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Determinants of satisfaction with campus transportation services: Implications for service quality

Authors:
Felix Charbatzadeh[1]
Udechukwu Ojiako[2,3]
Maxwell Chipulu[1,4]
Alasdair Marshall[1]

Affiliations:
[1]Southampton Business School, University of Southampton, United Kingdom

[2]Faculty of Business & Law, British University in Dubai, United Arab Emirates

[3]Hull University Business School, University of Hull, United Arab Emirates

[4]Faculty of Management, University of Johannesburg, South Africa

Corresponding author:
Udechukwu Ojiako,
udechukwu.ojiako@outlook.com

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Background: In a number of countries, buses are a critical element of public transportation, providing the most inclusive and sustainable mode of transportation to all forms of citizenry, including staff and students of universities.

Objectives: The study examines the determinants of satisfaction with campus bus transportation. The article is primarily discursive and based on the synthesis of existing service literature supported by data obtained from a survey of 847 respondents.

Method: Structural equation modelling is undertaken using *AMOS 19*, allowing for the examination of compound relationships between service engagement variables.

Results: Results show statistically significant differences between perceived service quality and travel routes. The authors argue that managerial attention to service user experiences does not only hold the key to ongoing competitive success in campus transportation services but also that those services can be significantly enriched through greater managerial attention to the interface between risk of financial loss (which increases when the campus bus transportation service provider becomes less able to compete) and service quality.

Conclusion: The authors argue that if providers of campus bus transportation services are to rise to their service delivery challenges and also maintain or improve upon their market positions, they must conceptualise their services in a manner that takes into consideration the two-way interrelationship between risk of financial loss and service quality. It must also be noted that, although this study may have relevance for firm–firm scenarios, its focus is primarily on service supplier firm–customer service engagements.

Introduction

Overview

Scholars have long been concerned with the question of how *service* may be a key driver for a service supplier firm's prosperity and survival (Busse & Wallenburg 2011; Daugherty, Chen & Ferrin 2011; Grawe, Autry & Daugherty *et al*. 2014). As shown in the wide range of research available (see Busse & Wallenburg 2011; Bustinza, Parry & Vendrell-Herrero 2013; Grawe 2009; Hsu 2013; Kahkonen, Lintukangas & Hallikas 2015; Lin, Pekkarinen & Ma 2015; Yazdanparast, Manuj & Swartz 2010), the topic of service is important in logistics research. Service is also recognised as having an influence on customer behaviour (Pedrosa, Blazevic & Jasmand 2015; Tokar 2010; Su, Ke & Cui 2014); hence, it is of no surprise that scholars who have set out to establish an agenda for both service (Chandler & Lusch 2015; Ostrom *et al.* 2015) and logistics research (Bonney & Jaber 2014; Busse & Wallenburg 2011; Daugherty 2011; Defee *et al.* 2011; Connelly, Ketchen & Hult 2013; Gonzalez-Loureiro, Dabic & Kiessling 2015; Olhager, Pashaei & Sternberg 2015; Weele & Raaij 2014) have directed considerable attention to the notion of 'service'.

Scholars have long been interested in the question of not only the selection of modes of transport service (Bhattacharya *et al*. 2014; Correia & Antunes 2012; Jain *et al*. 2014), but also in customer service quality and supplier–customer relationship satisfaction specific to buses as a mode of transportation (see de Ona *et al*. 2013; Dell'Olio, Ibeas & Cecin 2010; Hensher 2014; Hensher, Stopher & Bullock 2003; Hu & Jen 2006; Wall & McDonald 2007; Yang, Kong & Meng 2001). More specific interest in campus bus transportation can be found in the works of Farzaneh *et al*. (2009) and Eboli, Mazzulla and Salandria (2013). For example, following the discovery that key challenges still existed in the identification of how bus customers assessed satisfaction with service levels, Hensher *et al*. (2003) suggested the need to quantify service quality levels as a means of comparing service levels within and between bus operators. Hensher and colleagues' work was followed shortly by that of Hu and Jen (2006) who, on examining bus service quality in Taiwan, found that customers articulated service quality not only with reference to the perceived respect and care they receive from service providers but also in terms of levels of comfort with bus facilities. In other studies, whilst Wall and McDonald (2007) established a relationship between bus frequency and customer satisfaction, Yang *et al*. (2001) examined how 'value-of-time' distributions were impacted by service diversity and price competition in bus services. In addition, Dell'Olio *et al*. (2010) examined how quality perceptions of bus service provision varied with levels of information, particularly when new information was made available to customers.

Within this context, two research questions are examined in this study: (1) What service attributes significantly influence the satisfaction of students using campus bus services? and (2) Does customer satisfaction vary depending on bus transport route and frequency? In answering these two questions, the authors seek to make a contribution to knowledge on the imperatives impacting upon user transport mode preferences.

Customer satisfaction and its attributes

Whilst Engel and Blackwell (1982:501) conceptualise satisfaction as 'an evaluation that the chosen alternative is consistent with prior beliefs with respect to that alternative', Andreassen (1995:33) suggests that customer satisfaction represents 'the accumulated experience of a customer's purchase and consumption experiences' and the performance that is perceived is related to 'the consumer's perception of quality, marketing mix, brand name and image of the company'. It is therefore of no surprise that, because of an interest amongst firms to increase their rate of customer retention, interest in understanding how service components influence customer satisfaction continues to grow following seminal work by Slater (1997), who sought to develop a customer value–based theory of the firm that 'maximises the effectiveness of the firm's customer value creation activities' (p. 165). Underpinning our understanding of customer satisfaction is the expectancy–disconfirmation theory first introduced by Oliver (1981). According to scholars (e.g. Aurier and Guintcheva 2014; Sengupta, Balaji & Krishnan 2015), the *expectancy–disconfirmation theory* posits that customers form a perspective of satisfaction against a specific service and that this is carried out mainly subjectively by comparing their idiosyncratic preferences and ideal expectations. In other words, customer satisfaction remains a psychological construct of expectations and perceptions.

Articulation of the *satisfaction* construct remains complex not only because of the intricate nature of the interrelationships that exist between assessment attributes which represent the general evaluative criteria for assessing the quality of service employed in judging satisfaction but also because of situational differences that may arise from customers' perceptions of 'quality' (Calabrese & Scoglio 2012; Dagger & Sweeney 2007; Parasuraman, Zeithaml & Malhotra 2005; Zayer, Otnes & Fischer 2014). Thus, perceptions of service quality may influence customer satisfaction (Burton, Sheather & Roberts 2003; Dagger & Sweeney 2007; Nyffenegger *et al*. 2014; Sureshchandar, Rajendran & Anantharaman 2002). In other words, quality – which refers to the totality of the characteristics of a service (Golder, Mitra & Moorman 2012) – remains a key factor for researchers seeking to understand consumer satisfaction judgements. These notions of service, quality and customer satisfaction also apply to transportation (Ettema *et al*. 2011; Weinstein 2000).

A review of literature (see, e.g. De Ona & De Ona 2015; Eboli & Mazzulla 2011; Fellesson & Friman 2012; Morris & Guerra 2014; Olsson *et al*. 2012) shows that numerous studies dealing with customer satisfaction in public transportation have been undertaken. Studies specific to bus transport services include that of Hensher *et al*. (2003), who, following the discovery that key challenges still existed in the identification of how bus customers assessed satisfaction with service levels, suggested the need to quantify service quality levels as a means of comparing service levels within and between bus operators.

