

Customer Churn: The Missing Link in Public Transport Marketing

PRUDENCE BLAKE¹, GRAHAM CURRIE², ALEXA DELBOSC², CHRIS LOWE³

¹*Department of Civil Engineering, Public Transport Research Group, Institute of Transport Studies, Monash University, Building 60, Clayton, Victoria 3800, Australia*

²*Department of Civil Engineering, Public Transport Research Group, Institute of Transport Studies, Monash University, Building 60, Clayton, Victoria 3800, Australia*

³*Bus Association of Victoria, PO Box 125, Port Melbourne, Victoria 3207, Australia*

Email for correspondence: prudence.blake@monash.edu

Abstract

Growing public transport user markets is a fundamental goal of transport organisations worldwide. In the field of marketing a widespread strategy for understanding markets and facilitating growth is the measurement of 'Customer Churn' or the number of customers that defect (cease using) a service. Despite its prevalence in marketing, there is a single study available of Customer Churn in the context of public transport markets. This paper identified four core elements of market change; customer acquisitions, customer defections, customer retention and internal variability. The relevant literature on customer churn and similar studies in public transport (net market change, customer loyalty and internal variability) were assessed against whether they addressed these four elements. This identified that there was no singular method of measurement that reviewed all four elements of market change. To address this a new framework termed Customer Fluctuation, that holistically measures the rate of customer acquisitions, defections, retention and internal variability is proposed. This framework offers the potential of a more efficient and less ambiguous approach to understanding market changes and facilitating market growth.

1. Introduction

Growing public transport user markets is a fundamental goal of transport organisations worldwide (Currie and Wallis, 2008, Taylor and Fink, 2013, Krizek and El-Geneidy, 2007). The focus for encouraging growth has typically been on attracting new users, however, rider acquisition is costly and can take an extended period to see significant results (Taylor, 2007, Abou-Zeid and Ben-Akiva, 2012, Abou-Zeid et al., 2012, Matthies et al., 2006). An entirely feasible alternative is to focus on retaining customers, minimizing lost customers and increasing the frequency of use by existing users. Despite this, there are limited studies of customer churn (lost or defected users) in the public transport industry (Bass et al., 2011). There were no studies identified in marketing that study the impacts of customer acquisitions,

defections and retention and the internal variability in public transport markets. Notably in marketing these elements are often reviewed in corresponding pairs rather than holistically. There are no studies within the field of public transport that holistically review the impacts of customer acquisitions, defections and retention and the internal variability of how these elements interact to influence change.

This paper explores published work on customer churn in public transport markets to identify whether it could be applied to improve our understanding of market change. It presents a new framework to better conceptualise customer fluctuation in public transport markets.

The paper is structured as follows; the next section reviews the research and practice literature to better understand the concepts associated with customer churn. This includes a review of the concept, how this relates to public transport markets and how customer loyalty and travel frequency relate to churn. This is followed by a description of proposed Customer Fluctuation framework. The paper concludes with an outline of key findings including suggestions for future research.

2. Research and practice review

2.1 Customer churn

Customer Churn is defined in marketing literature as the ‘tendency for customers to defect or cease business with a company’ (Kamakura et al., 2005, Tamaddoni et al., 2014). The term ‘churn’ is used interchangeably in the literature with ‘attrition’ (Libai et al., 2009), ‘defections’ (Reichheld and Sasser, 1990, Neslin et al., 2006), and ‘turnover’ (Schneider and Bowen, 1985). Customer churn measures defecting customers and assumes dissatisfied customers are the most likely to defect. This establishes a link between satisfaction and retention, with satisfied customers more likely to continue using a service (Reinartz and Kumar, 2000, Athanassopoulos, 2000).

