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Abstract: The purpose of this paper is to develop measurement scales for customer contact in a technology-generated context. The authors adapted the scales of Froehle and Roth (2004), by following a systematic scale adaptation and development process. The adapted scales were tested for psychometric properties and refined by building measurement models using PLS-SEM. The authors found it necessary to revise Froehle and Roth's (2004) original items in most of the scales. After testing, the "attitude towards the episode" scale was dropped and remaining nine scales, retained. The scales will be useful to future researchers on online shopping to advance their research. The scales can be tested and validated with data from multiple empirical contexts and adapted to those contexts as necessary. Future studies must examine path relationships between belief, attitude and intention constructs. The adapted scales can be useful to practitioners in the domain of online shopping, to measure the beliefs, attitudes and intentions of their customers. Potential beneficiaries include service providers, service designers, industry associations as well as regulators in the government. The overarching contribution of this paper lies in developing scales pertaining to the online shopping context of technology-generated customer contact. The paper has simultaneously addressed two relatively less attended areas of research on service operations – the role of technology in customer contact and measurement of customer contact.

Keywords: Customer contact, Measurement scales, Online shopping, Technology, Service operations, e-Commerce

Measurement Scales for Technology-Generated Customer Contact

Introduction

In a paper in the *Harvard Business Review*, Chase (1978) first introduced customer contact to service operations management as the degree to which the customer is in direct contact with (that is, physically present in) the system, relative to the total service creation time. Over the ensuing period of nearly four decades, the term has evolved from one that merely captures the customer's physical presence, to a multi-dimensional construct. Academic research has identified and discussed other aspects of customer contact such as customer-provider interaction and service customization (Schmenner, 1986; Mersha, 1990), customer input (Wemmerlov, 1990; Sampson and Froehle, 2006), intimacy and richness in the interaction (Kellogg and Chase, 1995) and frequency of visit and revisits needed to complete the service (Dietz *et al*., 2004; Mayer *et al*., 2009; Lin and Hsieh, 2011).

Customer contact has also been discussed from multiple perspectives. These include its applicability to the classification of services (Wemmerlov, 1990; Patterson and Cicic, 1995; Noone *et al*., 2012; Apte et al., 2010), the design of service systems (Metters and Vargas, 2000; Oh and Teo, 2010; Ponsignon et al, 2011; Zomerdijk and de Vries, 2007), and the role of high contact in customer satisfaction and/or effectiveness (e.g. Tansik, 1990; Mersha, 1990, Goldstein, 2003; Lin and Hsieh, 2011).

Notwithstanding all this, there is a scarcity in customer contact research in two distinct areas. The first pertains to the role of technology in customer contact. Only a few studies have explicitly recognized that customer contact does not necessitate the customer's physical presence in the service system but can also happen through the support or mediation of technology, and suggested ways to study the concept in technology-related contexts. Most of these studies are subsequent to the development of internet-based services since the mid-1990s. The early literature here includes Walley and Amin (1994), whose framework mapped services along technology/customer dimensions, and Apte and Mason (1995), who referred to technology-mediated contact as 'symbolic contact' and analyzed its role in the outsourcing of information related services. Later studies include Froehle and Roth (2004), who suggested five distinct archetypes of customer contact in relation to technology and Theotokis *et al*. (2008), whose term 'customer-technology' contact refers to the level of customer-technology interaction during service processes. Apart from a few such studies, little research has paid attention to customer contact in service contexts facilitated by the fast growing internet and mobile computing technologies.

The second pertains to the quantification and measurement of customer contact. One of the most elaborate attempts to measure customer contact was that of Kellogg and Chase (1995), who used multidimensional scaling, paired comparisons and content analysis to develop a regression model using data gathered by videotaping service episodes in hospitals. They suggested that customer contact be characterized in terms of three dimensions – duration, information richness and level of intimacy – and proposed that a single score be computed to assess the degree of contact during a service episode, as a weighted average of the three dimension scores. Later, Kellogg (2000) validated the model using three other sample groups.

Subsequently, Froehle and Roth (2004) developed measurement scales for customer contact in technology-mediated settings, using multiple constructs and a measurement model approach.