Other studies include that of Stradling *et al*. (2007) that examined the customer experience of the ideal bus journey. As part of the study, they examined the influence of factors such as gender, age and frequency of bus use on the experience of bus users. In another study, Gatersleben and Uzzell (2007) examined affective experiences of daily bus commuters, finding that public transport users generally perceived their experiences as unpleasant. This negative affect was generally seen to be driven by a number of factors such as stress associated with waiting times and delays. In response to similar findings on the negative impact of waiting times on the experience of bus customers, scholars such as Dell'Olio *et al*. (2010), Politis *et al*. (2010) and Tang and Thakuriah (2012) have examined the role of real-time bus information systems on improving the overall bus transport experience. Fellesson and Friman (2012), for example, found four satisfaction dimensions – system, comfort, staff, and safety – to be of importance in their assessment of perceived satisfaction with public transport service across nine European cities. At the same time, the findings from the studies by Gatersleben and Uzzell are not surprising in view of much earlier work by Van Vugt, Van Lange and Meertens (1996) into motivational factors underlying the decisions by passengers on whether to commute by car or by public transportation. Van Vugt *et al*. (1996) had found that commuters preferred journeys that involved not only shorter travel time but also alternative and direct travel routes (Stradling *et al*. 2007). The question of routing is particularly important, noting the findings of earlier studies. Numerous studies (Broome *et al*. 2012; Kepaptsoglou & Karlaftis 2009; Van Oudheusden, Ranjithan & Singh 1987; Wirasinghe & Vandebona 2011) all show that optimised bus route designs have the ability to simultaneously enhance customer satisfaction with bus service operations.

An interesting strand of work that has begun to emerge in transportation studies deals with customer satisfaction as relates to 'mood and mode'. These studies which include, for example, the works of Choi, Coughlin and D'Ambrosio (2012), De Vos *et al.* (2013), Morris (2013) and Morris and Guerra (2014) have focused on exploring the relationship between satisfaction, access to transportation and travel behaviour. The findings of these studies, whilst not statistically significant, suggest that although individual preference is a major determinant of mode of transportation, a relationship does exist between customer mood and their chosen or preferred mode of transportation. Generally, bus (and train) passengers have been found to have the most negative emotions whilst bicyclists have the most positive emotions. At the same time, there appears to be a relationship between travel behaviour (in terms of the actual commuting experience) and mood, with some scholars such as Choi *et al*. (2012) and Morris (2013) finding that passengers with longer distances to commute tend to have low levels of satisfaction with their travel experience.

More pertinent to our study, Wall and McDonald (2007) and Wall *et al*. (2008) had identified the key determinants of satisfaction with bus travel to include frequency, reliability, bus information, comfort of travel, friendliness of bus driver, competence of bus driver, appearance of bus shelters or stops, cleanliness, cost, route, time of travel and socio-demographic factors. In addition, Eboli and Mazulla (2007) had sought to rate customer satisfaction with bus campus services against 16 service quality attributes (see Table 1). In the process, they found three over-arching attributes – (1) planning and reliability, (2) comfort and other factors and (3) network design – as factors impacting customer satisfaction with campus bus services. Similarly, in an extensive study, which involved international comparisons of satisfaction with public transportation experiences, Fellesson and Friman (2012) found four key attributes – (1) systems, (2) information, (3) design and (4) skills – which all seemed capable of significantly impacting the service experiences of public sector transport users.

TABLE 1: Service quality attributes.

Attribute	Description
Bus stop availability	Availability
Route characteristics	Route characteristics (number of bus stops, distance between bus stops, etc.)
Frequency	Service frequency
Reliability	Number of buses that arrive on schedule
Bus stop furniture	Availability of shelter and benches at bus stops
Overcrowding	Bus overcrowding
Cleanliness	Cleanliness of interior, seats and windows
Cost	Cost affordability
Information	Availability of schedule or maps at bus stops
Promotion	Availability of service information by phone, mail, internet, etc.
Safety on board	Vehicle reliability and competence of drivers
Personal security	Safety against crimes on buses
Personnel	Helpfulness of personnel
Complaints	Administration of complaints
Environmental protection	Use of ecological vehicles
Bus stop maintenance	Physical condition of bus stops

Source: Assessed by Eboli, L. & Mazzulla, G., 2007, 'Service quality attributes affecting customer satisfaction for bus transit', *Journal of Public Transportation* 10(3), 21–34

The study

Buses and student transportation

Buses are a critical element of public transportation. In most countries, buses provide the most inclusive sources of sustainable mode of transportation to all forms of citizenry. Therefore, buses can be regarded as a cornerstone of any nation's social fabric. According to scholars such as Morris, Ison and Enoch (2005), Andaleeb, Haq and Ahmaed (2007) and Ahn (2009), the importance of buses cannot be underestimated when compared to other forms of transportation. For example, buses transport the largest number of passengers within most cities (White 2010). Nevertheless, because studies (Dell'Olio *et al*. 2010; Eboli & Mazzulla 2007; Hu & Jen 2006; Sheth, Triantis & Teodorovic 2007; Stradling *et al*. 2007) suggest that bus services face reliability questions, a substantial number of scholars (Chen, Yan & Tseng 2010; Gu *et al*. 2011; Sheth *et al*. 2007) have focused on optimising bus service operations. This is to be expected when one notes that buses share road infrastructure with other motorists.

Compared with many other social groups, students are represented disproportionately as bus transport customers (Limanond, Butsingkorn & Chermkhunthod 2011; Park & Kim 2010; Ubillosa & Sainz 2004). Unsurprisingly, senior administrators across a substantial number of higher institutions promote the use of buses as a sustainable means of transportation with the capacity, if optimised, to enhance overall student experience (Balsas 2006; Bond & Steiner 2006; Conway *et al*. 2008). Other institutions have gone further to initiate transportation demand management initiatives that include, for example, the provision of campus bus services. However, these initiatives face considerable challenges for a number of reasons, including (1) an increasing student population which will continue to exert pressure on services, (2) an increase in student wealth (and by implication, students who have enough disposable income to purchase cars; see Bamberg and Schmidt 2003), (3) a general student preference for car travel over the utilisation of public transport services (Eriksson, Friman & Garling 2013; Paez & Whalen 2010) and (4) the existence of studies showing that students tend to make mode of transportation selection decisions based largely on convenience (Field 1999).

The *Uni-link* service

Being the host to two large universities with a combined student population of 42 190 (Higher Education Statistics Agency 2010), the City of Southampton is strongly influenced by its character as a university town. The *Uni-link* service, launched as a major campus-oriented bus service in 1998, is a major joint-venture transport initiative between the University of Southampton and a local bus operator, *Bluestar*. The objective of the venture is to provide convenient transportation between the five campuses, 20 halls of residence, sports centre and key locations within the City of Southampton for staff and students of the University whilst

TABLE 2: *Uni-link* services.