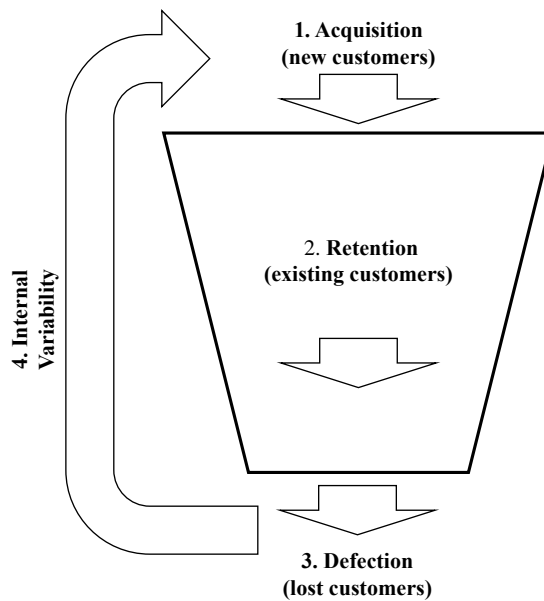
The theory underpinning customer churn is the premise that customers have a dynamic relationship with a service over time, with longer customer relationships being more profitable (Reinartz and Kumar, 2000). This is referred to as ‘Customer Lifetime Value’ (CLV). All businesses experience both short and long term customers and variations in how profitable these customers are (Reinartz and Kumar, 2003, Kotler, 1994). Measuring churn also allows us to set benchmark rates of defection and retention. This information can be used to identify what degree of observed customer defections is unusual (Riebe et al., 2014). This is useful information for service providers, as an unusually high rate of defections (above the benchmark) may be an indication of customer dissatisfaction with service provision. It can also allow for comparisons to be made with competitors.

The availability of information in current times has made customers increasingly transient, as they can re-evaluate their choices with little cost or effort (Tamaddoni et al., 2014, Holtrop et al., 2016). Services with high switching costs (for example, contract cancellation fees, time consuming paperwork) can make people less likely to switch and can result in a false impression of customer loyalty (Lee et al., 2001), where non-contractual services might have low switching costs and create the impression that customers are highly prone to fluctuating. Criticisms of customer churn include that the existing definition implies that customer defections are a permanent state, this does capture non-contractual service settings where people may defect and re-patronise a service later (Tamaddoni et al., 2016). This occurrence of defection and re-acquisition to a service can be thought of as part of the internal variability within a market (coupled with acquisitions, defections and retention).

A small number of studies investigate the relationship between customer acquisitions (new or re-commencing customers) and customer retention. Although both new and retained customers are required to grow markets, they require different marketing strategies and as such different expenditure and therefore are not commonly studied simultaneously (Reinartz et al., 2005). Riebe et al. (2014) found the complex interplay between acquisitions and defections in increasing the profitability of markets. They noted that while changes in defection rates were marginally more profitable than equivalent changes in acquisition rates, acquisition rates are prone to greater variation and thus play a more influential role in influencing customer profitability.

An exploration of the marketing literature around Customer Churn has identified four core elements of understanding market change; customer acquisitions, defections, retention and internal variability. These elements are illustrated in figure one. To understand markets, it is important to accept that all four of these elements are occurring at any one time. It is not possible to isolate individual elements and expect to obtain a clear picture of overall market change. Despite churn being an important and widespread concept in Marketing, it has received limited attention in studies of public transport.

Figure one - The four elements of market churn



2.2 Customer churn in public transport markets

Churn is an important and widespread concept for influencing market change in marketing and yet it has received limited attention in studies of public transport. To the authors' knowledge, Mason et al. (2011) have completed the only direct study of market churn within a public transport context. This industry report reviews the occurrence of churn within the British Rail commuter and leisure markets. The method for obtaining data includes a broad survey of users, with a more detailed panel survey to detect the influence of churn. The study of commuter travel identified the percentage of customers that were 'new' (market entry), 'lapsed' (market exit) and 'loyal' (retained) customers. This report separated their studies of commuter and leisure-based travel to reflect the different frequencies anticipated for these

types of travel. They found churn rates of combined acquisitions and defections of up to 42% (25% using rail more and 17% using rail less) within leisure markets and 46% in commuter markets (23% more and 23% less). The implication is that retention is slightly higher in leisure markets than commuter markets. This study provides important evidence that net market change varies significantly by the characteristics of the 4 core elements of churn; acquisition, retention, defection and internal variability. This is a simple and straightforward application of churn to the public transport market that would benefit from further expansion and refinement.

This research of Mason et al (2011) focused on findings across two years and noted that due to the changing external conditions within these time frames it is possible that the underlying level of churn is over-estimated. This sensitivity to external conditions emphasises the value of regularly measuring and reporting on churn to detect influences and identify the underlying rate of market churn at a finer level of detail. This study also relied on a high volume of data to accurately measure churn, it would be beneficial to the industry to investigate different and less intensive methods to capture the impacts of churn for wider application. This can also expand the findings by application to different modes of transport in different locations.