A few other studies have also measured customer contact/frequency of customer contact. Some of these used single-item scales (Mayer *et al*., 2009; Lin and Hsieh, 2011; Xu *et al*., 2006) and some, two-item scales (Dietz *et al*. 2004; Skaggs and Youndt, 2004; Skaggs and Galli-Debicella, 2012). An early attempt by Kimes and Mutkoski (1991) is also noteworthy, which measured time durations of different activities in a work sampling study in restaurants, and assessed customer contact as the proportion of time that a waiter spent interacting with the guest, of the total time involved in a service episode. However, apart from Kellogg and Chase (1995) and Froehle and Roth (2004), no study could be found that used methodical scale development pertaining to customer contact.

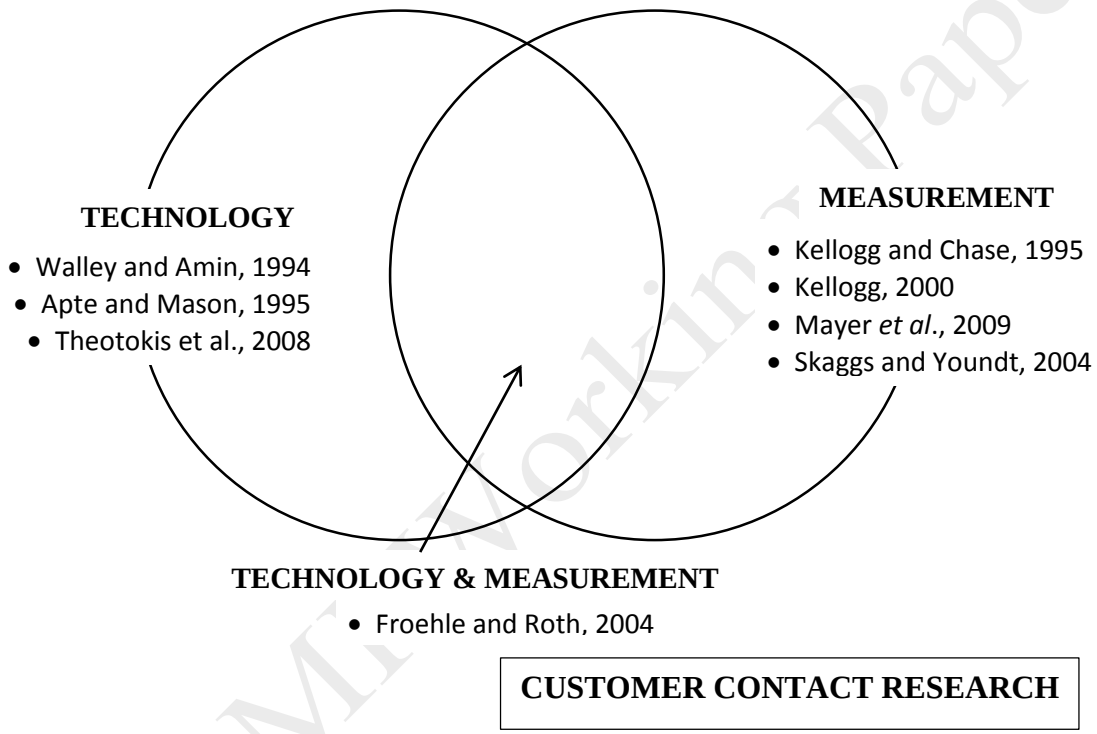

Figure 1: Research gap in which the current study is positioned

Our study is positioned in the gap created by the intersection of these two streams of customer contact research (see Figure 1). The aim of our study was to systematically develop measurement scales for customer contact in the technology-generated context of online shopping. Central to our study were the measurement scales developed by Froehle and Roth (2004) for a technology-mediated context. We adapted these scales to a technology-generated context.

Background

The Froehle and Roth study

Froehle and Roth's (2004) seminal contribution distinguished five conceptual archetypes of customer contact, based on the role played by technology in it. These were technology-free, technology-assisted, technology-facilitated, technology-mediated and technology-generated customer contact. Table 1 summarizes what these stand for and offers some common illustrations.

Table 1: Five conceptual archetypes of customer contact (Froehle and Roth, 2004)

No.	Type of customer contact	Description	Illustrations
1	Technology-free	the customer is in physical proximity of, and interacts with, a human service provider.	• a psychiatrist's in-office consultation with a patient. • a patient receiving a body massage at an Ayurvedic clinic.
2	Technology-assisted	the provider employs technology as an aid to improve the face-to-face contact, but the customer does not have access to it.	• an over-the-counter airline check-in. • a real-estate broker using a digital tool, while advising her client.
3	Technology-facilitated	both provider and customer have access to the same technology during face-to-face service encounters.	• an equity consultant using a slide presentation in a meeting with a client. • a cricket coach using a speed-o-meter while training fast bowlers.
4	Technology-mediated	customer and provider are not physically co-located, and interact through a technology medium.	• a voice telephone call. • Online instant messaging.
5	Technology-generated	human component of the service provider in the customer to provider encounter is entirely replaced by technology.	• a bank ATM. • an e-commerce website for online shopping.