Route	Bus times	Start	Final destination (and vice versa)
U1	Between every 10 and 20 minutes	Airport Parkway Station	Dock Gate 4
U2	Every 30 minutes or hourly	Civic Centre	Bassett Green/ Crematorium
U6	Every 30 minutes or hourly	Dock Gate 4	General Hospital
U9	Monday to Friday three times a day	Townhill Park	Coxford Road

at the same time providing a bus service open to the general public. Since 2008, the *Uni-link* service has been operated by the bus operator *Bluestar*, a trading arm of the *Go-Ahead* Group, one of the leading bus and rail companies in the United Kingdom.

Uni-link covers four different campus bus routes (see Table 2). The 'U1' is *Uni-link's* most popular bus service with the company deploying only double-decker buses on this route.

Uni-link's competition comes from other bus operators that cover a total of 42 service routes within the city. Although *Uni-link's* routes and schedules are primarily tailored to meet the needs of University staff and students (timetabling, semester schedules and location of students' facilities), the service is also available for general public use, thus making its operations – particularly during student vacation periods – subject to indirect competition by other local bus operators.

It is perhaps important at this juncture to point out that whilst the 16 service attributes drawn from Eboli and Mazulla's (2007) study form the basis of assessment of the *Uni-link* service being examined in this study, subtle differences exist between their study and this one. The major difference is that whilst the bus service examined by Eboli and Mazulla focuses on a public transport service habitually used by students to reach campus, our focus is on examining levels of customer satisfaction with bus transportation services established primarily to serve students (and staff) of a university.

Research methodology

Questionnaire design

To address the research questions, we employed a survey questionnaire. To take into account average bus journey times in the UK, which is estimated to be about 34 minutes (McLennan & Bennetts 2003), we sought to streamline the questionnaire to a maximum of two pages (as a means of ensuring completion by respondents during a single bus journey). The questionnaire was also printed on both sides of one sheet of paper[1].

We designed our questionnaire against three sections based on earlier studies conducted by Wall (Wall & McDonald 2007; Wall *et al*. 2008), which identified the following key determinants of satisfaction with bus travel to include frequency, reliability, bus information, comfort of travel, friendliness of bus driver, driving of bus driver, appearance of bus shelters or stops, cleanliness, cost, route, time of travel, and socio-demographic variables. The first section of the questionnaire focused on socio-demographic questions, whilst the second section focused on factors such as journey purpose and frequency of use of service. In the last section of the questionnaire, we sought to gather information relating to service quality attributes based on bus service attributes earlier identified by Eboli and Mazzulla (2007). To achieve a higher completion rate, the responses were structured against a five-point Likert scale (Likert 1932).

The fieldwork

The fieldwork was undertaken over two consecutive weeks beginning on Sunday, 05 June 2011. To capture data from different respondents, data were recorded at random times between 08:00 hours and 23:00 hours. To achieve a good time efficacy, 20 clipboards and 20 ballpoint pens were distributed at any one point in time for the convenience of the respondent. In line with earlier works by Fernandez (2010) and Gu *et al*. (2011) that address how limitations with aligning and discharge flows degrade the overall service experience of bus passengers, in this particular study, we did not board any of the *Uni-link* buses at major bus stops. During the 2 weeks of data collection, a total of 847 respondents were sampled. In total, during the final count, 10 questionnaires were excluded either because of missing variables or because the respondent had only completed one side of the questionnaire. Data entry was conducted on SPSS Data Entry 4.0 primarily to mitigate against data entry mistakes. Additionally, unlike MS Excel, SPSS Data Entry 4.0 software reduces the time required to enter the data and also facilitated the initial definition of the variables. Structural equation modelling (SEM) was constructed on *AMOS 19* (Shiftan, Outwater & Zhou 2008).

Analysis and results

In summary, the majority of the respondents were male participants (54.2%), whilst 45.8% of the respondents were female participants. The average age of the participants was 25.35 years, with a standard deviation of 7.977. This is not surprising as *Uni-link* customers are predominantly students. Of the student respondents, 97.9% stated their university as the University of Southampton whilst 0.4% indicated that they studied at Southampton Solent University (showing a strong association of the *Uni-link* brand with the University of Southampton). The purpose for service utilisation is shown in Table 3. The most common needs driving the utilisation of the service appeared to be 'shopping' (32.1%) and 'social/leisure/visiting/recreation' (30.3%). Our interpretation of the low responses in terms of 'Travel to/ from uni' may relate to the fact that data were gathered in June (near the end of term).

1.We were conscious that some respondents may not notice the questionnaire continued on the flipside; for this reason, we distributed the questionnaire upside down, thus forcing the respondents to flip the questionnaire over.

TABLE 3: Purpose for service utilisation.

Data	Most common needs driving the utilisation of the service	Frequency	%	Valid %	Cumulative %
Valid	Travel to/from uni	133	15.7	15.9	15.9
	Personal-medical	22	2.6	2.6	18.5
	Talking/collecting someone	11	1.3	1.3	19.8
	Travel during Uni	15	1.8	1.8	21.6
	Travel to/from work	102	12.0	12.2	33.8
	Taking/collecting children from school	1	0.1	0.1	33.9
	Shopping	269	31.8	32.1	66.1
	Social/leisure/visiting/recreation	254	30.0	30.3	96.4
	Other	30	3.5	3.6	100.0
	Total	**837**	**98.8**	**100.0**	**-**
Missing	System	10	1.2	-	-
Total	-	**847**	**100.0**	**-**	**-**

Structural equation modelling

The structural equation model

All variables ascertained for the modelling are in ordinal measurement because of the labelling on a five-point Likert scale. More specifically, only those variables are taken into account which asked about the overall perceptions of *Uni-link*'s services in general, rather than about the bus service on the day of the bus journey. The model is calibrated with the specialist statistics software *AMOS 19*. The data violate normality, which might cause a poor fit but also support or identify expected directions of parameter estimates (Andreassen 1995). Still, normality and continuous-scale measurements are assumed for further analysis, as Pallant (2010) states that, in case of nonnormality, the results are only slightly affected when analysing a large data set. Maximum likelihood is used as the estimation method, which is the default procedure in *AMOS* and used by 'the majority of the marketing studies' (Andreassen *et al*. 1995:50). The aim is the construction of a hypothetical model that formulates the relationships between the aspects of the phenomenon of *Uni-link*'s customer satisfaction. This abstract creation is supposed to reveal the theoretical phenomenon that cannot be observed directly.