2.3 Understanding net market change in public transport

The focus of Customer Churn is to understand market change and drive market growth; this is also a focus of ridership research in public transport. However, the focus in public transport is predominantly on net market growth and decline focusing on the overall market outcome rather than issues such as retention or attrition rates. Currie and Wallis (2008) provide a detailed synthesis of the factors that impact on growing bus markets. This paper identified reduced fares, higher frequency and shorter in-vehicle time, as the three main attributes of bus services that affect changes in the market. Each had a generally similar impact on patronage (growth). These variables and 'soft' or customer amenity improvements were reviewed only in terms of patronage gains or losses resulting from improvements. Although the purpose of the paper was to effectively grow markets, it does not review customer retention, attrition or the internal variability of patronage – thus ignoring where any gains or losses in users are coming from.

Other studies (for example, Chen et al., 2011) review the elasticities of changing petrol and fare pricing on public transport ridership at a macro level. Specifically, capturing the impact of lags and lead times for measuring changes in behaviour in response to these variables. They note that there can also be an asymmetry in the impacts of market changes. The reliance on cross-sectional data in transport studies limits the ability to capture these asymmetrical changes, although multiple studies have noted their existence and note a need for monthly data (Chen et al., 2011, Pendyala et al., 1995, Dargay, 2001).

Overall it is clear from transit ridership research that retention and attrition in market size is a clear gap in knowledge. However, some public transport research has considered the related issue of customer loyalty.

2.4 Loyalty among public transport users

It is well known in studies of public transport that a small number of users who travel at high frequencies often represent a high proportion of trips (Bagchi and White, 2005). In the context of public transport, 'loyalty' refers to a commitment to re-patronise a preferred service consistently in the future (Tao et al., In Press, Oliver, 1999). Much focus in public transport is predicting loyalty using satisfaction with services (St-Louis et al., 2014, Olsson et al., 2013, De Vos et al., 2016, Abou-Zeid and Fujii, 2016), behavioral intentions (Lai and Chen, 2011, Tao et al., In Press) or both (van Lierop and El-Geneidy, 2016).

Measurement approaches to understanding loyalty in response to external or internal changes are of the greatest interest to understanding churn. The connection between different variables related to satisfaction (for example, safety, comfort, cleanliness) and loyalty and how that varies for captive, choice and 'captive by choice' transit users was measured by Van Lierop and El-Geneidy (2016). The results of this study identified that service quality improvements will influence the loyalty of the groups (choice, captive or captive by choice) in different ways, however, changes targeted at one group such as captive riders may also positively influence ridership in other groups. Similar studies have found that loyalty was positively influenced by good experiences of a service and that loyal passengers were less likely to shift to alternate modes (Tao et al., In Press). Other studies have measured the impact of external changes, such as the introduction of new services and used modelling to determine 'demand stability' or the likelihood of users migrating to a new mode (Bass et al., 2011). Although not identified in their paper, the concept of 'demand stability' might be seen to have obvious links to ridership retention. The increasing availability of smart card data has also increased the ability to measure and predict changes in loyalty over time. As an example, Trépanier et al (2012) found through hazard modelling that the rate of terminating a card increases over time.

Although there is clearly an existing research literature surrounding customer loyalty in public transport we suggest there is still a limited understanding of many aspects of loyalty. In particular due to the reliance on cross-sectional surveys which limits the ability to observe real-time changes, and a lack of individual data to appropriately segment markets (Tao et al., In Press). Limitations also arise from the use of aggregated assessment, as it is increasingly difficult to capture individual decisions around preferred mode choice (Bass et al., 2011). A final concern is the lack of non-public transport users in existing panel studies, limiting our ability to understand how these users behave or how they may be targeted in marketing programs (Transit Cooperative Research Program, 1999).

2.5 Internal variability of public transport users

Not all studies examine public transport markets; there is, for example, a growing availability of smart card data which has led to much research on the variability of user behaviour within market segments. Studies of internal variability within a market generally apply longitudinal study methodology to identify variations in travel patterns and behaviours. These studies can look at individual travel patterns (spatial or temporal) from day-to-day or year-to-year (Chu, 2015, Kieu et al., 2015). Differences in internal variability by market segment (Briand et al., 2017, Ma et al., 2013) or variability of external factors, such as station arrival times or weather conditions have been explored (Csikos and Currie, 2008, Bocker et al., 2013). Research of this kind has also found a relative stability of internal markets over longer periods, although it was common that individual cards were not active for more than one or two years (Briand et al., 2017). This overall stability does not mean that important findings could not be made about internal market changes. Significant seasonal variability in public transport use is a recurrent and accepted finding of internal variability studies (Chu, 2015). Chu (2015) also identified a 'new card bias', where new cards had a higher proportion of trips in the first few months, with frequency diminishing over time and stabilising at around six months of use.

