

Insights into Intelligent Parking Technology Adoption

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Abstract: Although the first patent for a parking meter was filed more than 70 years ago, since that time, the technology has barely changed. This paper focuses primarily on what intelligent parking technology (IPT) offers parking consumers and whether or not they are willing to adopt it. Prior studies on technology adoption and diffusion provide a theoretical framework. This research surveyed 133 drivers to explore the perceived value for drivers from different parking technologies currently available to parking providers. Findings from the driver surveys indicate that drivers are more than willing to adopt IPT.

The majority of drivers indicated that they believed they would get some value from the specific parking technologies presented. Furthermore, the majority of drivers also stated that they would be willing to pay more for a parking space if IPT added value for them.

Keywords: parking; technology; adoption; intelligent;

1. Introduction

According to Luttrell [32], Carl Magee, of Oklahoma, is generally credited with originating the parking meter. Magee filed for a patent for a “coin controlled parking meter” in 1935 and the patent was issued in 1938.⁷

Many parking providers, however, still rely on parking meters even though these are inefficient and inadequate technologies for meeting the demands of today’s parking industry. The same can also be said for many parking lots where we might see an attendant sitting idly by waiting for payment from drivers who are entering or leaving the lot.

With the price of a permanent parking space costing more than the price of a car in cities such as Hong Kong and total revenue from parking meters in cities such as Pasadena, California exceeding \$2,000 per meter each year, it is easy to understand how profitable the industry can be [49, 3].

For drivers, frustration occurs when they receive a parking fine because their meter expired while they were running an errand or because they did not have any coins on hand to insert in the meter. Consumers experience frustration from time wasted trying to find an available space or having to walk to a self-serve kiosk during harsh weather in order to make a payment.

These are but a few examples of situations in the parking industry that can be improved on with the use of appropriate technology. Recently developed Intelligent

Parking Technology (IPT) could potentially deal with many of these issues.

IPT solutions can facilitate or enhance the parking process and may include features such as giving consumers the ability to pay for parking using their cellular telephones (m-commerce), automatically directing drivers to available parking spaces or automating payment via smart cards.

Examples of these technologies and some of the benefits they offer include:

- *Technologies that facilitate the payment process:* e.g. payment by cell phone, key fob or smart card
- *Technologies that direct drivers to available parking spaces:* e.g.) signs or lights that direct drivers to available spaces detected by sensors or GPS technology
- *Technologies that make parking lots safer:* e.g. technologies that sense motion and increases lighting in the parking lot; security systems that automatically detect suspicious activity by monitoring the movement of vehicles and people in a parking lot.

Previous research on technology adoption has not discovered why the parking industry appears reluctant to implement intelligent parking technologies [40, 19, 38, 46, 21].

Many intelligent parking technologies currently available to parking providers have existed for several years. The issue of the slow adoption rate has only re-

cently encouraged research focusing specifically on this and related issues. As such, there are significant gaps in existing research focused on adoption of new technologies as it pertains to this industry.

This paper presents some of the results from a larger study exploring two research issues:

- 1) *What can intelligent parking technology offer to the consumer?* And,
- 2) *Are parking consumers willing to adopt intelligent parking technology?*

After the literature review, we explain the methodology and present the results of the survey. The conclusion summarizes the results and provides an agenda for future research.

2. Literature review

“Every day in Beijing an additional 1,466 cars are added to the city’s roads” [34].

“Our unwise parking policies have damaged our cities, our economy, and our environment. ... Cities can charge fair-market prices for curb parking, return the resulting revenue to pay for neighbourhood public services, and remove the requirements for off-street parking” [44].

Statements such as these give us an indication of the importance and value of research focused on helping the parking industry become more efficient while adding more value for the consumer.

However, many parking providers still use the same type of coin operated parking meter that has essentially remained unchanged over the last 50 years and drivers continue to be frustrated with the task of having to park their vehicle.

Even though the majority of parking in the United States is free for motorists, society is in many ways subsidizing it through increased costs in other areas such as the economy and environment [44]. For example, research done on a 15-block area in downtown Los Angeles found that over a one year period, drivers cruising the streets looking for a free or low-cost parking space drove in excess of 1.5 million kilometres while consuming approximately 178,000 litres of fuel and producing more than 650,000 kilograms of carbon dioxide emissions [44].

Figures such as these indicate the staggering waste and inefficiency associated with the parking industry. Imagine what these numbers might be if we consider the waste on a global scale.