Initial structural equation model

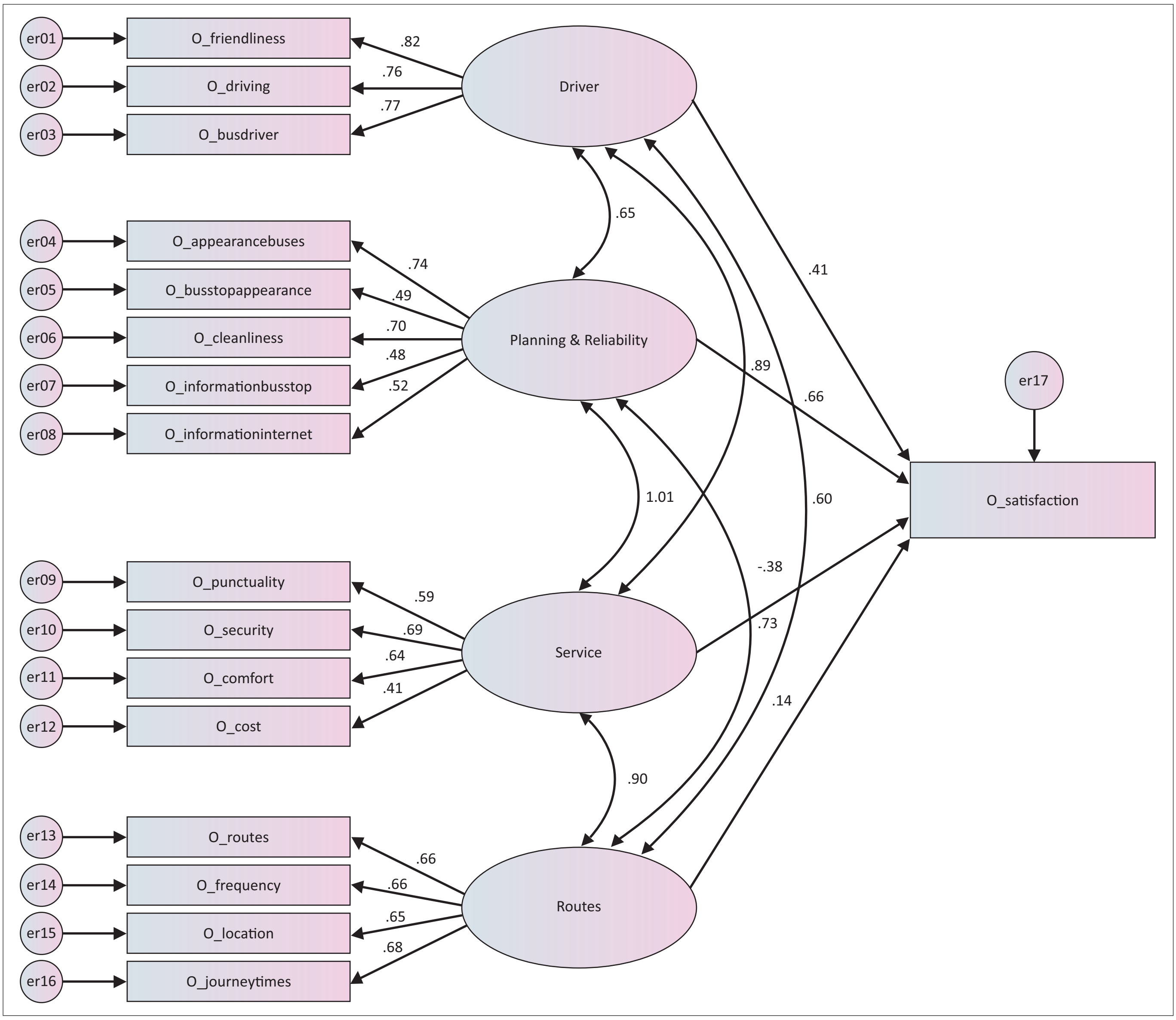
As our two research questions fundamentally involved the establishment of complex relationships, we employed SEM (Shah & Goldstein 2006). The SEM we propose seeks to combine observed variables into related superior service quality areas. The initial SEM depicts four different service quality areas which summarise the assessed variables that are largely drawn from earlier work by Andreassen (1995) and Eboli and Mazzulla (2007). Figure 1 shows the relationships between the four different service quality areas and overall customer satisfaction that are articulated in the SEM whilst Table 4 shows the constructs (service quality areas) and the variables (items) of the four different service quality areas.

The rectangles on the left of Figure 1 are the 16 variables that were assessed in section C of the questionnaire. They are observed variables (as they are directly measured on a five-point Likert scale) and determine the ellipses connected to them. Accordingly, the ellipses represent the four different service quality areas, which are unobserved variables in the model. In the figure, the path coefficient estimates are indicated as standardised values. The standardised values are chosen in this case to simplify the comparisons amongst themselves (Anderson *et al.* 2010). In the structural equation model, the construct *Planning and Reliability* shows the strongest effect on *O_satisfaction*. This is indicated by the value in the middle of the arrow, which is 0.66. According to the model, the second strongest effect comes from the construct *Driver*, that is 0.41. The construct *Routes* has a weaker effect on *O_satisfaction* with 0.14. All those values are positive; thus, higher satisfaction levels in the service quality areas would lead to a higher overall satisfaction. The difference of the values indicates the strength of the effects of the different service quality areas on *O_satisfaction*.

The constructs were tested for their internal reliabilities to examine whether the included items, combined, represent a consistent measure. In this respect, the values of Cronbach's coefficient alpha (Cronbach 1951) are shown in Table 5.

The Cronbach's alpha (α) values range between 0.618 (construct *Service*) and 0.824 (construct *Driver*). For basic research, Nunnally (1967) suggests Cronbach's alpha values of above 0.5 (this is later raised to 0.7; see Nunnally 1978). In terms of *Goodness of fit*, which measures how well the hypothesised model fits the sample data, possible indices range from zero (0) to 1.0, whereby values close to 1.0 imply a good fit of the model (Joreskog & Sorbom 1993). The values of the *Goodness of fit* indices of the initial model are stated in Table 6. For the comparative fit index, Hu and Bentler (1999) considered a value > 0.95 as representative of a model with a good fit.

Based on the Goodness-of-fit index (GFI) and Adjusted-goodness-of-fit index (AGFI) values of 0.913 and 0.879, respectively, it can be concluded that the hypothesised model fits the sample data well. Also the comparative fit index value suggests that the model fit is adequate. In terms of the *Path coefficients* of this initial model, the standardised path coefficients of the initial model were chosen to simplify the comparisons amongst themselves (see Anderson *et al*. 2010). In the initial structural equation model (with standardised estimates), the construct *Planning_Reliability*



Source: Authors' own creation; IBM SPSS Amos

FIGURE 1: Initial structural equation model (with standardised estimates).

TABLE 4: Variable 'purpose'.

Service quality area or construct	Underlying variables	Definitions
Driver	*O_friendliness*	Friendliness of bus driver
	O_driving	Driving of bus driver
	O_busdriver	Overall satisfaction with bus driver
Planning and Reliability	*O_appearancebus*	Appearance of buses
	O_busstopappearance	Appearance of bus stops
	O_cleanliness	Cleanliness of buses
	O_informationbusstop	Information at bus stops
	O_informationinternet	Information on the Internet
Service	*O_punctuality*	Punctuality
	O_security	Feeling of security
	O_comfort	Comfort
	O_cost	Cost
Routes	*O_routes*	Routes
	O_frequency	Frequency
	O_location	Location
	O_journeytimes	Journey times

has shown the strongest effect on *O_satisfaction* (0.66). The construct *Routes* has a weaker effect on *O_satisfaction* (0.14), implying that higher satisfaction levels in the service quality areas would lead to a higher overall satisfaction. The difference of the values indicates the strength of the effects of the different service quality areas on *O_satisfaction*. On the account that the negative effect of the construct *Service* on overall satisfaction is doubtful, the construct *Service* would imply that a high satisfaction level of the service quality could lead to a lower level of overall satisfaction with *Uni-link*'s bus service. This explanation may, however, need further investigation as there is very limited work describing how a negative direction in a service quality area may increase the overall customer satisfaction. Furthermore, the significance levels are low for the effects of the constructs *Service* and *Routes* on *O_satisfaction* at a p-value < 0.05.