Several studies also note limitations of smart card data, predominantly the large size of data sets that are often incomplete, including a lack of attached demographic information (Briand et al., 2017, Chu, 2015, Ma et al., 2013). However, research is also consistently developing improved methods for using and interpreting this data, such as Kieu et al (2015) who developed an improved clustering model to reduce analysis times from 24 hours to 7 minutes. This research meets a well-acknowledged need for more accessible models and tools to help practitioners understand and predict travel patterns by a better understanding of the drivers of internal variability of markets (Yoh et al., 2012).

While the internal variability of travel frequency of public transport markets is a mature and growing area for research, the authors were unable to find any research that linked this to net market change including consideration of market acquisition or defection.

2.6 Synthesis of findings

Table one shows a synthesis of the research literature which assesses the degree to which the four elements of Market Churn have been considered in published research on public transport markets. With the exception, of the technical study of British Railway Markets prepared by Mason et al. (2011), there were **no** studies found that addressed all the four elements of understanding market change in public transport markets at the same time. We contend that this represents a significant gap in knowledge.

Studies of market churn emerged to limit defections at the expense of investing in acquiring new customers and this has consistently been the approach applied in other industries, although not to the authors knowledge public transport. This idea appears to have prevailed through to modern studies with Reinartz et al. (2005) the only study that looked at acquisitions in a study of churn. The authors were unable to find any research on customer churn in marketing which also investigated internal variability within a market.

There are some studies in public transport that come close to measuring elements associated with market churn including measurements of net market change, transport user loyalty and internal variability of travel behaviour. Studies of net market change (aggregate change) will in some part cover acquisitions (overall growth in demand) and defections (lost patronage) but place a limited focus on investigating retention or the internal movement of individual customers (e.g. Currie and Wallis, 2008, Chen et al., 2011). Studies of transport loyalty generally ignore customer acquisitions and defections (with the exception of Bass et al., 2011) to focus on measuring customer retention and internal variability (Trépanier et al., 2012, van Lierop and El-Geneidy, 2016, Tao et al., In Press). Finally, studies of variability in behaviour focus almost exclusively on internal variability within a market, usually in response to a defined variable (Csikos and Currie, 2008, Briand et al., 2017, Chu, 2015).

From the findings of table one, we can conclude the following:

- There are **no** singular methods of measurement that account for all four core elements of market change in the published literature
- There is a limited focus on the impact of customer acquisitions and defections in public transport research, with a greater focus on retention and internal variability of existing users.
- There has been a single study that reviews all four elements of market fluctuation.

To address these findings, a new framework is proposed for further investigation.

Table one - Synthesis of literature against the four elements of market change and application to public transport

SOURCE	Acquisitions	Defections	Retention	Internal Variability
Marketing/Churn				
(Tamaddoni et al., 2016)	-	✓	✓	-
(Tamaddoni et al., 2014)	-	✓	✓	-
(Athanasopoulos, 2000)	-	✓	✓	-
(Reinartz et al., 2005)	✓	-*	✓	-
(Reichheld and Sasser, 1990)	-	✓	✓	-
(Riebe et al., 2014)	✓	✓	✓	-
Public Transport and Churn				
(Mason et al., 2011)	✓	✓	✓	✓
PT/ Net Market Change				
(Currie and Wallis, 2008)	✓	✓	-	-
(Chen et al., 2011)	-	-	-	✓
PT/ Loyalty				
(Trépanier et al., 2012)	-	-	✓	✓
(van Lierop and El-Geneidy, 2016)	-	-	✓	-
(Bass et al., 2011)	-	✓	✓	-
(Tao et al., In Press)	-	-	✓	✓
PT/ Variability in Behaviour				
(Csikos and Currie, 2008)	-	-	-	✓
(Briand et al., 2017)	✓	✓	-	✓
(Chu, 2015)	-	-	-	✓
(Ma et al., 2013)	-	-	-	✓
(Kieu et al., 2015)	-	-	-	✓