Froehle and Roth focused on technology-mediated customer contact (TMCC) and identified ten constructs to characterize it. They drew support from multiple theoretical bases, which, apart from customer contact theory, also included the concept of media richness (Daft and Lengel, 1986; Daft *et al*, 1987), the service profit chain theory (Heskett and Schlesinger., 1994), the theory of reasoned action (Fishbein and Ajzen, 1975) and the theory of planned behavior (Ajzen, 1985; 1991). The theory of planned behavior, in particular, proposes that the beliefs of individuals shape their attitudes, and this in turn leads to the formation of intentions to perform (or to not perform) a behavior. In accordance with it, Froehle and Roth categorized the ten constructs into three domains, 'belief', 'attitude' and 'intention'. We briefly describe them here; a detailed description of each is given in Froehle and Roth (2004).

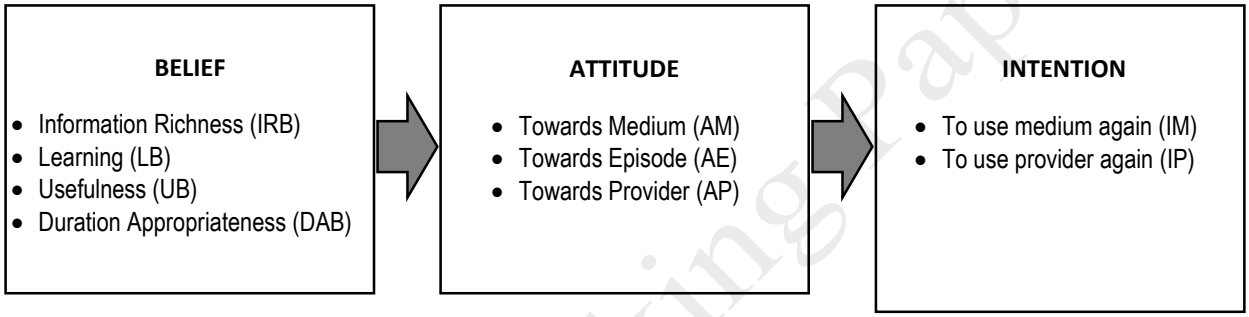

Figure 2: The ten-construct B-A-I framework (Froehle and Roth, 2004)

The belief domain has five of the ten constructs, as follows. Information richness belief (IRB) represents a customer's cognitive assessment of the complexity and vividness of the communication between the service provider and the customer during the episode. Duration appropriateness belief (DAB) has to do with whether a customer considers the time spent in a contact episode as appropriate to the context or not, while intimacy appropriateness belief (IAB) is the customer's assessment of the appropriateness of the level of intimacy. Learning belief (LB) is the assessment of the customer that he is learning something, in the course of the interaction with the medium. Usefulness belief (UB) is the customer's assessment that the episode has been useful or worthwhile. The attitude domain has three constructs, attitude towards the episode (AE), towards the medium of interaction (AM) and towards the service provider (AP). These represent the customer's favorableness or unfavorable-ness towards the episode, medium and service provider respectively. Finally the intention domain has two constructs, intention to use the medium again (IM) and to use the service provider again (IP), which respectively capture the customer's self-generated likelihood assessments that he may use the medium or the service provider again. Figure 2 depicts the three domain, ten-construct framework of TMCC as presented by Froehle and Roth (2004, pg. 4).

Using this framework and following a step-by-step empirical procedure, Froehle and Roth (2004) developed multi-item scales to measure the ten constructs and validated them with confirmatory factor analysis (CFA). Our study extends the work of Froehle and Roth by

adapting the scales to, and validating them in, the context of technology-generated customer contact (TGCC). We could not locate a study in the literature that has pursued a similar objective. TGCC manifests itself in several contemporary service settings, prominent among which is online shopping, or the purchase of goods and services using the internet. Developing robust and valid measurement scales to measure the same is important to advancing service operations theory.