Herein lies an argument for IPT which, among other things, has the potential to help reduce congestion, conserve energy, improve air quality and produce public revenue that can then be reinvested to improve urban areas [44].

Achieving this through near-obsolete technologies such as the parking meter would be impossible. However, with the proper use of efficient IPT, parking providers could help maximize the benefits realized from paid

parking. These are benefits that extend far beyond increased profits.

There are some instances of IPT being implemented worldwide that achieve these benefits. These include a system at Heathrow’s Terminal 5 that directs drivers to an available parking space. When the driver returns they can insert their parking ticket into a machine which shows a 3D map image indicating where the car is parked [1].

Another IPT implementation guarantees that you will be able to park your car in 60 seconds or less even if it is in the last available space [2].

There are pay-by-cell options available in Miami, Florida [6]. Some parking lots use technology for security and enforcement purposes as well by tapping into existing closed circuit video cameras to automatically recognize licence plates [5].

In Hong Kong, the Octopus smart card is used to transfer electronic payments in online or offline systems and can be used with on-street parking meters among other things [7].

However, such implementations of IPT seem few and far in between. It follows then, that there is a need for research that aims to understand why parking providers are not adopting, or appear hesitant to adopt currently available IPT. We are not referring to technologies, such as computer systems, that are only used internally within the parking providers’ offices, but more specifically to those technologies that interact directly with the driver adding value to the parking process for them.

The two core processes we consider involve finding a parking space and then paying for it. Our primary focus is on the technologies that facilitate and make these two core processes more efficient. Of course many of the technologies available also add value in other ways. These may be related to the environment or driver safety for example.

As such, the purpose of this study is to investigate the research question: ***Are parking consumers willing to adopt intelligent parking technology?***

We define IPT as technology that adds value by adapting itself to whatever a parking situation may be. It is technology that promises to help parking providers and consumers more efficiently manage the vehicle parking process when compared to the more dated parking methods prevalent around the world today.

We begin our study of IPT adoption in the context of pioneer studies that have focused on technology adoption. Diffusion models, which measure how quickly a technology dissipates through the population, are also considered.

In order to investigate our research problem, we need to consider attitudes towards IPT by drivers, parking technology companies as well as the parking providers themselves. These three groups are the primary stakeholders.

This paper focuses primarily on what IPT offers the consumers and whether or not they are willing to adopt it.

Many theoretical models have been developed over the years in an attempt to explain user adoption of technology. The major technology adoption and diffusion models typically try to explain in broad terms which factors or combination of factors best explains why people accept or reject computers. The underlying theories of these models typically consider users' internal beliefs and attitudes and how they might be affected by external factors such as system design or implementation [20].

These parent theories are important as they help give us a better understanding of what factors might affect adoption of IPT. However, they do not consider more recent technologies specific to the parking industry nor do they necessarily consider any attitudes or beliefs that may be unique to the parking industry. The parent theories may also apply more to the consumer rather than the parking provider. The driver is, after all, the one who is likely to be the primary user of any technology the parking providers implement.

Many of the earlier adoption theories from social psychology such as the *Theory of Reasoned Action* (TRA) were chosen to study users' acceptance levels with regards to technology even though these models had never been applied in that way before [11].

It is not until many years later that a model was developed specifically to study technology acceptance. The *Technology Acceptance Model* (TAM) developed by Fred Davis in 1986 is an adaptation of *Theory of Reasoned Action* (TRA) and states that a person's intention to use the technology, their ability to easily use it, along with how they perceive its usefulness, will determine its usage rate [20].

The *Technology Acceptance Model* (TAM) model has been used extensively in recent years for modelling user acceptance of computer technology and routinely explains up to 40 percent of usage intentions and 30 percent of systems usage [17].

Researchers continue efforts to develop more accurate theoretical models regarding technology adoption. The *Theory of Planned Behaviour* (TPB) model is yet another extension to the *Theory of Reasoned Action* (TRA) model and links attitudes and behaviour. It has its roots in the field of psychology. It was introduced by Icek Ajzen and essentially states, in the context of technology adoption, that the more favourable a person's attitude and subjective norm are, combined with a high level of perceived control by that person, the more likely they will be to use the technology presented to them [9, 10].

These major adoption models appear to focus primarily on the end user of the technology. Parking providers and parking technology companies need to know how many people will be willing to adopt a newly adopted parking technology before they initiate the process to acquire and implement such technology.

