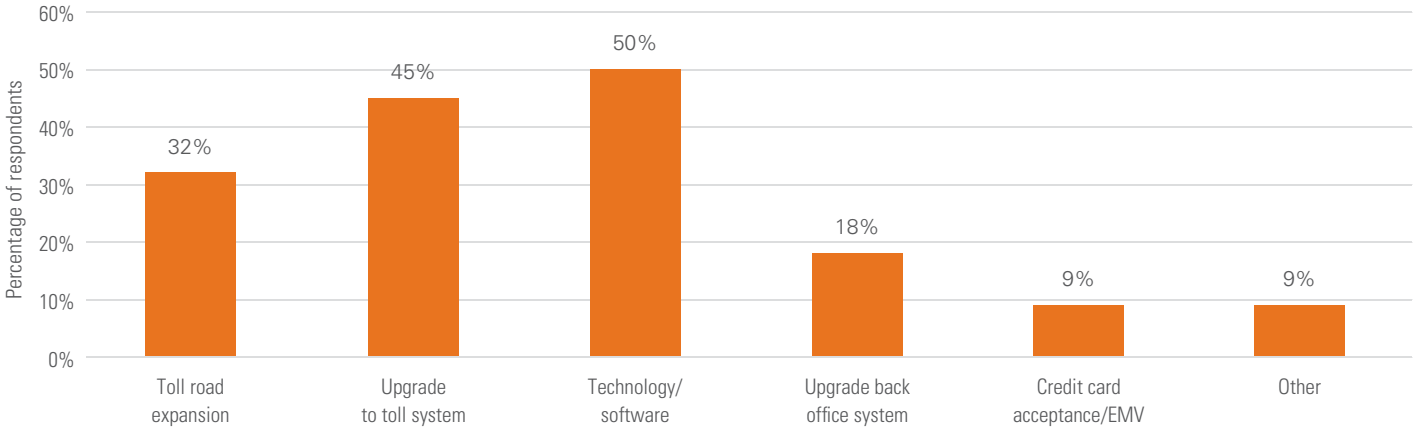
Yet given that 56 percent of respondents reported that their tolling systems were more than five years old and 82 percent said they anticipated an equipment life-cycle of 10 years or less, it seems clear that the door is open for further automation and deeper adoption of electronic modes of toll collection.

In fact, of the 60 percent of respondents who said they would be making a major capital improvement over the next fiscal year, almost half said they would channel those investments into upgrading the tolling system.

Looking ahead, many believe that new technological advances will continue to deliver potential improvements. More than a quarter of respondents said they expected to see a positive impact from the introduction of toll collection systems based on global positioning (such as GPS or Glonass); a further 23 percent said they expected the adoption of such a system to result in cost reductions for the sector.

Our survey demonstrates that tolling agencies and organizations have also been adopting technology solutions to improve performance and efficiency across the organization. Nine in ten respondents said that their organization had invested in improved IT systems; 72 percent said they had invested in credit card and banking transaction management technologies.

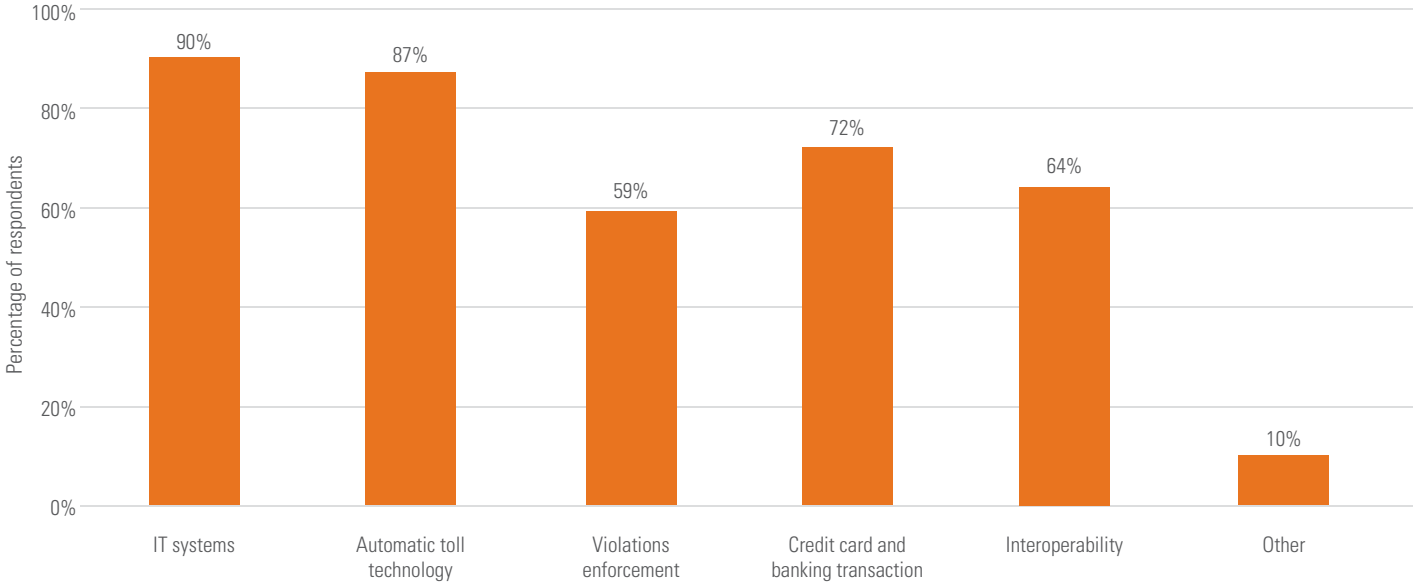
If your agency is planning and/or undertaking any major capital improvement initiatives over the next fiscal year, please specify:



Source: KPMG International, 2015

At the same time, our survey suggests that many are starting to leverage a wide range of technologies (such as video tolling with Optical Character Recognition (OCR) or the use of smart phone applications) to help overcome other challenges. Fifty-nine percent of respondents said they had invested in technology to help improve their Violation Enforcement System (VES) – largely through CCTV or OCR solutions – while 64 percent pointed to technologies aimed at enhancing interoperability between and among systems.

Does your agency's tolling technology include the following?