Online shopping

Online shopping, a subset of the larger arena of electronic commerce (e-commerce), is a growing segment in the service sector across the world. In India, in particular, online shoppers were expected to increase from 20 million in 2013 to 40 million in 2016, a joint study by Assocham and Grant Thornton (Gadgets 360, 2015) has suggested. The study also estimated that the Indian e-commerce market would grow at a compound annual growth rate (CAGR) of 63 percent to reach US $ 8.5 billion in 2016 on the back of growth in the penetration levels of mobile and Internet and increased consumer demand (Gadgets 360, 2015).

Online shopping has the ability to provide instant communication, greater choice and more flexibility to customers, and at all times of the day (Kiang and Chi, 2001). Referring in particular to the growth of online shopping in India, Panda and Swar (2014) noted that many traditional store formats of retailers were entering into electronic retailing, and that with deeper penetration of the internet, online shopping has become an alternate way of purchasing goods. They also observed that non-metropolitan customers are likely to shop online for items not available in local stores, and that e-commerce retailers are increasingly willing to attempt to improve infrastructure in interior places, to increase their reach. Online shoppers typically have good internet access and the capability to make online payments.

Methodology

As this study was based out of India, we identified two sectors, where recent years have seen a significant growth in online shopping in India: travel and e-tailing. The latter involves purchasing retail items such as electronics, books, clothes and gifts online. According to Macquarie Equities Research (2014), travel and e-tailing have market shares of 71% and 16% respectively in the Indian e-commerce market. More importantly, these sectors are growing at compound annual growth rates of 59% and 32% respectively, indicating their importance in the e-commerce arena.

We decided to sample from the users of two well-known websites in India, one each in the sectors of travel and e-tailing. We used the Alexa Traffic Rank (Alexa, 2014), which is an indicator of a website's popularity amongst users. Popularity ranking is based on algorithms that consider the number of visitors, ease of viewers, stickiness of viewers and linkages to other websites. Among Indian websites, we found that the Indian Railways Catering and Tourism Corporation's (IRCTC) website (www.irctc.co.in) for travel was ranked 44 and the Flipkart (www.flipkart.com) website for e-tailing was ranked 7. These two websites held the best ranks in their respective segments and we chose them to sample for the study.

IRCTC and its website (www.irctc.co.in)

IRCTC was formed in 1999 and is a public sector enterprise under Ministry of Railways of the Government of India. One of the purposes for which it was set up was to promote and carry out online railway ticketing by offering ease and convenience of booking. As of November 2015, IRCTC had a database of more than 21 million consumers. In the financial year ending March 2014, it had revenues through online ticket sales of about Indian rupees 206 billion (US$ 3.1 billion), about 34% more than it had generated the previous year. Anticipating very rapid growth, the firm has recently enhanced its online ticketing capacity from 2000 tickets per minute to 7200 tickets per minute (Choudhury 2015).

IRCTC users seek a variety of information to facilitate planning and decision making, such as the railway stations at which to commence and terminate their journeys, the list of trains running between any two stations, the arrival and departure times at stations, the routes taken by different trains, seat/berth availability and refund rules in case of cancellation and channels for payment.

Flipkart and its website (www.flipkart.com)

Flipkart Online Services Pvt Ltd was set up by young Indian entrepreneurs Sachin Bansal and Binny Bansal, in 2007. Though operating largely in India, Flipkart is headquartered in Singapore. The enterprise began with the online retail of books, and subsequently expanded into a wide range of products such as consumer electronics, footwear, clothing for men, women and children, products for babies, sports gear, furniture and a wide range of home and kitchen appliances. In 2015, the firm declared that it had 45 million registered users, about 10 million daily visitors and over 30,000 registered sellers, and stated that it expected these numbers to grow exponentially (Indian OnlineSeller, 2015).

Flipkart users seek product information about range, variety, price and likely delivery time, channels available to make payments and expect efficient search, shopping cart and billing processes and secure gateways. The customer expectation is therefore multi-dimensional and huge, and has increased over time.

Initial basket of constructs and scale items

Scale development follows an iterative process of design and refinement of multi-item scales to measure the constructs of interest. Froehle and Roth (2004) developed a multi-item scale for each of their ten constructs representing TMCC. Their initial measurement model had 31 items across the constructs, of which 9 were dropped in the revised model owing to multidimensionality. See Appendix A for a complete listing of the original 31 items. Keeping the current study's aim in mind of adapting the Froehle and Roth scales to a TGCC context, we followed a stage-by-stage process, as described below (Figure 3).