The Diffusion of Innovations (DOI) theory was first presented in 1962 by Everett Rogers and describes the *rate* at which innovations are adopted through the population [42]. Rogers describes different characteristics

about innovations that help explain their rates of adoption or how quickly they diffuse into the population. These include the relative advantage they offer over existing solutions, compatibility with potential adopters, their complexity, their ability to be experimented with on a limited basis, as well as the degree to which their benefits can be observed. He also points out that one cannot assume that all innovations represent equivalent units of analysis [41].

Another very influential study on technology diffusion is the Bass New Product Growth Model [16]. In 2004, 35 years after the model had been initially published, Bass describes how he was reading Rogers' Diffusion of Innovations study and decided to couple it with stronger mathematics to come up with a conditional likelihood of adoption where adoption at time t was a linear function of the number of previous adoptions [15].

The *Multi-generation technology diffusion model* simply combines the *Bass new product growth model* with Fisher and Pry's (1971) *Technological substitution model*. The resulting model is one that considers diffusion and substitution factors [37].

Diffusion rate is a very important factor for parking providers to consider as it helps them determine how quickly they will reach the break-even point on their IPT investment.

2.1. Theoretical frameworks

As new technologies are introduced and used in ways that were previously unthought-of, the need for more accurate and industry specific adoption and diffusion models emerges.

Research addressing this development includes a more recent attempt to unify eight of the more prominent models used to describe information technology adoption and diffusion. This resulted in what is called the Unified Theory of Acceptance and Use of Technology (UTAUT) model [47]. Theoretical models used in the formulation of this new model include the TRA, TAM and DOI models, along with the *motivational model*, a *model combining TPB with TAM*, the *model of PC utilization* and the *social cognitive theory* [47]. It is important to note that many of these theories have their roots in sociological studies dating back to the early 1960s.

The UTAUT study neatly summarizes and discusses the role of moderators in each of the theoretical models [47]. In analysis of these eight different models, Venkatesh et al (2003) found that the variance of the models in explaining user intention to using information technology varies from 17 to 53 percent [47].

In contrast, the new Unified Theory of Acceptance and Use of Technology (UTAUT) model explains user intention to use information technology with significantly higher accuracy [47].

Other efforts to develop more accurate models that either parallel or build on existing models have been ongoing. One such case is Burton-Jones and Hubona's research that builds on Davis' *Technology Acceptance Model* (TAM). Their research shows, contrary to the

normally accepted assumption, that external variables *could* have direct effects on usage behaviour over and above their indirect effects [17]. It also builds on a study by Legris et al. that found that in TAM studies, there was “no clear pattern with respect to the choice of the external variables considered” [28].

A model based on TAM, TPB and Luarn and Lin's mobile banking acceptance model adds *perceived credibility*, *self-efficacy* and *perceived financial resources* to Davis' technology adoption model (TAM) and re-examines the relationships between the proposed constructs [48]. The model is validated and from this the authors claim “Luarn & Lin's m-banking acceptance model can be generalized to predicting consumer intention of using m-services” [48].

Another recently developed theory discusses the importance of “trust” in m-commerce technology as a determinant for user acceptance and adoption. Based on a review of the literature, Lu, Chun-Sheng and Chang propose a model of three latent constructs: *Facilitating Conditions*, *Wireless Trust*, and *intention to adopt Wireless Internet services via Mobile Technology (WIMT)* [31]. Although many studies have been published on the application of mobile technology, few have studied how a company decides on adopting mobile technology [29].

Liang et al. recently refined a Fit-Viability Model (FVM) to become a useful tool for assessing successful use of mobile technology in organizations. However, they state that they are unsure as to whether the nature of an industry, or other factors, play roles in the model [29].

He and Lu conducted a review of the literature on technology adoption and concluded that future m-business adoption research should aim at developing a comprehensive model for m-business and involve both conducting interviews and having questionnaires [24]. This is something this research does and is not limited to only m-business IPT applications.

Amberg et al. introduced the Compass Acceptance Model (CAM), which is designed for the analysis and evaluation of user acceptance for mobile services. They identified four dimensions considered relevant for an in-depth analysis of user acceptance: perceived usefulness, perceived ease of use, perceived mobility and perceived costs [12]. IPT implementation.

Ammenwerth et al. developed the FITT model to help analyse the socio-organisational-technical factors that influence IT adoption [13]. However, this model was developed in a health care setting and has not been applied to the parking industry.

When smart card technology was first introduced as a payment method, it appeared that its rate of diffusion across the population would be greater than it had been for ATM or banker's cards. Perceptions were that a driving force to this success would be marketing managers making sure people were aware of the existence of the smart card and its specific and desirable functions [14].