TABLE 5: Internal reliability (initial model).

Construct	Number of items included	Cronbach's alpha (*α*)
Driver	3	0.824
Planning and Reliability	5	0.729
Service	4	0.618
Routes	4	0.759

TABLE 6: Goodness of fit indices initial model.

Index	Value
Goodness of fit index	0.913
Adjusted goodness of fit index	0.879
Comparative fit index	0.902

The analysis of the initial model (Table 7) shows that there is room for improvement and modifications, even though we found compelling values in terms of the *Goodness of fit* indices. However, the initial model does not seem to replicate customer satisfaction correctly; therefore, it is modified and an improved final model is analysed in the next subsection.

Final structural equation model

In the initial model, the variable Cost (*O_cost*) was included as one of the four underlying variables of the 'service' construct. In the final model, which is shown as Figure 2, *O_cost* is not included in any construct but has the function of a moderating variable as it influences the other constructs. The assumption of the moderating impact of cost on service quality is made based on earlier studies. For example, Sharma (2003) explicitly identifies cost as an independent moderator in customer–service–provider relationships. The model was amended because the construct 'service' was deleted as a result of the negative effect it had on the model because of generally lower model parameter estimation and significance levels (see Table 7). However, we made a decision not to drop the higher ranking individual attributes, of *O_security, O_comfort* and *O_punctuality*, instead choosing to move *O_security* and *O_comfort* to another closely aligned service quality area, *Planning_Reliability*. The modification of the initial model led to the final model described above and is shown in Figure 2, with improved values.

As the attribute *O_punctuality* appeared by definition more aligned to 'Routes', this was removed as well. The remaining three constructs and the variables are shown in Table 8.

In our *Internal test of reliability* of the final model, Cronbach's coefficient alpha (α) values were calculated to measure the level of agreement between the variables (Table 9).

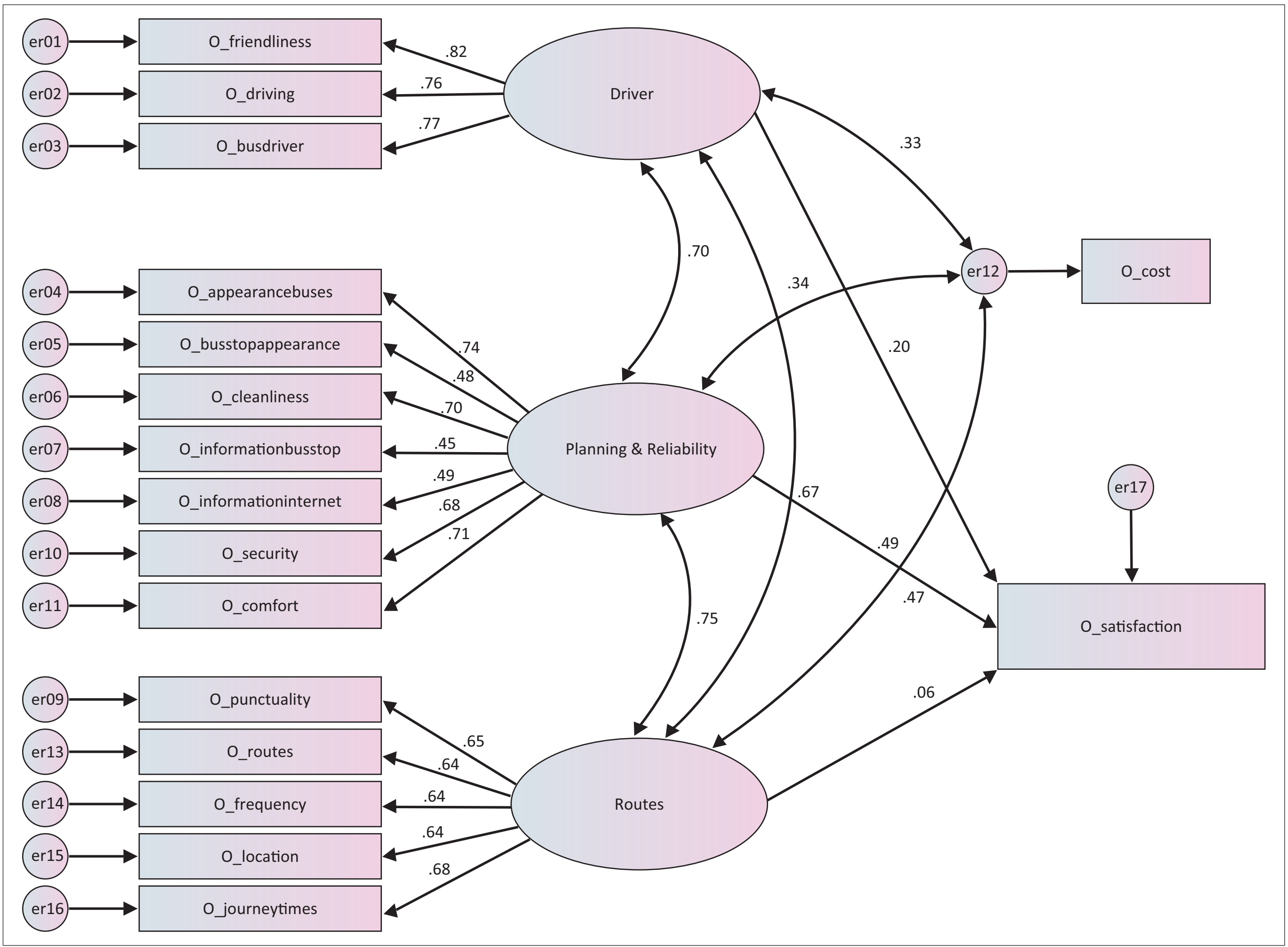
This time, all Cronbach's coefficients have values ≥ 0.7, which are scattered around 0.8. This is indicative of good internal consistence and reliability (see Nunnally 1978). Analysis of the *Goodness of fit* indices (Table 10) shows that the indices of the final model slightly improved over those of the initial model (as shown in Table 6). The values are spread around 0.9, which represents a good model fit of the sample data (see Joreskog & Sorbom 1993).

When we examined the path coefficients of the final model, we observed that all three constructs – *Driver*, *Planning_Reliability* and *Routes_Service* – now indicate a positive relationship with *O_satisfaction*. The construct *Planning_Reliability* has the strongest effect on *O_satisfaction*, with a standardised value of 0.49. However, *Routes_Service* shows a weak impact on *O_satisfaction* with a value of 0.06. *Routes_Service* on the other hand has a latent variable with 0.47, whilst *Planning_Reliability* and *Driver* show 0.34 and

TABLE 7: Initial model attribute estimation and significance levels.