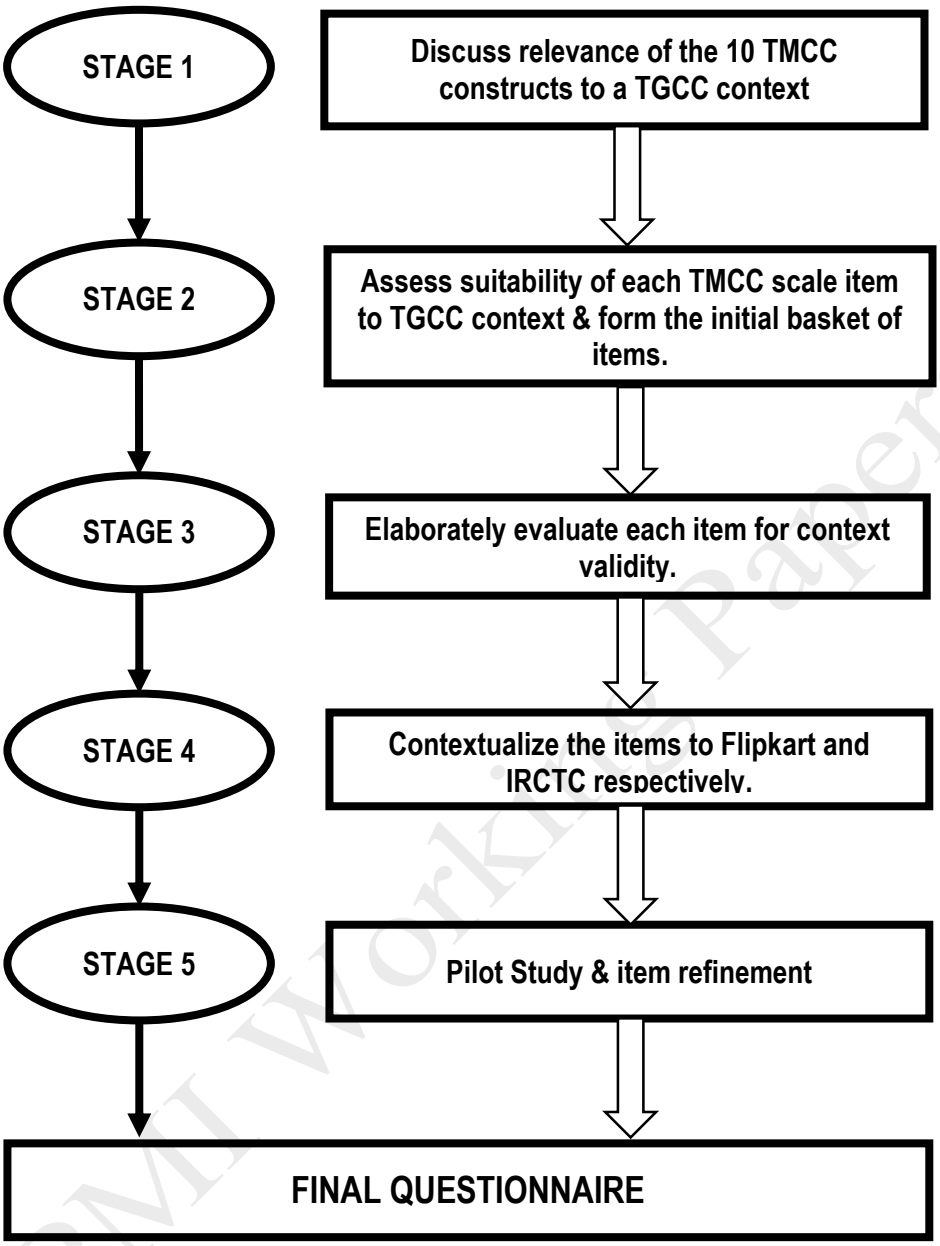

Figure 3: Stages in questionnaire development followed in the study

Stage 1: Discuss and deliberate on the applicability and relevance of the ten TMCC constructs to the study's two TGCC contexts, IRCTC and Flipkart. It was felt that the each of the ten constructs is relevant for both TGCC contexts.