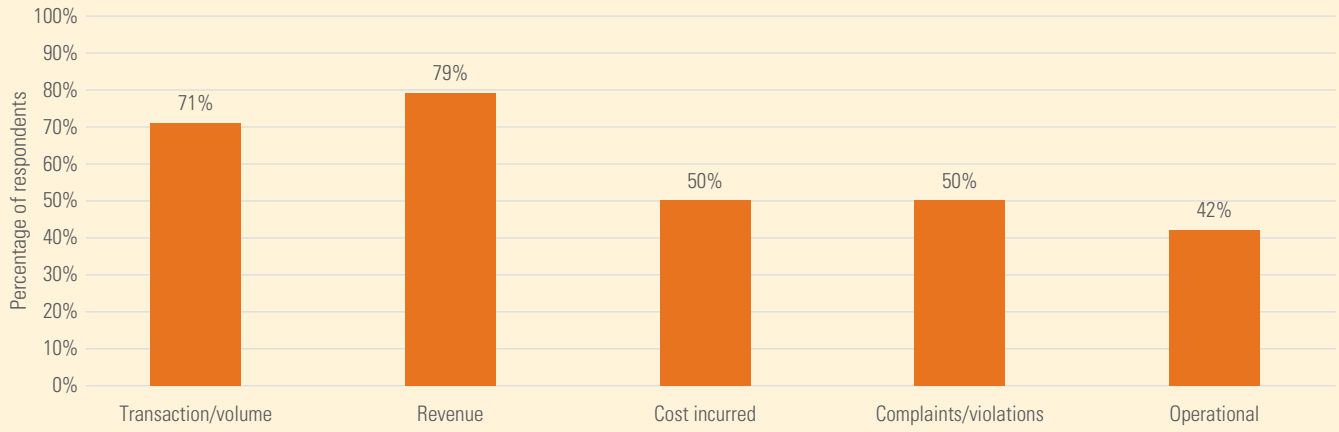
Source: KPMG International, 2015

Making the most of your data

One way that toll agencies and operators can squeeze more value out of their assets is by squeezing more insights out of their data. Indeed, many toll operators actually collect a significant amount of data on their users (particularly those that use ETC) but few use their data for more than simply tracking and billing customers. Clearly, privacy concerns cannot be dismissed, but it is also clear that toll operators can still increase the yield out of their data.

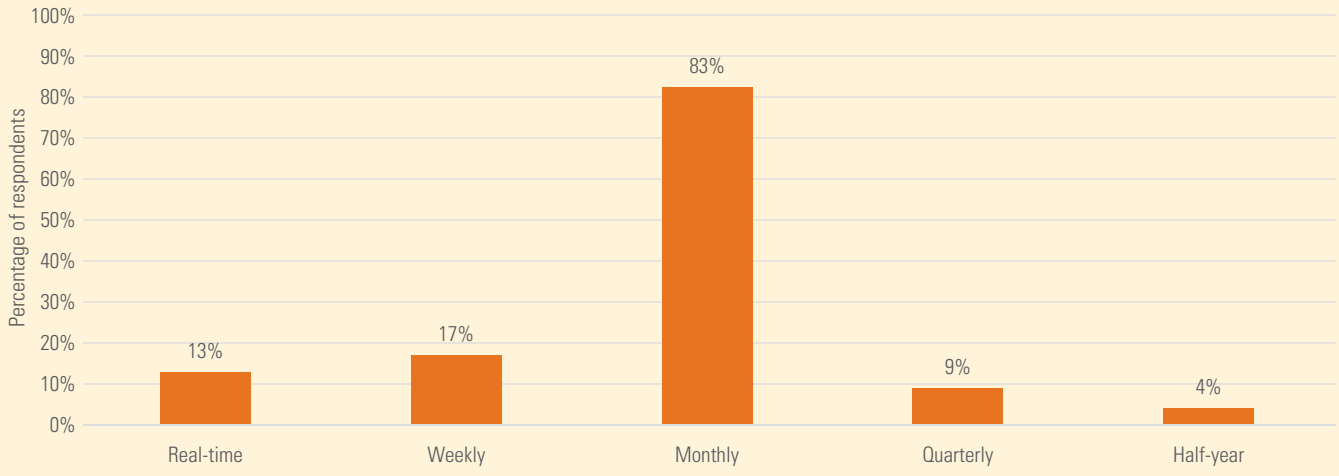
Only 30 percent monitor their toll collection and KPI data on a real-time or daily basis. Our experience suggests that operators could be uncovering important opportunities for operational and performance improvements if they only knew where to look.

What information on toll collection/key performance indicators (KPIs), service quality and costs are monitored by senior leadership?



Source: KPMG International, 2015

How frequently are they monitored?



Source: KPMG International, 2015

Much as it has in other industry sectors, we believe that data and analytics will quickly become a source of important value for toll operators. Those able to measure travel time, for example, would be well positioned to adjust their pricing to reflect the value to the users. Others may want to use their data to fully understand the cost to serve each customer across various channels in order to inform future investment and marketing decisions.

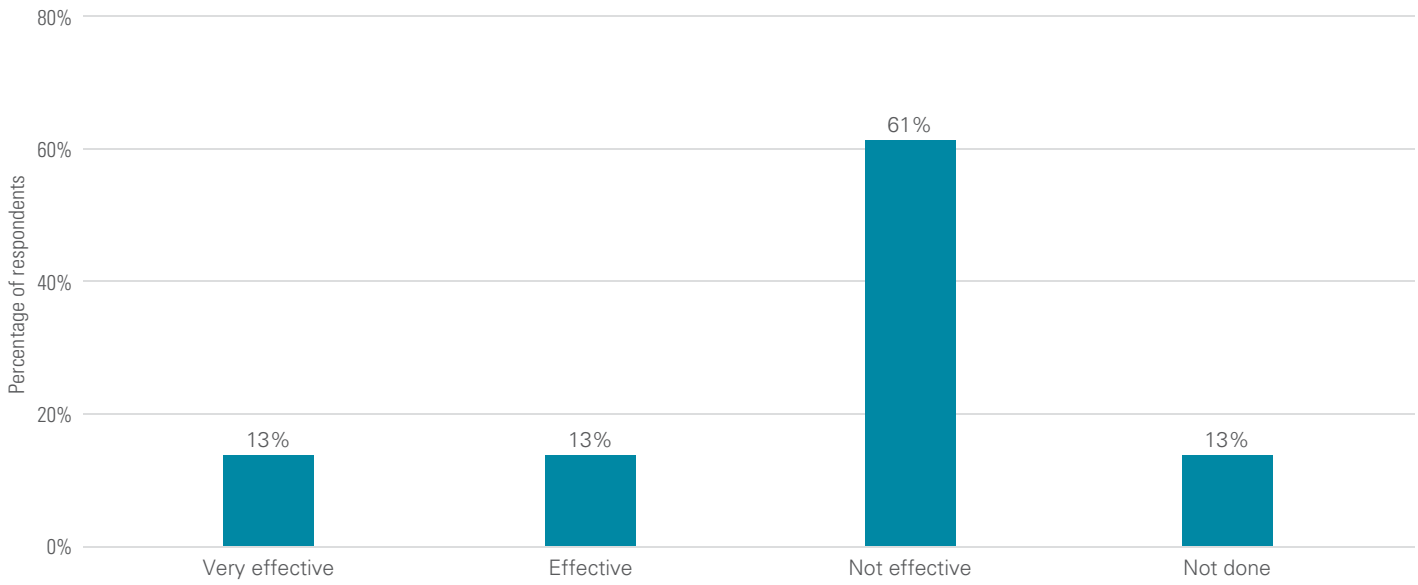
Once GPS-based systems come into play, toll operators should start to gain access to a whole universe of new information such as vehicle makes and models or real-time traffic flow and travel time information. Looking ahead, one might find all sorts of potential value in this information, both to drive efficiency and improve revenues (consider, for example, how this data – aggregated and anonymized to protect individual privacy – could be bundled up and sold on to car manufacturers or traffic sites).