Two years later it seemed that smart cards had failed, particularly in the financial services industry, because they continued to be an application in search of a viable

set of consumer needs to fill [39]. This is another indication of how important proper marketing can be for organizations to realize successful implementation of a new technology.

2.2. Applicability to the research problem

Most theories on adoption and diffusion of technology have to date been somewhat generic in nature. Even Bass, creator of the highly regarded Bass New Product Growth Model, stated in 2004 that “the fact remains that little is known about the relationship between stated intentions and actual adoptions and even less is known about how to adjust stated intentions in individual cases to estimate market potential” [15].

In essence, his statement describes the contribution this research hopes to make as a result of efforts to gather information as it pertains to the parking industry. This is done by considering the limitations of existing theories as they apply to the research problem and through analysis and consideration of intentions of the consumers, parking providers and parking technology companies.

For example, many studies state that in order to achieve consideration and further evaluation, information about the performance characteristics of a new superior technology needs to be overwhelming [43, 45, 50]. After all, simply bringing a new technological innovation to market does not guarantee that it will replace currently used product service technology [50, 23].

The consumer has a critical influence on whether a technology innovation is adopted or not [50, 25]. Consequently, it might be necessary for the marketer of a technological innovation to recruit *parking consumers* to champion the new innovation.

This leads us to our first research issue: *What can intelligent parking technology offer to the consumer?*

Many intelligent parking technologies available today could add value to the parking process for the consumer. These technologies focus on helping the consumer find a parking space and facilitate the process of them having to pay for it, leading to the second research issue: *Are parking consumers willing to adopt intelligent parking technology?*

There are many intelligent technologies currently available that could add value to the parking process for the consumer:

- A payment system that allows drivers to pay for parking using their cellular telephone. [18].
- A network of cameras able to track individuals, as well as vehicles, in real-time through a parking lot. This could be used to direct drivers to available parking spaces or even to track illegal activities [35].
- An electronic parking-payment system where drivers load value onto smart cards or other electronic device, then activate it with the zone/space they park. Drivers then deactivate the smart card when they leave so that they are only paying for the parking time they have used.

- Satellite based systems that transmit available parking space information to the vehicle's satellite radio [8].
- Internet enabled parking meters that wirelessly verify an account and activate it when a driver waves a Radio Frequency Identification tag (RFID) in front of the meter [30].
- Wireless sensor networks that guide traffic to an available parking space [27].

An IPT that is mandatory for the driver to adopt will obviously have different adoption and diffusion rates than what it would be in the case where drivers are given a choice such as payment by cell phone or with coins.

3. Method

Initial interviews with parking providers were carried out to give us a general overview of the industry and informed the development of a questionnaire for drivers. Six content experts (parking providers) were selected. These included representatives from a city municipality, a private parking company, two educational institutions, an airport parking provider and a sporting event coordinator. The parking providers were asked questions about the company structure, current operations, and current or intended use of intelligent parking technologies. The parking providers were asked for any questions they would like the research project to ask drivers. These questions served as the foundation for the driver survey.

Interviews were conducted with a senior level manager from a company that has invested heavily in developing and patenting an IPT they feel adds value for the driver while maximizing efficiency for the parking providers.

The input from these managers was considered in the development of the driver questionnaire and in our discussion of the data and how it pertains to each research issue. We then used this questionnaire to survey 133 randomly chosen drivers.

Drivers were approached in parking lots and asked if they might mind taking a few minutes to answer questions as part of a research project. We surveyed a total of 133 drivers who had parked their vehicle at one of the parking spaces managed by the parking providers interviewed. To help reduce any bias, the researcher did his best to evenly distribute driver surveys across the parking spaces managed by the six different parking providers.

A fixed-structure questionnaire was presented to drivers. The questions are included in Appendix A. Surveyed individuals consisted of randomly selected drivers leaving their vehicles either at a parking meter or in a parking lot. A cluster sampling approach was used as it helps reduce travel and administrative costs while increasing the variability of the samples above what a simple random sampling approach would offer. Questionnaires were given to drivers leaving their vehicles at different parking lots or spaces at different times of day and even in different cities. These natural groupings, or clusters, included private, government, shopping mall, university and other parking lots or spaces.

The survey contained both quantitative and qualitative questions. The quantitative questions give us statistical information regarding the drivers' willingness to adopt intelligent parking technologies and the qualitative questions to help give us a feel for their perceptions and expectations vis-à-vis this kind of technology as it applies to the parking industry.