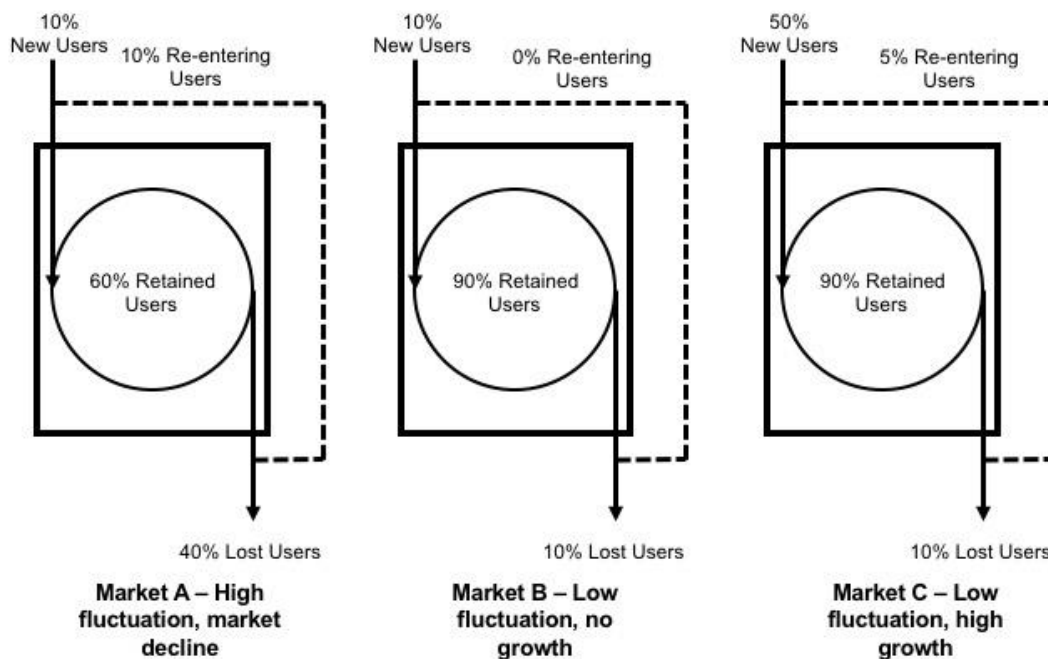
3. A new framework: customer fluctuation

A new framework is proposed to address the conclusions resulting from an analysis of Table 1. This framework has been termed ‘Customer Fluctuation’; the measurement of changes in use (commencing or ceasing use) of individual users in a market as a continuous and ongoing process over time. This framework measures customer acquisitions, defections and retention simultaneously, whilst also recognising that this can be a temporary rather than definitive event (capturing internal variability). Within this framework, a customer that becomes inactive may re-enter the market at a later time (Tamaddoni et al., 2014).

The proposed new framework uses elements of Customer Churn and builds on what is termed the ‘Leaky Bucket’ theory of market change. This theory compares a market to a bucket; you can’t fill it with water when there are leaks in the bottom. Similarly, you cannot grow markets if customer defections are higher than customer acquisitions (Blythe, 2009, Ehrenberg, 1972). Using this comparison, we can review the benefits of Customer Fluctuation as a new measurement framework.

Figure two illustrates three separate markets that are currently stable, experiencing no market growth or decline as acquisitions and defections are the same.

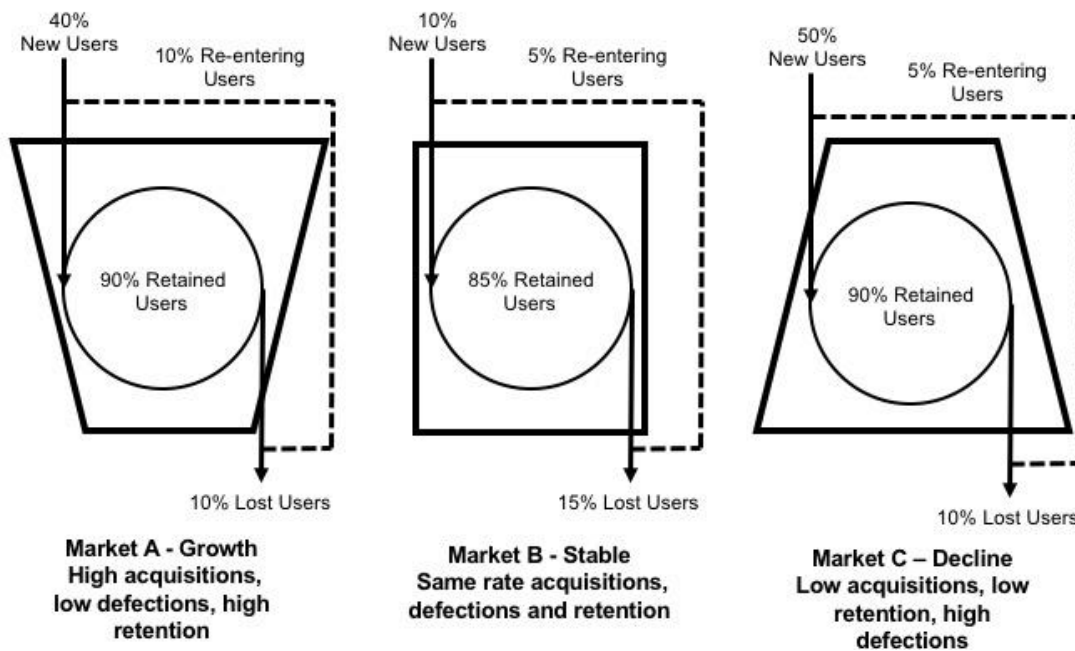
Figure two - Customer fluctuation within a stable market context adapted by the author from Blythe (2009)