We believe that those toll operators that are able to develop a core capability in data and analytics should be well placed to reap the benefits of their data – not just today, but well into the future.

Dealing with enforcement

Anyone involved in toll operations understands the importance of enforcement to a successful toll operation. Given the growing prevalence of ORT and ETC, the challenge is becoming even more acute. Yet many tolling organizations are limited in their ability to identify (let alone collect from) foreign or out-of-state vehicles and most require police support to stop violators. Clearly, there is still much room for improvement.

How effective is your agency in identifying owners of foreign cars in cases of violation?



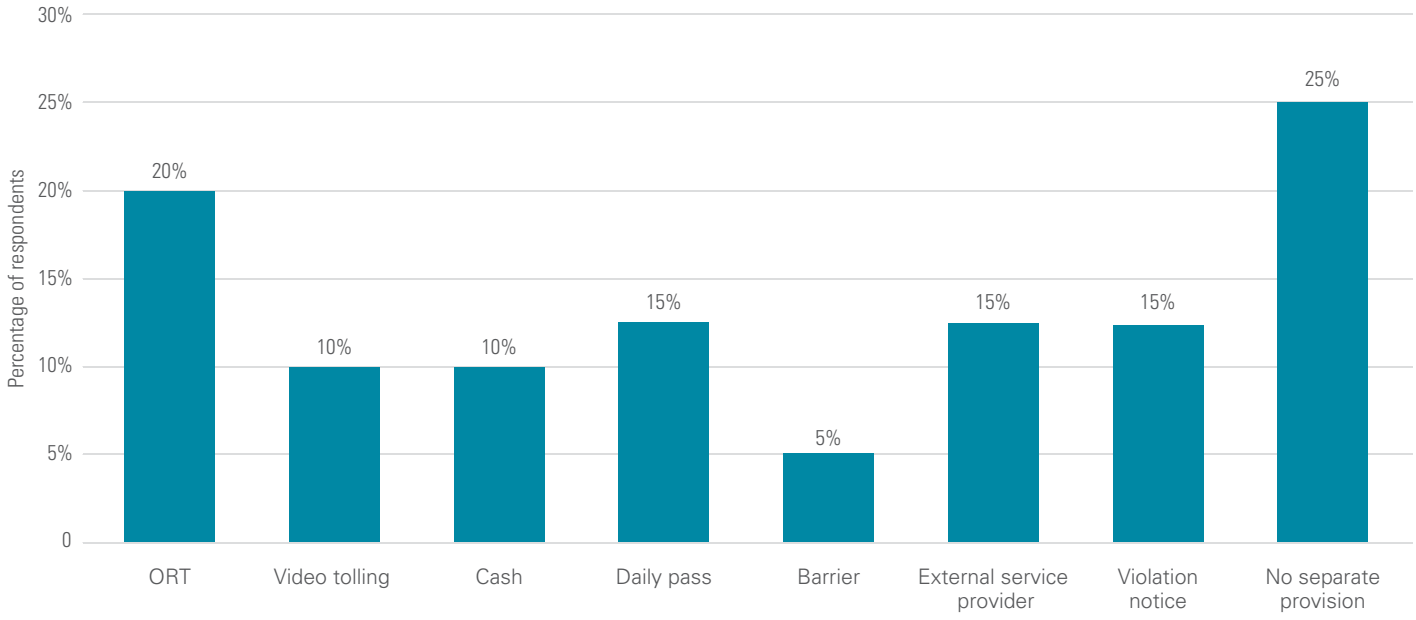
Source: KPMG International, 2015

While controlling and reducing revenue leakage is a key concern for toll operators, our survey suggests that many still struggle to optimize their enforcement and collections. In particular, the management of foreign (or out-of-state) and rental cars creates significant concerns and demonstrates that there is no consistent approach to solving these issues.

Reducing leakage

Those 'out-of-jurisdiction' vehicles (often foreign or out-of-state) create a particular challenge for toll operators; only 15 percent said they are effective at identifying the owners of out-of-jurisdiction cars in case of violation. More than two-thirds said they had no specific

What products does your agency use for foreign vehicle collection?



Source: KPMG International, 2015

provisions for collecting from out-of-jurisdiction vehicles at all. Not surprisingly, therefore, the vast majority (85 percent) admitted that they do not prosecute violators in their home jurisdiction.

Those that do collect tolls from foreign vehicles tend to use multiple approaches. Nearly one third (30 percent) said they use video cameras to identify foreign users. Less than a sixth (15 percent) of respondents said they outsource the process to an external service provider, such as Euro Parking Collection plc (which has been authorized by various toll agencies across Europe to act on their behalf in issuing toll violation notices) or collection agencies.

Our survey suggests that the introduction of an international or jurisdictional registration program would provide significant benefits to those seeking to reduce revenue leakage. Yet only two respondents said they were currently involved in such a program (both of whom, it must be noted, found the protocol to be effective).

Another key area of concern for enforcement is the treatment of rental cars. Our respondents seem equally split on who should bear responsibility for rental car charges with 52 percent saying it is the responsibility of the rental car driver and the rest placing the burden on the company.

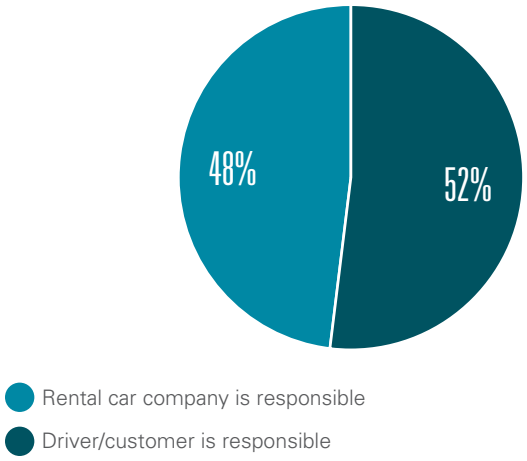
Partnering for enforcement

Our survey suggests that toll operators are rapidly adopting new technologies to help improve their VES. As noted earlier, 59 percent say they already use technologies such as CCTV and automatic plate recognition solutions to identify violators.