Underlying variables	Service quality area	Estimate	Standardised estimate	S.E.	C.R.	*P*
O_busdriver	← Driver	1.000	0.77	-	-	-
O_driving	← Driver	1.040	0.76	0.051	20.533	***
O_friendliness	← Driver	1.037	0.82	0.048	21.838	***
O_cleanliness	← Planning_Reliability	1.000	0.70	-	-	-
O_busstopappearance	← Planning_Reliability	0.728	0.49	0.059	12.233	***
O_appearancebuses	← Planning_Reliability	0.977	0.74	0.055	17.778	***
O_informationbusstop	← Planning_Reliability	0.763	0.48	0.064	11.939	***
O_informationinternet	← Planning_Reliability	0.805	0.52	0.062	12.899	***
O_comfort	← Service	1.000	0.64	-	-	-
O_security	← Service	0.990	0.63	0.061	16.251	***
O_punctuality	← Service	1.083	0.59	0.070	15.399	***
O_cost	← Service	0.935	0.41	0.085	11.038	***
O_frequency	← Routes	1.000	0.66	-	-	-
O_routes	← Routes	0.938	0.66	0.063	14.912	***
O_location	← Routes	0.908	0.65	0.061	14.790	***
O_journeytimes	← Routes	1.020	0.68	0.066	15.347	***
O_satisfaction	← Service	-0.557	-0.38	0.297	-1.877	.061
O_satisfaction	← Planning_Reliability	0.854	0.66	0.162	5.269	***
O_satisfaction	← Routes	0.167	0.14	0.110	1.512	.131
O_satisfaction	← Driver	0.447	0.41	0.101	4.444	***

S.E., standard error; C.R., critical ratio; *P*, *p*-value.
***, *p*-value is less than 0.001



Source: Authors' own creation; IBM SPSS Amos

FIGURE 2: Final structural equation model (with standardised estimates).

TABLE 8: Service quality areas of the final model.

Service quality area	Underlying variables
Driver	Friendliness of bus driver (*O_friendliness*)
	Driving of bus driver (*O_driving*)
	Overall satisfaction with bus driver (*O_busdriver*)
Planning_Reliability	Appearance of buses (*O_appearancebus*)
	Appearance of bus stops (*O_busstopappearance*)
	Cleanliness of buses (*O_cleanliness*)
	Information at bus stops (*O_informationbusstop*)
	Information on the Internet (*O_informationinternet*)
	Security feeling (*O_security*)
	Comfort (*O_comfort*)
Routes_Service	Punctuality (*O_punctuality*)
	Routes (*O_routes*)
	Frequency (*O_ frequency*)
	Location (*O_location*)
	Journey times (*O_ journeytimes*)
Moderating variable	Cost (*O_cost*)

TABLE 9: Internal reliability (final model).

Construct	Number of items included	Cronbach's alpha
Driver	3	0.824
Planning_Reliability	7	0.802
Routes_Service	5	0.787

TABLE 10: Goodness of fit indices final model.

Index	Value
Goodness of fit index	0.915
Adjusted goodness of fit index	0.884
Comparative fit index	0.902

0.33, respectively. The significance levels and *unstandardised* estimates of the final model are shown in Table 11.

In Table 10, we observe that all path coefficients are significant at a *p*-value < 0.05, except the impact of *Routes_Service* on *O_satisfaction*. The overall measure for the construct *Planning_Reliability* (*A_ Planning_Reliability*) in Table 11 shows a mean value of 1.9288, followed by *A_Routes_Service* (2.0091) and *A_Driver* (2.0156). Analysis of variance is now used to test if the level of crowdedness on the bus routes shows significant differences in the means of the overall measures *A_Driver*, *A_Planning_Reliability* and *A_Routes_Service*. Summations of the underlying variables are shown in Table 12.

The calculated means follow in Table 13.

Crowdedness and service quality areas: The level of crowdedness on the bus (from 5 = 'very crowded' to 1 = 'very uncrowded') was used to obtain an estimate of the

TABLE 11: Final model attribute estimation and significance levels.

Underlying variables	Service quality area	Estimate	Standardised estimate	SE	C.R.	*p*
O_busdriver	← Driver	1.000	0.77	-	-	-
O_driving	← Driver	1.026	0.76	0.051	20.315	***
O_friendliness	← Driver	1.036	0.82	0.048	21.767	***
O_cleanliness	← Planning_Reliability	1.000	0.70	-	-	-
O_busstopappearance	← Planning_Reliability	0.708	0.48	0.058	12.141	***
O_appearancebuses	← Planning_Reliability	0.984	0.74	0.053	18.412	***
O_informationbusstop	← Planning_Reliability	0.714	0.45	0.063	11.404	***
O_informationinternet	← Planning_Reliability	0.764	0.49	0.061	12.513	***
O_security	← Planning_Reliability	0.943	0.68	0.055	17.046	***
O_comfort	← Planning_Reliability	0.980	0.71	0.055	17.756	***
O_frequency	← Routes_Service	1.000	0.64	-	-	-
O_routes	← Routes_Service	0.940	0.64	0.064	14.693	***
O_location	← Routes_Service	0.916	0.64	0.063	14.644	***
O_journeytimes	← Routes_Service	1.040	0.68	0.068	15.339	***
O_punctuality	← Routes_Service	0.993	0.65	0.067	14.867	***
O_satisfaction	← Routes_Service	0.073	0.06	0.072	1.016	0.310
O_satisfaction	← Planning_Reliability	0.639	0.49	0.083	7.695	***
O_satisfaction	← Driver	0.221	0.20	0.055	4.010	***

S.E., standard error; C.R., critical ratio; *p*, *p*-value.
***, *p*-value is less than 0.001

TABLE 12: New overall measures.

Service quality area	Underlying variables	New overall measure
Driver	Friendliness of bus driver (*O_friendliness*)	A_Driver
	Driving of bus driver (*O_driving*)	
	Overall satisfaction with bus driver (*O_busdriver*)	
Planning_Reliability	Appearance of buses (*O_appearancebus*)	A_ Planning_Reliability
	Appearance of bus stops (*O_busstopappearance*)	
	Cleanliness of buses (*O_cleanliness*)	
	Information at bus stops (*O_informationbusstop*)	
	Information on the Internet (*O_informationinternet*)	
	Security feeling (*O_security*)	
	Comfort (*O_comfort*)	
Routes_Service	Punctuality (*O_punctuality*)	A_Routes_Service
	Routes (*O_routes*)	
	Frequency (*O_frequency*)	
	Location (*O_location*)	
	Journey times (*O_journeytimes*)	

TABLE 13: Means of overall measures.

Overall measure	Mean
A_Driver	2.0156
A_ Planning_Reliability	1.9288
A_Routes_Service	2.0091

space available to passengers (a more meaningful means of comparison of crowdedness on double-decker and single-decker buses). The means of the service quality areas and the different levels of crowdedness are shown in Table 14.

For the service quality areas grouped by crowdedness, the analysis of variance (ANOVA) shows a statistically significant difference at *p*-value < 0.05. The statistically significant differences exist in the service quality area *A_Planning_Reliability* and between the crowdedness levels 4 and 1, as well as 4 and 2 (*Eta squared* = 0.022). Further, a statistically significant difference can be found in the service quality area *A_Routes_Service* between the crowdedness levels 3 and 1 as well as 3 and 2 (*Eta squared* = 0.017).

Routes/frequency and service quality areas: The ANOVA (Table 15) found a statistically significant difference at the *p*-level < 0.05 for *A_Driver* for the different routes as well as *A_ Planning_Reliability* for the different routes with *Eta squared* effect sizes of 0.016 and 0.014, respectively.