Currently, adopting the perspectives used in existing public transport research, each of the above markets would be seen as being the same. By revealing the scale of acquisitions, defections and retention we can identify clear differences between these markets. For example, Market A is attracting a small number of customers but it is also losing a small number of customers, meaning that most of the customers that are attracted remain within the market (high retention). This can be compared with Market C which is attracting a high number of new customers, but also experiencing a high rate of defections, this means that the market has a low rate of retention and is struggling to maintain the customers that it acquires; a considerably different market appreciation.

Figure three provides a more detailed illustration of how customer fluctuation can help us understand market growth and decline and identify key areas to target. This figure illustrates three very different markets; Market A is experiencing steady growth; Market B is stable and Market C is experiencing a significant decline. Knowing the rate of acquisitions, defections and retentions can help us target areas for maintenance or improvement. For example, in Market A, a strategy might be developed to retain customers, Market B might focus on improving retention or increasing acquisition and Market C should seek to minimise defections and improve retention. These are all very different strategies which need to be targeted to a given state of customer fluctuation; this is not possible unless it can be measured.

Figure three - Illustration of customer fluctuation showing market change



The above is a general simplification of the information that could be found from the measurement of customer fluctuation. Reinartz et al.(2005) noted that many of their findings would not have been revealed if the model being used did not integrate acquisition, retention, and customer profitability into a single framework that accounts for the natural linkages. One of the most notable additions would be the ability to measure these factors on a regular and ongoing basis, to capture the internal variability within markets. This will also help us confirm key areas to target for growth. The ability to measure all four elements of market change will also allow us to gain more information from market comparisons. This could assist practitioners in benchmarking acceptable rates for each element and maintain awareness of market health. Based on the above, developing a single framework that allows us to measure and understand the four core elements of market change will provide a more efficient and less ambiguous approach to understanding market change.

4. Conclusions

This paper explores published work on customer churn in public transport markets to identify whether it could be applied to improve our understanding of market change. It also presents a new framework to better conceptualise customer fluctuation in public transport markets. Findings established that despite its prevalence in marketing there are limited studies on

customer churn within public transport markets (Bass et al., 2011). Public transport authorities do not currently have the required information to estimate turnover rates and assess retention (Trépanier et al., 2012). There are few studies of customer churn of public transport markets that consider customer acquisitions, defections, retention and the internal variability within markets as part of a holistic measurement of market condition. Although numerous models measure and predict ridership patterns, there is a need for simple open and defensible tools that can be used by operators and practitioners to better understand market churn (Yoh et al., 2012, Morency et al., 2007). Customer Fluctuation is suggested as a new framework for measurement that holistically reviews the impacts of acquisitions, defections and retention as an ongoing process that changes over time.

4.1 Areas for future study

The new framework of Customer Fluctuation should be further investigated as to how it improves our understanding of public transport markets and developing strategies to facilitate market growth. Developing a single tool to measure the four core elements of market change will provide a more efficient and less ambiguous approach to understanding market changes. A clear next step is an investigation of longitudinal panel data and smart card as a data source for measuring customer fluctuation. Tools for measurement are needed and a process to implement them to better understand variations in market fluctuation by mode, market group, location, socio-economics and even culture. The authors consider this a potentially powerful area to improve our understanding of public transport markets and are implementing a research program to achieve this over the next 3 years.

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