However, when it comes to enforcement, our survey suggests that most toll operators are highly reliant on external agencies and providers. Almost half of respondents say they rely on public enforcement agencies and a further 12 percent say that both private and public authorities are part of their enforcement mix.

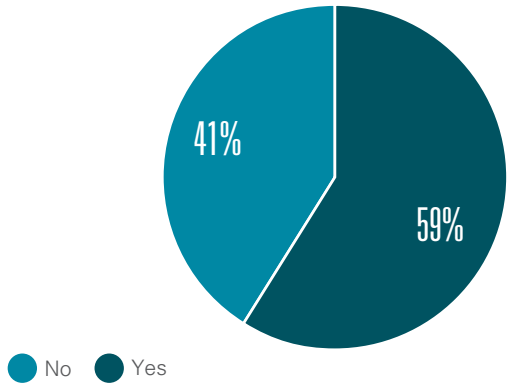
Just over a third (37 percent) of all respondents say their enforcement team is empowered to act autonomously while the remainder either rely upon or coordinate with police agencies to conduct enforcement measures. Most respondents (81 percent) said they require police assistance to stop drivers on the road in the case of a violation.

How do you deal with toll and/or fines for rental cars or similar transactions?



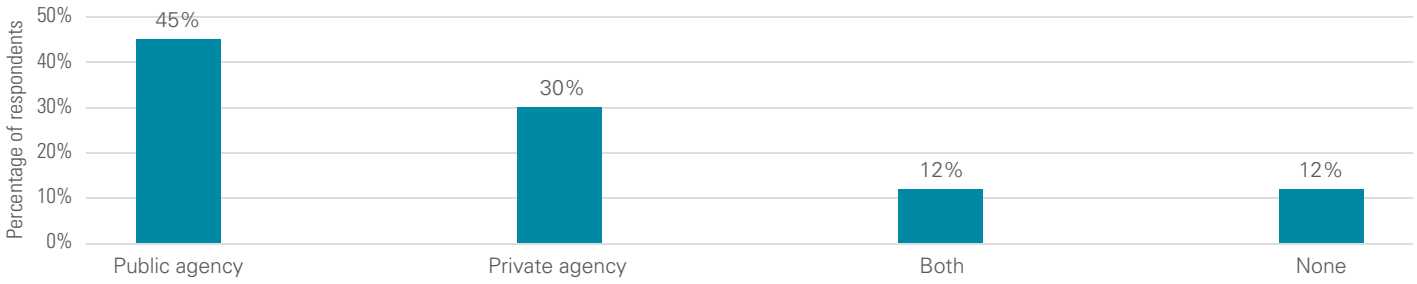
Source: KPMG International, 2015

Does your agency's tolling technology include violations enforcement?



Source: KPMG International, 2015

Are there public enforcement agencies in-state/country to assist with toll violations or are these functions guaranteed through private agencies?



Source: KPMG International, 2015

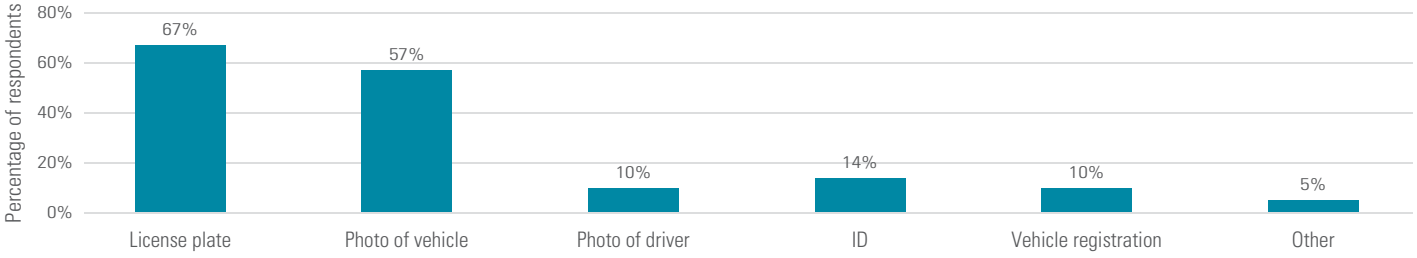
The right evidence in the right way

While privacy concerns are often raised by users (and tolling opposition groups) and may influence the type of enforcement technology used by toll agencies, two-thirds (66 percent) said they had no special data privacy or personal data laws that impacted their enforcement activity.

Those that do face specific privacy laws report a wide range of challenges. In parts of the US, for example, video can only be used to capture license plates (not driver's faces) meaning that operators need to select and implement their enforcement technology carefully. In some jurisdictions tolling organizations are often not permitted to share data on violators by statute.

Once in court, our survey suggests that there are a range of evidence that could be considered 'eligible' for use in prosecution. By far the most acceptable evidence seems to be photographs of license plates (cited by over two thirds of respondents) followed by photos of the vehicle (cited by 57 percent of respondents) and owner/driver or OBU identification (14 percent).

What kind of evidence is eligible for using in court?



Source: KPMG International, 2015

Measuring

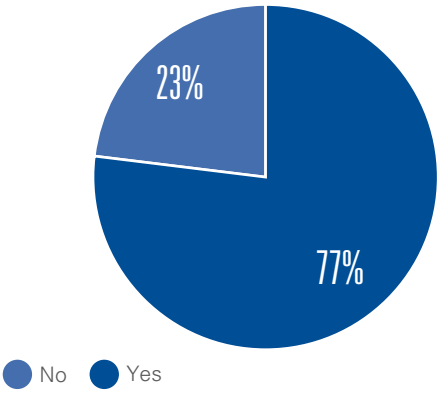
operating margins and cost efficiency

With so many different operating models, collection technologies, and regulatory frameworks, our survey highlights a lack of consistency in the way operators account for and calculate their cost to collect tolls. Some do not even try to calculate their cost to collect. However, despite such diversity, our data clearly indicates that – of the prevalent collection methods – On Board Units (OBUs) offer far lower cost per transaction than any other modes of collection.

Based on the data gathered and our own calculations on tolling operating margins, we have developed benchmarks to allow organizations to assess the efficiency of their tolling operations. And while margins are indicative of both pricing power and cost efficiency, the results suggest that cost efficiency may be as much about location and labor costs as it is about choice of toll collection technology.