After the data from the driver questionnaires had been collected and summarized, follow-up interviews with the content experts (the parking providers) and the senior manager from the parking technology company were carried out and results from the driver surveys were discussed to confirm their validity.

Combining data from these different sources, all of which have either a direct or indirect influence on the adoption of IPT by the parking providers increases the reliability of our interpretation of the data while reducing bias.

4. Results and discussion

The driver survey questions and a summary of the responses are provided in Appendix A. All respondents were drivers (Q1), and all had paid to park a vehicle (Q2). The majority (72%) used paid parking less than 4 times per month (Q4). For most drivers (66%), the duration of paid parking was 30 minutes to 3 hours (Q5) and 72% of drivers usually paid by coins (Q6). The majority of drivers (85%) had felt rushed to return to their vehicle before the meter expired (Q7) and more than half (57%) had received a parking ticket for an expired meter (Q8). Many drivers (83%) did not have coins when required (Q9) and more than half (56%) had felt unsafe in a parking lot (Q10).

Drivers showed a marked preference (75%) for IPT-enabled lots when the price was the same (Q11) but only 42% were prepared to pay more for IPT-enabled parking (Q12). The vast majority (92%) admitting to driving around the block to seek a free parking space in preference to an available metered space (Q13), The main reason for this behaviour was not lack of coins, but resistance to paying for parking (76%) (Q14). About half the respondents (54%) had driven in excess of 10 minutes looking for a parking space (Q15). The majority (66%) agreed they would be willing to pay more for a parking space if IPT added value (Q16).

Survey questions 17 through 22 explored the value offered by a few different intelligent parking technologies that currently exist in the marketplace and all received positive responses: payment by cellular phone (74%) (Q17); direct to available space (83%) (Q18); smart card (83%) (Q19); RFID through gate (65%) (Q20); robot parking system (60%) (Q21); Internet enabled meters (82%) (Q22).

In answer to the first Research Issue - *What can intelligent parking technology offer to the consumer?* – drivers indicated that they would receive value from technologies that give better payment options. Other benefits to the consumers included time saving, safety and environmentally friendly technologies.

In fact, an IPT that could direct drivers to parking space would save the consumer time while simultaneously reducing environmental pollution through a reduction in driving. Approximately 95 percent of respondents said they would receive value from this technology. Consider this in the context that almost half the respondents reported that, in the last three years, they have driven “around the block” for more than 10 minutes looking for a parking space.

Questions 17-22 explored the perceived value drivers might get from different intelligent parking technologies that are currently available to parking providers. In every case, the majority of drivers indicated that they would get some value from the specific parking technologies presented.

As well as technologies specific to facilitating the payment process, other technologies were also viewed as being valuable. This varied from a low of 61 percent of respondents indicating they would get value from a robotic parking system to a high of 95 percent indicating they would get value from a system that would direct them to available parking spaces. There were no real surprises here although some of the parking providers appeared impressed by how high some of the results were indicating driver value for some of the specific technologies such as the robotic parking system.

In relation to Research Issue 2 - *Are parking consumers willing to adopt intelligent parking technology?* - drivers appear to be price sensitive.

Given the choice to park in either of two parking lots side-by-side, both priced the same, 75 percent of drivers responded that they would be more likely to choose the parking lot offering IPT over the one that does not offer IPT.

Less than half of drivers surveyed stated they would be willing to pay more to park in a lot that offered IPT. The overwhelming majority indicated that they have driven “around the block” at least once in the last three years looking for a no-charge parking spot when a parking lot or parking meter was readily available. Of all of these drivers, only 18 percent did this because they did not have coins on hand to pay for parking. 76 percent did it because they simply did not want to pay for parking.

5. Conclusion

Survey results from 133 drivers were gathered and discussed with the parking providers and the senior manager from the parking technology company in follow-up interviews. Results from the survey questions related to IPT to facilitate the payment process confirm that most drivers felt there *was* value added for them.

Drivers clearly demonstrated a willingness to adopt intelligent parking technologies. If they felt the technology added significant value for them, then they were even willing to pay more for this. For example, an IPT that directs drivers to available spaces was viewed by almost 95 percent of drivers as being valuable.

The majority of existing adoption and diffusion models revolve around the end-user of the technology in

question. In this research, this represents the drivers themselves. Although it is fair to say that in some cases IPT will be forced upon users and in other cases, it will be left to them to decide if they use it. An IPT that is the only available choice to the driver will obviously have different adoption and diffusion rates than if the technology were presented as an optional choice. For example, payment by cell phone *or* with coins.