Stage 2: Examine the suitability of each item on the Froehle and Roth scales to the requirements of a TGCC context, keeping in mind the specific websites of IRCTC and Flipkart. Deliberate on whether to retain all of the original 31 items or to consider only the reduced set of items that Froehle and Roth arrived at, after model revision. Here, it was noted that an item dropped in a TMCC context might be relevant in a TGCC context. Since the context has changed, it was deemed beneficial to retain all 31 items, and later drop any if warranted by the validation procedure. For example, LB-3, which asks if the respondent found the

communication with service provider 'educational', was dropped by Froehle and Roth owing to multi-dimensionality. In the case of TGCC contexts, customers may often find websites educational, as they get additional information, and may appreciate the knowledge gain after interaction with website. Hence it made sense to retain this item in the initial basket of the current study.

Stage 3: Elaborately evaluate each item, as amended by the researchers on a first-cut basis during Stage 1, for context validity. The new context involved a change of industry as well as a change in geography. The original study was about TMCC, with respect to an internet service provider based in the US. The new context was TGCC, with respect to online ticketing and shopping in India. We made changes wherever we deemed necessary. For example, the word 'communication' was replaced by 'interaction' in all the items it appeared in. 'Communication' was appropriate during TMCC, where a customer interacts with another human (service provider) through the mediation of technology. During TGCC, there is no two way communication between humans, and the word 'interaction' was deemed more appropriate.

Stage 4: Further contextualize the items. For item IRB-2 "face-to-face in-person communication" in Froehle and Roth was replaced by "face-to-face communication with a sales person" for Flipkart and "…with a booking agent" for IRCTC. For item LB-1, "your issue" in Froehle and Roth was replaced by "travel matters relevant to you" for the IRCTC scale. Thus, care was taken to ensure that the item's meaning would be clear and unambiguous to a respondent. Scales were also supplemented with better explanation. For the scale of IRB-2, the explanations at the two ends of scale were amended from 'extremely' and 'not at all' in Froehle and Roth, to 'extremely similar' and 'extremely dissimilar' for both IRCTC and Flipkart. Also, the 13-item Likert scales (e.g. DAB-1) were reduced to 7-item scales, for simplicity. Explanations were provided at three places on the scale, instead of only at the extremes. For example, in addition to the explanations at the end points in Froehle and Roth of "much shorter" and "much longer", an explanation called "neither shorter nor longer" was introduced at the middle value of the scale, thus increasing clarity.

Stage 5: Do a pilot study. A mini pilot study was done on small groups of users (three each), who were known to use the services of IRCTC and Flipkart, to obtain reflective and qualitative feedback. The feedback of the group was collected with respect to the ease of use of items, and whether the questions needed to be briefer or more elaborate. The refinements suggested were discussed, and a list of initial basket items was drawn up separately for IRCTC and Flipkart.

Appendix A presents the items and scales of Froehle and Roth (2004) alongside the corresponding adapted items in the initial list of the current study. The initial set of scale items and scales thus formed, were aggregated into two separate questionnaires, one each for IRCTC and Flipkart. The questionnaires were then administered online to two separate respondent groups, as described below.

Sampling

There was no readily available sampling frame or enumeration of all users of IRCTC or Flipkart in the public domain. Further, both user populations are large and constantly increasing. Since the resources required to conduct a simple random sampling would be very large, it was decided to approach users that were more readily accessible. A snowball sampling approach was taken to build the sample. Snowball sampling is a non-probability sampling procedure in which early respondents refer to their friends or acquaintances, some of who are also likely to become respondents in the study and who in turn will be requested to refer to their friends and acquaintances (Goodman, 1961). Thus, the sample continuously grows in size as the sampling progresses.

Given the technology-mediated context of the study, a web-based survey was considered a good option for administering the questionnaires. Froehle and Roth (2004, pg.9) noted, "…another advantage of using a web-based medium for data collection is the fact that our respondents are likely to be already familiar with the Internet". In fact, an internet-based survey would have even greater relevance in the context of online shopping. Besides, the web offers a greater anonymity to the respondents, in comparison to email. The data gathering tool, SurveyMonkey (www.surveymonkey.com) was used, considering its ease of use, low cost, facility to use unlimited questions and take unlimited responses, and the facility to download data as MS Excel files.

Before administering the questionnaires, we sent the links to the online surveys to a small user group and requested them to respond. We sought their feedback on the potential ambiguity of items, and the time they took to fill out the survey. No ambiguity about items was reported, and time taken was less than eight minutes, which we felt was reasonable.