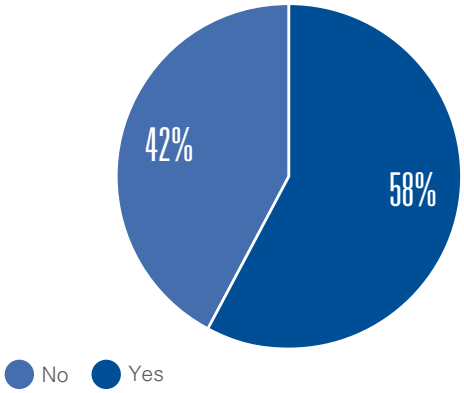
Likely the greatest challenge in measuring cost efficiency in the tolling sector is a lack of consistency in the way costs are accounted for. Given that the cost to collect tolls is one of the major metrics driving operating profit, it is interesting that the majority of respondents (58 percent) said that they had no documented methodology to measure collection costs consistently and almost a quarter said they have no documented methodology for depicting the toll collection process.

Does your agency have a documented methodology for depicting the toll collection process?



Source: KPMG International, 2015

Does your agency have a documented methodology for calculating the cost to collect a toll transaction?

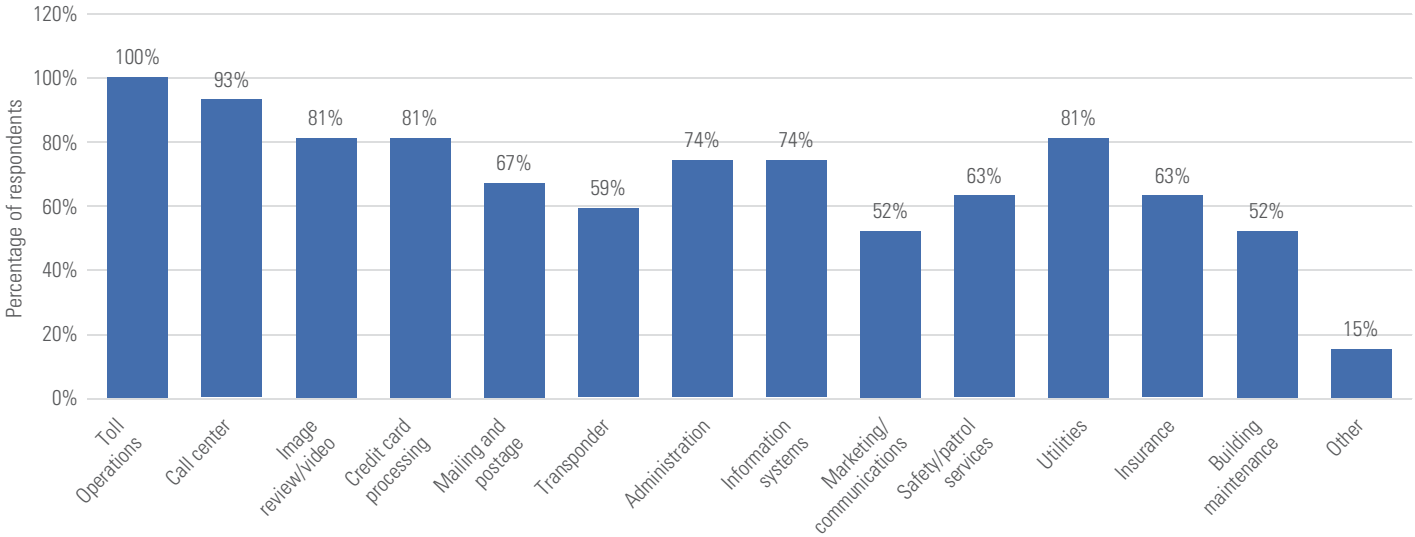


Source: KPMG International, 2015

As a result, our survey has found significant variations in what operators include in their cost to collect calculations. Some costs – such as toll operations, call centers, credit card processing, utilities and image review – tend to be widely viewed as a component of the cost to collect and are therefore included in more than 81 percent of organizations' cost calculations.

The allocation for other costs, however, is somewhat less clear and in some instances puzzling. Only 62 percent of respondents include mailing and postage and 55 percent include transponder costs in the cost to collect, even though these cost items are essential functions of the toll collection system. Conversely, around half said they include marketing and communications expenses (52 percent) and building maintenance (48 percent), which do not generally correspond to core tolling functions. More than two thirds said they include administrative office costs such as HR, finance and audit, as well as IT.

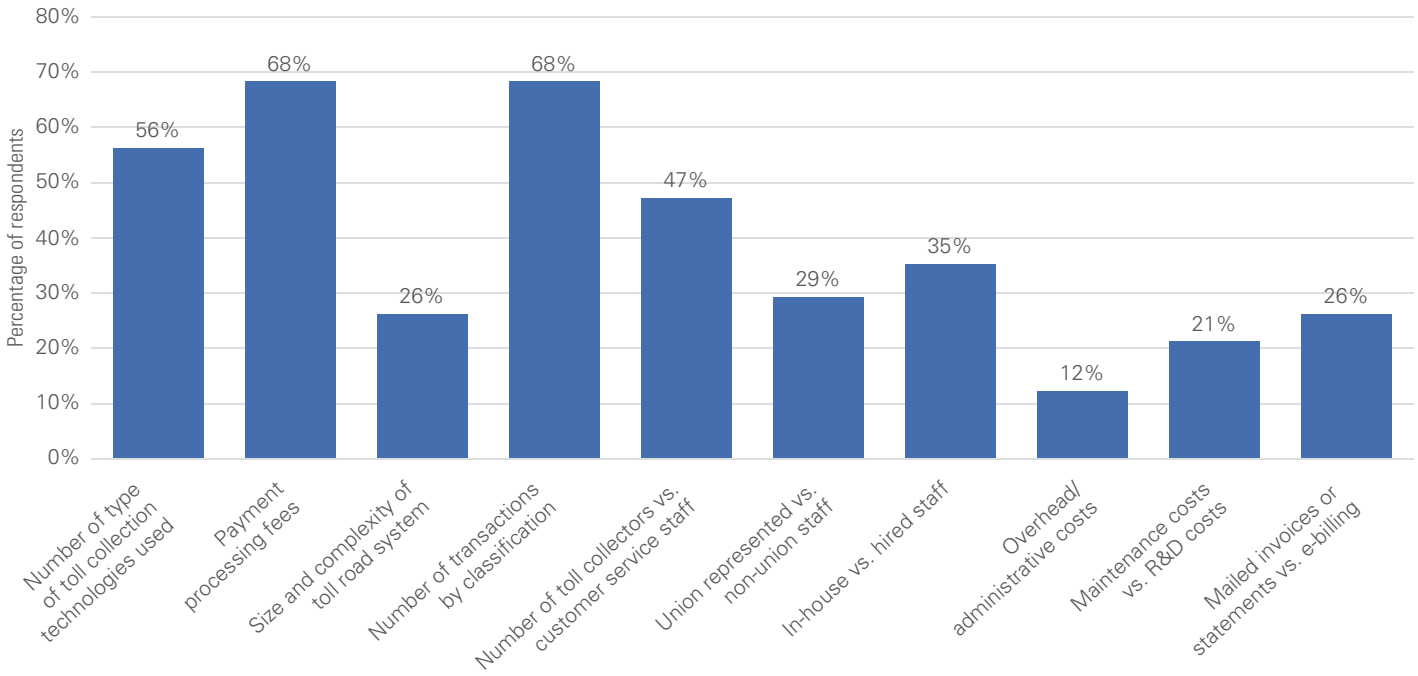
What is included in your cost to collect for a transaction?