Discussion

The outcome of the SEM analysis is that three different service attributes – *Driver*, *Planning_Reliability* and *Routes_Service* – are seen to significantly impact customer service satisfaction, thus addressing the first research question (*What service attributes significantly influence the satisfaction of customers using bus services?*). Our findings are in line with extant literature not only on the moderating role of cost on services (see Sharma 2003), but also on the role that frontline employees in campus bus transportation service providers play in the customer's service satisfaction (Ellinger, Keller & Baş 2010). In addition, also in line with existing literature (Diana 2012; Hensher *et al*. 2003; Salicru, Fleurent & Armengol 2011), it was expected that variables such as frequency, punctuality and journey times, all of which measure the construct *Routes_Service,* would have a high impact on customer satisfaction; however, this construct, that is *Routes_Service,* had a low standardised path coefficient of 0.06. On the other hand, in line with earlier studies (Eboli & Mazzulla 2011; Politis *et al*. 2010; Wall & McDonald 2007), *Planning_Reliability* has a high impact on customer satisfaction. In the case of our model, this construct had a path coefficient of 0.49.

It might be the case that the variables that measure *Routes_Service,* that is punctuality, routes, frequency, location of bus stops and journey times, are hygiene factors, which do not

TABLE 14: Means of crowdedness and service quality areas.

Service quality area	Area	*N*	Mean	SD	SE
A_Driver	1	131	2.1069	0.65276	0.05703
	2	221	2.0920	0.69564	0.04679
	3	189	1.9330	0.71059	0.05169
	4	137	1.9270	0.64133	0.05479
	5	93	2.0036	0.67297	0.06978
	Total	**771**	**2.0156**	**0.68295**	**0.02460**
A_ Planning_Reliability	1	131	2.0305	0.41214	0.03601
	2	221	1.9942	0.45935	0.03090
	3	189	1.8874	0.57005	0.04147
	4	137	1.8363	0.53831	0.04599
	5	93	1.8510	0.48533	0.05033
	Total	**771**	**1.9288**	**0.50328**	**0.01813**
A_Routes_Service	1	131	2.1115	0.50056	0.04373
	2	221	2.0796	0.53952	0.03629
	3	189	1.9132	0.64055	0.04659
	4	137	1.9679	0.65135	0.05565
	5	93	1.9527	0.65832	0.06826
	Total	**771**	**2.0091**	**0.59876**	**0.02156**

TABLE 15: Routes and service quality areas.

Service quality area	Route	*N*	Mean	SD	SE
A_Driver	U1	529	2.0668	0.69036	0.03002
	U2	129	1.8320	0.61678	0.05430
	U6	113	1.9853	0.68775	0.06470
	Total	**771**	**2.0156**	**0.68295**	**0.02460**
A_Planning_Reliability	U1	529	1.9533	0.51269	0.02229
	U2	129	1.7951	0.43735	0.03851
	U6	113	1.9671	0.50867	0.04785
	Total	**771**	**1.9288**	**0.50328**	**0.01813**
A_Routes_Service	U1	529	2.0265	0.61550	0.02676
	U2	129	1.9442	0.56788	0.05000
	U6	113	2.0018	0.55129	0.05186
	Total	**771**	**2.0091**	**0.59876**	**0.02156**

necessarily lead to customer satisfaction. Regarding the underlying case of customer satisfaction, it might be that those variables are important, even though this is not directly implied by our results. The service quality area, *Planning_Reliability* showed the greatest impact on customer satisfaction (0.49) amongst the three constructs. This emphasises the importance of the underlying variables that contribute most to the construct; namely, appearance of the bus (0.74), cleanliness (0.7), security feeling (0.68) and comfort (0.71). Those variables all aim to ascertain customers' perceptions on the buses, that is how passengers perceive the overall experience of their bus journey.

In terms of the second research question (*Does customer satisfaction vary depending on bus transport route and frequency?*), the ANOVA showed that there were statistically significant differences between the service quality areas and bus routes and frequency. Nevertheless, the effect size measured by the *Eta squared* indicated small effects on the difference in means. Pallant (2010) argues that even though some results of the ANOVA might indicate statistical significance, the interpretation can be impractical when mean scores only differ slightly. With a large sample, small differences in mean scores might become statistically significant, although the difference between the groups has only limited practical meaning (Pallant 2010).

Conclusion

The study examined the determinants of satisfaction with campus bus transportation. The research reflected scholarly interest on the selection of modes of transport service, but specifically that related to buses – a mode of transport characterised by its popularity. Within this context, the study also explored possible implications of satisfaction with such campus bus transportation for service quality. The study is of particular relevance to logistics research for a number of reasons including the fact that universities and other institutions of higher education are increasingly embracing the concept of campus shuttle services in order to reduce costs – for example, those relating to parking operations. More specifically, Farzaneh *et al*. (2009:vi) suggest that such strategies 'have positive impact on the liveability of the campus and surrounding neighbourhoods and can provide substantial fiscal benefits for the university…'. Traditionally, worldwide, the transportation systems of most universities had been predominantly car-dependent. However, in light of emerging concerns relating to safety, noise and pollution, and the demand for land required to build and operate parking facilities, mainly for single-occupancy vehicles, the operation of 'dedicated' campus bus transportation (shuttles) has become increasingly popular. Taking this into consideration, this study presented two research questions: (1) *What service* *attributes significantly influence the satisfaction of students using campus bus services*? and (2) *Does customer satisfaction vary depending on bus transport route and frequency?*

In terms of the first research question (*What service attributes significantly influence the satisfaction of students using campus bus services*?), based on the outcome of the SEM analysis, we found that three different service attributes – *Driver*, *Planning_Reliability* and *Routes_Service* – significantly impacted upon customer service satisfaction with campus bus transportation. In terms of the second research question (*Does customer satisfaction vary depending on bus transport route and frequency?*), overall, results from our study suggested that customer satisfaction varied depending on bus transport route and frequency.

The study also has considerable implications – in particular, noting that a fundamental objective of services theory focuses on developing an appreciation of not only the service experience of customers but also the way that those experiences are evaluated (Buffa & Ross 2011).

As earlier highlighted, scholarship emphasises that positively evaluated service experiences are primary drivers of customer loyalty and trust in high-contact service scenarios, such as bus transportation. But for what purposes can customer service experience data be used? Consider that, because of contractual guarantees, as a service established to predominantly cater for university students (and staff), arguably, the *Uni-link* service may be perceived to operate a near monopoly over campus bus services in Southampton. The key implication for managers is that the operators of the *Uni-link* service in this case lack obvious competitive pressures to improve service satisfaction and performance. The danger here is that one of the managers (or more than one) may succumb to complacency with respect to service quality, which may damage trade-off decisions where cost reduction takes priority over maintaining and improving the quality of service provided to its customers. Hence, the firm might usefully manufacture their own clear incentives. A first step is to conceive of service improvement as something more than reactive fire-fighting in response to dips in performance on explicitly stated and identified customer experience attributes. One way forward for the operators of the *Uni-link* service is to focus more on one, one additional very specific measure of service satisfaction, 'customer accountability'. Through the provision of transparent customer service indicators, derived from and improved through consultation with customers themselves, the service operator might use customer discipline as a substitute to clearly manifest market discipline in driving forward enhanced *service quality improvements. This, though, would hinge upon the determination of Uni-link* management to report to its newly constituted 'passenger panels' with a clear mandate to demonstrate quality improvement to them (dependent on how the panels interpret 'quality') instead of simply using the panels to determine isolated 'local' incidents and issues requiring isolated managerial responses. It thus appears that an opportunity for further study may involve examining bus services under different market conditions. One such condition may involve full competition along *Uni-link*'s preferred routes. Such studies will also be beneficial to scholars interested in understanding which service attributes play critical roles under different service conditions.