The survey results clearly indicate that the majority of drivers would find value in the use of intelligent parking technologies. They are however also very price sensitive as can be seen in the results from the survey.

Reliability was increased through triangulation by collecting data from three sources including in-depth interviews with parking providers, interviews with a senior manager from a parking technology company and quantitative driver survey data.

Future qualitative research using the Delphi technique should also strive to do this. Without this, we would not have been able to answer our research question.

Future studies could consider how different industries and new technologies could benefit from adapted data collection procedures based on the Delphi technique used in this study. The study could be replicated in different parts of the world where attitudes and beliefs may be different. This would further substantiate the findings and conclusions of this research.

In summary, this research showed that IPT adoption by parking providers is more complex than what one might first imagine. The research showed that even though IPT implementation offers apparent value to all stakeholders, its formal implementation by parking providers could be affected by subjective complexities such as attitudes prevalent in the workplace and other factors affecting their willingness to make the effort to make a change that could benefit all stakeholders. Although previous research such as the Diffusion of Innovation model identifies determinants that may affect a parking provider’s decision to implement IPT or not, there is also the factor of complex relationships existing between the three primary stakeholders: parking providers, parking technology companies and drivers.

These relationships serve as a vehicle for change by allowing each of the parties to communicate things that may be mutually beneficial.

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Appendix A: Driver interview questions (condensed) and results

1. Do you drive a vehicle? *Yes 100%; No 0%*
2. Have you ever paid to park a vehicle? *Yes 100%; No 0%*
3. Do you pay for parking on either a weekly, monthly or annual basis? *Yes 48.9%; No 50.4%*
4. How often on average do you pay to “casually” park a vehicle? *<4/month 72.2%; 4-10/month 21.8%; >10/month 6.0%*
5. When you pay to “casually” park a vehicle, how long on average would you say you park each time? *<30 mins 6.8%; 30mins-3 hours 66.2%; >2 hours 27.1%*
6. How do you typically pay to park a vehicle? *Coins 72.2%; Credit/Debit Card 27.1%; Auto debited 0.8%; Other 0.0%*
7. Have you felt rushed to get back to your vehicle because time was running out on your meter? *Yes 85%; No 15%*
8. Have you received a parking ticket because the time ran out on your meter? *Yes 57.1%; No 42.9%*
9. Have you found that you had no coins with you when you were wanting to park at a parking meter? *Yes 83.5%; No 16.5%*
10. Have you ever felt unsafe in a parking lot? *Yes 56.4%; No 43.6%*
11. Given the choice to park in either of two parking lots side-by-side with the same prices, how likely would you be to choose a lot offering IPT over the other which does not? *Very likely 46.6%; Somewhat likely 28.6%; Not sure 21.1%; Somewhat unlikely 3.8%; Very unlikely 0.0%*

12. Given the choice, how likely would you be to choose the lot offering IPT with slightly higher prices over the other, which does not? *Very likely 17.3%; Somewhat likely 24.8%; Not sure 20.3%; Somewhat unlikely 24.8%; Very unlikely 12.8%*

13. Have you ever driven “around the block” looking for a no-charge parking spot when a parking meter was readily available? *Yes 92.5%; No 7.5%*

14. If the answer to Question 13 was “Yes”, what was your reason for searching for a no-charge parking spot? *No coins on hand 18.0%; Did not want to pay for parking 75.9%; Other 1.5%; Not applicable 4.5%*

15. Have you ever driven “around the block” for more than 10 minutes looking for a parking spot? *Yes 45.9%; No 54.1%*

16. Would you be willing to pay more for a parking space if IPT added value for you? *Yes 66.2%; No 33.1%*

<i>How much value would the following IPT offer you?</i>	<i>A lot</i>	<i>A little</i>	<i>None</i>	<i>Not sure</i>
17. Payment by mobile phone	32.3%	41.4%	21.1%	0.8%
18. A system to direct you to a parking space	49.6%	45.1%	3.8%	1.5%
19. A system using smart cards to pay for parking	35.3%	48.1%	14.3%	2.3%
20. Wireless transmitters to impose charges as you travel through a gate.	23.3%	42.1%	21.1%	12.8%
21. A robotic parking system that stores your vehicle	37.6%	23.3%	26.3%	12.8%
22. Internet enabled parking meters activated by key fob	30.8%	51.1%	8.3%	9.8%