Source: KPMG International, 2015

In part, this is due to a lack of standards for calculating toll collection cost. The vast majority (86 percent) of respondents said their agency had no specific guidance from state or federal regulators on what costs should be included. Slightly more than half (58 percent) said that their accounting, finance or planning departments decide what costs should be included, while 37 percent said their Board of Directors or Senior Management was responsible for that decision.

What are the key variables affecting the cost of toll collection by your agency?



Source: KPMG International, 2015

Notwithstanding these significant variances, we analyzed the reported total collection cost and cost per transaction information provided by our respondents to gain some insight into the effective cost 'range' of each tolling method prevalent in the market today.

We first looked at the tolling operating margins as an aggregate measure of the efficiency of a toll road operation, combining its pricing power and its cost efficiency. Essentially, we subtracted the reported toll operating costs from the total reported revenues and divided the result by the total revenues to find the individual tolling operating margin for each respondent.

Due to the (above noted) lack of consistency in accounting for toll operations, we grouped together all toll operating costs, customer account management costs and administrative costs under a single bucket of 'toll operating costs'.

This analysis indicates that some tolling operators' cost to collect can be as low as 13 percent of revenues, whereas others may be as high as 60 percent or more.

Not surprisingly perhaps, the top margins were reported by operations that are either full ETC systems or that collect a high proportion of their revenues through ETC. At the other end of the scale, a large proportion of the lowest-margin operators tend to operate cash-only facilities.

While the sample size is somewhat small to develop a sound comparison across geographies, our data also suggests that location may influence operating margins for tolling operators. In part, this is likely due to the high correlation between geography and labor costs. At the same time, issues related to affordability and – most importantly – the pricing power of the toll agency which is often limited by regional rate setting schemes.

In Europe, compared with South America, for example, OBU margins are lower, reflecting higher uncollectable revenues, back office and labor costs (in some South American countries, OBU transaction costs are charged to the customer). North American operations (where automation and incomes are fairly high) see average margins fall exactly between those in Europe and South America.

Another method of measuring the efficiency of a toll road operation is through an examination of toll collection cost per transaction; a metric that also provides a more detailed view of cost efficiency across different modes of toll collection while simultaneously being independent of pricing power. And while the sample size may be somewhat small, and the list of 'inclusions' somewhat varied, we believe that this data provides one potential guide for benchmarking the efficiency of toll operations.

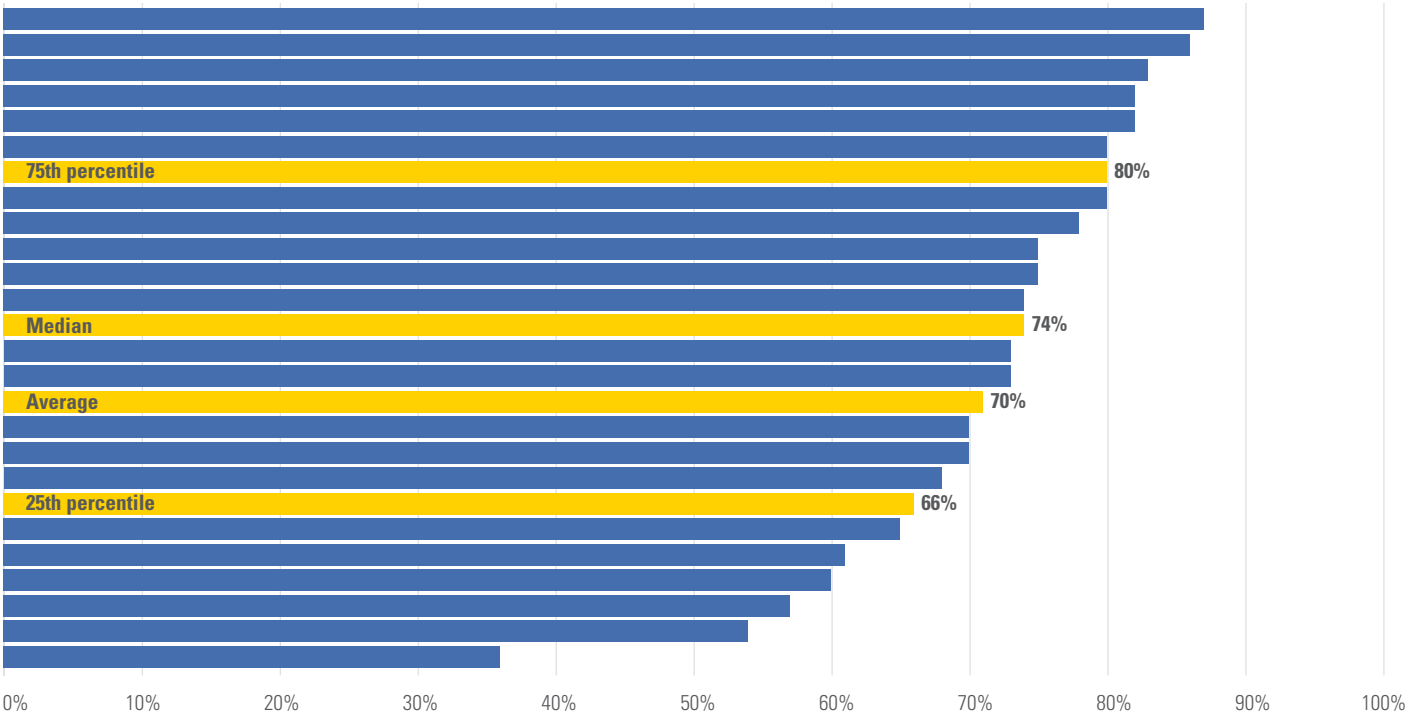
Overall, as the chart below illustrates, the most cost efficient toll operations tend to report costs of less than US$0.26 per transaction (corresponding to the top quartile of respondents). Conversely, respondents reporting costs in excess of US$0.59 per transaction (corresponding to the bottom quartile of respondents) can be considered inefficient in their toll operations. On average the industry spends US$0.43 for each transaction.