Whilst transport services operating in a fully competitive environment may seek to utilise service evaluation data to attract and retain customers by improving the efficiency of internal processes and operation, one could argue that, for firms offering dedicated services such as the operators of *Uni-link*, the main focus on service provision may need to switch from *service* evaluation to *customer* evaluation under conditions of improved transparency and accountability to customers. However, crucially, service evaluation data and processes are only useful to the extent that they provide an evidence base for managerial action to enhance or at least meet customer satisfaction expectations. Fundamentally, this entails focusing on weaknesses rather than the strengths that managers may prefer to focus on for purposes of performance evaluation. Of course, in a service environment established to predominantly service university students (and staff), such as the *Uni-link* services, the reality is that it may prove challenging to measure the hotspots of negative affect that influence customer satisfaction for a number of reasons including, for example problems where highly vocal individuals influence group discussions on customer panels. Another issue is that managers may come under pressure to also accede to different expectations of wider stakeholder groups (which in this case comprises students, the University and the Local Council). Conceivably, a range of stakeholder opinions might vary by individual bus route, which makes it important to privilege customer data based on direct service experiences rather than on general impressions of overall service levels.

Our research does show some general trends; yet the insight these trends yield of services at the individual route level ought to be demonstrated rather than assumed. Earlier studies that focused on service delivery challenges in the public sector (see Kelly 2005) suggest that, instead of engaging with these issues, service delivery managers are likely to 'focus their attention on internal measures of service delivery and not on external measures of value creation from consumers' (Kelly 2005:77). However, Kelly (2005) further suggests that service delivery decisions are best made where managers are able to harness inputs from customers who have been reasonably acquainted with information, which then enables them to conduct their own service quality assessments. Taking stock of Kelly's observations, we suggest that, if they are to rise to their service delivery challenges and so maintain or improve their market positions, bus transportation service providers that predominantly service university students (and staff) such as *Uni-link* need to (re) consider the interrelationship between risk of financial loss and service quality. Clearly, competitiveness is a function of service quality, and so the mitigation of risk of financial loss (particularly in near-service environments where specific competitive threats are not readily manifest and therefore not readily amenable to individually tailored risk-control activities) entails the general pursuit of quality improvement. Quality improvement, of course, entails exploiting opportunities for service innovation. However, as with all innovations the effect of quality improvement in this case is not automatically to reduce risk, but rather to modify the campus bus transportation service provider's *exposure* to risk. After all, innovations can be unsuccessful – they can be cost-ineffective and may carry reputational penalties that are difficult to quantify in financial terms. Amongst innovating dedicated campus bus transportation service providers, innovations often have both their promoters (who emphasise risks associated with failing to innovate) and their detractors (who emphasise risks brought by innovation) (see Marshall & Ojiako 2010). Given the uncertain and trial-and-error nature of service innovation, then, it makes sense to widen the service providers' 'innovation debate' by maybe having customer panels 'plugged in' as *consultees* to service innovation processes. This could be undertaken on both an *ex ante* basis and an *ex post* basis to service innovations, which may include actually changing the entire competitive landscape that presents students with alternative options when they need to shuttle on and off campus. One such approach may include service providers such as *Uni-link* collaborating with the University to invest more heavily in embracing blended learning. For example, increased use of Virtual Learning Environments may reduce the need for students to have to be physically present on campus at specific times. Its effect would be to attune the service provider on an ongoing basis to the effects of service innovations upon customer experiences of service quality, in whatever terms customers choose to frame their experiences. In effect, customer-dominant logic can then exert a positive influence on business logic.

In conclusion, the paper provides useful insight into the range of customer experience factors that may be relevant with respect to any given service innovation, but we stress that a viable understanding of customer experience, useful for a healthy customer–manager debate that can help steer service innovation over time, can only emerge where there is effective and ongoing *communicativity* and dialogue between customers and managers at the interface between customer logic and business logic. In sum, the contributions of the paper not only lie in undertaking the examination of service attributes and their influences on customer satisfaction in campus bus transportation but also in emphasising that managerial attention to service user experiences in predominantly dedicated transportation services alone will fail to deliver competitive success. Instead, management should invest additional effort to significantly enrich service by paying greater attention to the interface between risk of financial loss and service quality. We posit that our findings are valuable as *promptuaries* or 'touchstones' which can be used to encourage customers, for example on the *Bluestar* (another bus company) customer panels, to offer better informed and more nuanced views of their customer experiences. For example, if presented with our findings, customers would be able to comment on whether existing metrics seem adequate, and they may simultaneously be disciplined by findings based on these metrics, thus being more cautious and realistic when purporting to represent the general views of customers. The effect of this is likely to be benign, because it will help localise discussions at the level of actual customer experiences and the (customer) emotions they evoke.

As expected, this study was not without limitations. Four main limitations are identified. Firstly, examining the data shows that the *actual* number of bus passengers going to the university was 133 out of 847, representing approximately 15% of the *Uni-link* service. A possible reason for this lower-than-desired sample could be related to the fact that the data were gathered towards the end of term (which ended on 18 June), at a time when the majority of students were taking their examinations. Another possible reason could be that a lower-than-anticipated number of students utilise the service. Thus, to improve both response rates, future studies could focus on not only undertaking the collection of data perhaps in mid-term (when most students are likely to be on campus) but by conceptualising the study in a much broader way – for example not limiting interest to students. For example, it will be of interest to gain an understanding of why members of the wider public will choose to utilise such services (in the absence of routing considerations). Secondly, by assuming homogeneity in service provision of bus services, although taking specific determinants of satisfaction such as routing into consideration (in the design of the questionnaire), the future possible impact of future *direct* competition from other bus operators was not taken into consideration in the current study. Such consideration will be imperative in future studies. The third limitation relates to the grouping of the variables (particularly in the service quality areas of the final SEM model). The attribute categorisation was driven by shared interpretation of meaning or definition by the authors. For future studies, a more 'scientific' approach to grouping is recommended to ensure greater model robustness. The final limitation relates to an acknowledgement that the study did not undertake any assessment of the respondents' cognitive mode (process of thought), although the literature (see Amit & Sagiv 2013; Church 1997) does infer that perceptions are influenced by such mental modes. Thus, in reality, the study only captured the views of respondents that were *explicitly* expressed. Fisk and Haase (2011) highlight the importance of implicitly held perceptions in decision making. Again, this limitation presents considerable opportunities for future research directions.

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Competing interests

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Authors' contributions

F.C., U.O., M.C. A.M. all made equal conceptual contributions that led to the development of this article.

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