Cost per transaction

	Total	Cash	OBU	Video
Highly efficient	Less than US$0.26	Less than US$0.72	Less than US$0.17	Less than US$0.70
Average	US$0.43	US$0.85	US$0.29	US$0.97
Inefficient	More than US$0.59	More than US$1.00	More than US$0.34	More than US$1.15

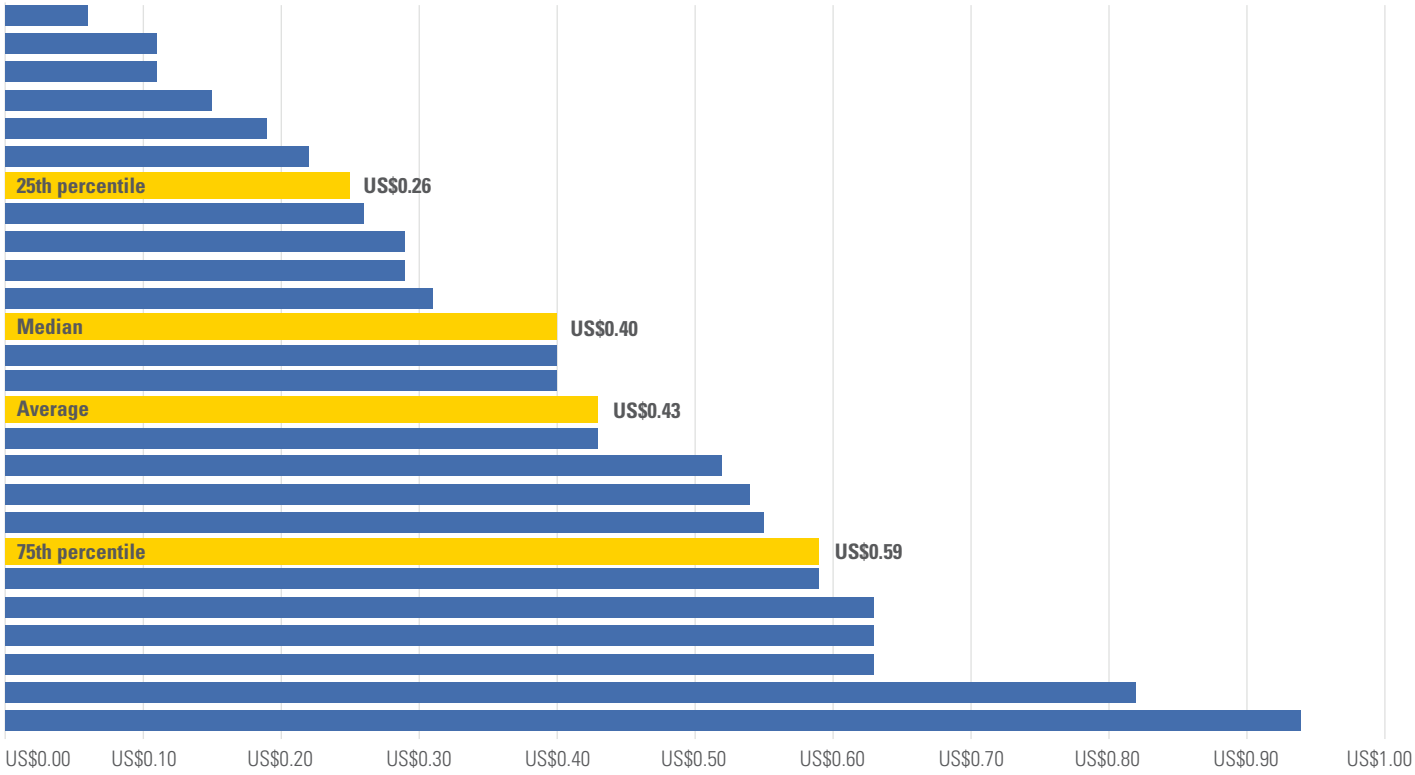
*please note that the lowest and highest values were not included in the calculations for this table.

Tolling operation margin



Source: KPMG International, 2015

Total cost per transaction



Source: KPMG International, 2015

Looking at the cost per transaction across collection modes, results are not surprising: those with OBUs reported an average cost per transaction of US$0.29, clearly influenced by the level of automation afforded by OBUs (and, it must be noted, by the small sample size included in this research). Those with cash transactions reported an average cost to collect of US$0.85, while video tolling represented an average cost of US$0.97.

Those with highly-efficient OBU toll operations reported cost per transaction of below US$0.17, while highly-efficient video tolling operations or cash operations both tend to incur costs of below approximately US$0.70 per transaction.

While we found that most (but not all) systems with OBUs report total toll collection costs below the total cost collection average of US$0.40 per transaction, there are also a handful of cash operators that have achieved similar levels of efficiency, albeit in low-cost labor markets in Asia and South America.

And while video tolling is generally a more expensive toll collection method – albeit comparable to the cost of cash collection – it is widely recognized that video tolling is most often used either for post-payment or as an enforcement tool and therefore often carries higher costs due to the additional steps and additional labor required (such as image review, plate lookup, mailing, and payment processing).

Enforcement also often adds additional costs to video tolling operations (including, in some cases, recourse to collection agencies). However, in many jurisdictions those higher collection costs are offset by higher fees – commensurate, arguably, to the additional services provided to the end user.

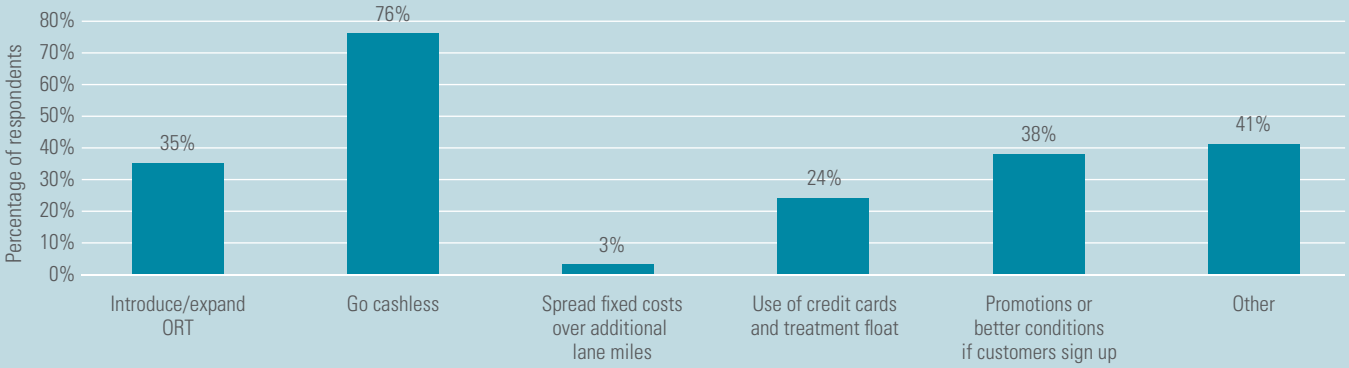
The continued evolution of technology and its wider adoption by tolling operators (such as OCR capabilities) coupled with the growing number of operators participating in interoperability arrangements should help facilitate data exchange between facilities and jurisdictions. And, as a result, operators and owners should start to see labor and other ancillary costs associated with video transactions start to decline, thereby greatly improving the cost efficiency of video tolling.

Maximizing efficiency with Open Road Tolling

As this report has clearly demonstrated, tolling agencies and organizations are undertaking a variety of measures to improve efficiency and further 'sweat' their existing assets. Many have already experienced significant efficiency gains from the implementation of new technologies; others are testing new models and approaches aimed at driving increased revenues from their existing operations.

Most toll operators seem to acknowledge the efficiency benefits that could be gained by transitioning to an All Electronic Toll (AET) collection system or introducing Open Road Tolling. More than three-quarters (76 percent) of all respondents said they had considered eliminating cash from their operations as a means of making toll collection more cost-effective. Over a third (35 percent) said they had considered introducing or expanding Open Road Tolling to make their system more efficient.

What strategies has your agency considered implementing to make toll collection more cost-effective?

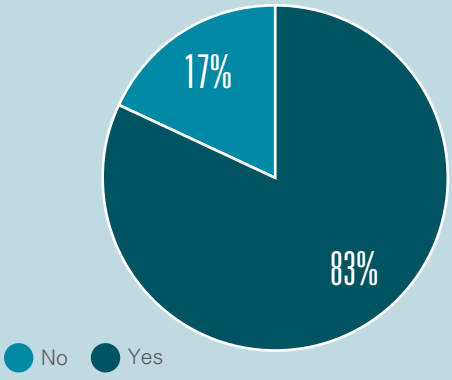


Source: KPMG International, 2015

Electronic toll operations certainly provide significant efficiency gains. According to our survey, 83 percent of respondents with electronic toll operations said that they experienced efficiency gains within the first five years of operations. Almost all (97 percent) said that those gains continued to be extracted well after the first year of operation.

Interestingly, respondents were more than six times as likely to suggest that their gains were the result of process efficiencies rather than higher volumes. So while Open Road Tolling and Electronic Toll Collection are well-known to increase level of service (due largely to enhanced convenience and improved traffic flow), this data suggests that equal – if not greater – benefits are actually achieved through internal improvements such as headcount reductions, improved CRM capabilities or lower leakage rates.

Did your agency experience efficiency gains after the agency's first 5 years of electronic toll operations?



Source: KPMG International, 2015

Glossary of toll terminology

Electronic Toll Collection (ETC): The collection of tolls based the automatic identification and classification of vehicles using electronic systems.

Open Road Tolling (ORT): An electronic Toll Collection System without toll plazas, where drivers will get charged the toll without having to stop, slow down, or stay in a given lane.

All Electronic Toll (AET): Technology which enables cashless toll collection, either through transponders and/or license plate readers, eliminating the necessity of stopping the vehicle to pay the toll. AET is sometimes referred to as "cashless" tolling.

CCTV: Closed Circuit Television.

Customer Service Center (CSC): A facility used to service customers.

E-ZPass: The E-ZPass Group is an association of 25 toll agencies in 15 states that operates the E-ZPass electronic toll collection program in the Eastern United States. E-ZPass is the world leader in toll interoperability, with more than 24 million E-ZPass devices in circulation.

Geographic Information System (GIS): A data management system designed to collect analyse and report geographic and demographic information.

GNSS: Global Navigation Satellite System.

Global Positioning System (GPS): Used for positioning and road segment identification. Similar to GALILEO system used in Europe.

Interoperability: A cooperative arrangement established between public and/or commercial entities (Authorities, parking lot operators, etc.) wherein tags issued by one entity will be accepted at facilities belonging to all other entities without degradation in service performance.

Intelligent Transportation Systems (ITS): A broad range of diverse technologies, including information processing, communications, control and electronics, which, when applied to our transportation system, can save time, money and lives.

Leakage: Transactions where no revenue is collected, or revenue is not fully collected. (Does not include non-revenue or violation transactions wherein the vehicle is either not permitted to cross the barrier or where a violation image is taken.) Generally also includes transactions not being captured due to failure or malfunction of the toll collection system.

On-Board Unit (OBU): The in-vehicle device component of a DSRC (or ETC) system. A receiver or transceiver permitting the Operator's Roadside Unit (RSU) to communicate with, identify, and conduct an electronic toll transaction; also called a 'transponder' or 'tag.'

Optical Character Recognition (OCR): Hardware and software system capable of recognizing alpha-numerical characters.

Operator: An entity that manages the functions of a tolled facility.

Throughput: The number of vehicles passing through a toll lane, in one direction, over a defined period of time.

Toll: A fee charged by a toll facility operator in an amount set by the operator for the privilege of traveling on said toll facility.

Toll Collection System: The combination of elements and components that constitute the means to collect a fee for use of a tolled facility.

Toll Plaza: An area, with restricted traffic flow, where tolls are collected from drivers, either manually or electronically.

Transaction: A time-framed event occurring in the toll lane representing either a cash or electronic toll. The transaction is identified by all or a combination of the following parameters; location, time, date, vehicle class, vehicle ID, toll amount, etc.

User: Any driver driving on a Toll Facility.

Video Billing or Video Tolling: A billing system capturing video images of a vehicle's license plate to identify the customer responsible for toll payment and using this information to bill the customer.

Violation: A record of an unpaid toll which occurs when a customer does not pay the proper amount.

Violation Enforcement System (VES): The collective equipment and procedures that capture a violation transaction, image and the citation process.

Source: IBTTA (http://ibtta.org/resource-library/glossary) - some definitions have been slightly edited by KPMG

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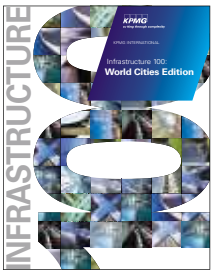

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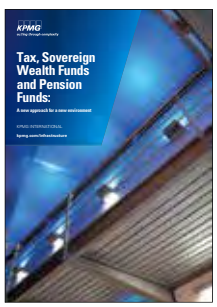

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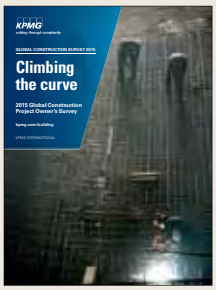

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