To initiate the sampling, we used two internet-based channels, e-mail and social media. First, we e-mailed a link to our two online questionnaires to two separate groups, each consisting of about 400 people. These were mostly students and staff of a large management institute in southern India, to whom we had ready access. It was commonly known that these people regularly make online purchases of books, electronics and other items and travel by rail frequently on official and personal work. They were also known to frequently use both IRCTC and Flipkart. Members in either group received a link to only one of the two questionnaires, to pre-empt respondent fatigue that can arise from asking the same respondent to answer very similar questions twice. Our mail also requested the respondents to forward the questionnaire to their contacts.

Second, we posted the links to our questionnaires on our own pages on the popular social media website, Facebook (www.facebook.com) and invited our contacts to respond to the questions. Each researcher had about 800 contacts and here too, while one of the researchers posted the IRCTC link, the other posted the Flipkart link. Each requested their contacts to share the link on their pages as well, thus expanding the potential outreach. After about four weeks of posting and sending reminders and data cleaning, 172 usable responses were obtained for Flipkart and 166 for IRCTC, which translated to approximate response rates of 14.3% and 13.8% for the respective websites.

Analysis

The data gathered was used to validate the scales adapted for TGCC. The validation was conducted by building and testing measurement models with confirmatory factor analysis (CFA) using Partial Least Squares Structural Equation Modeling (PLS-SEM). Several researchers have used and/or recommended the PLS-SEM approach for scale validation (Afthanorhan, 2013; Akter et al., 2013; Davari and Rezazadeh, 2015; Wen et al., 2012; Miguel et al., 2015; Reams, 2013). In particular, Afthanorhan (2013) compared the PLS-SEM approach with the covariance-based SEM (CB-SEM) and found the former better for CFA.

In the terminology used in the PLS-SEM approach, the ten TGCC constructs are called 'latent constructs', as they are not directly measured but assessed with the help of indicator variables. The indicator variables for the constructs are the respective scale items shown in Appendix A. Latent constructs are labeled reflective or formative (Gefen *et al*., 2000), depending on the nature of the indicators used. All constructs in this study are reflective. Reflective indicators are considered "effects" of the latent constructs, which are understood to cause or form the indicators (Chin, 1998). All indicators measure the same underlying phenomenon that the latent construct represents. Thus, the correlation among them is expected to be positive.

Sample size

Since the PLS approach analyzes one construct at a time and aims at minimizing the residual variance of all the dependent variables in the model, smaller samples sizes are often not a constraint. Cohen's (1992) table, presented in Hair *et al*. (2013, pg. 21), gives the minimum sample size necessary to achieve a statistical power of 80%, as a function of the minimum R^2 to be detected, the maximum number of indicators in any latent construct in the study and the significance level desired. In the current study, the maximum number of indicators for any construct is 4, and by Cohen's table, to detect a minimum R^2 of 0.1 at a 5% significance level, we would need a sample size of at least 137, while smaller samples would be sufficient to detect a higher R^2 at the same significance level. As reported earlier, the data sets gathered for both IRCTC and Flipkart, each provided larger samples than this minimum requirement.

Scale validation follows procedure involving multiple tests (Urbach and Ahlemann, 2010). First, a pretest is performed on the models with the data obtained, for common-method bias. If satisfactory results are obtained in these tests, then measurement model validation is done. This is conducted by assessing the models for unidimensionality, internal consistency reliability, convergent validity and discriminant validity. Measurement involves error, and these tests are done to assess the extent and behavior of unexplained variance, with the help of indices that reveal different aspects of measurement error. The results obtained in these latter tests help infer the validity of the scales constructed.

Below, we describe how model pretests as well as measurement model validation was done, and discuss the results obtained. The tests on the constructs were conducted separately with the respective data sets obtained for IRCTC and Flipkart. While common method bias was tested using IBM's SPSS software package version 22, the other four tests were performed using the SmartPLS software version 3.1.3 (SmartPLS, 2014).

Table 2 summarizes the tests.

Table 2: Data assessment and measurement model criteria (Urbach and Ahlemann, 2010)

Parameter	Explanation	Criterion / Test	Description
Common method bias	When multiple constructs are being measured using a common instrument, a spurious covariance between dependent and independent variables can be created on account of the instrument.	Harman's One factor Test	Maximum covariance explained by any single factor should not exceed 50%.
Unidimensionality	The notion that the indicator variables should represent only one underlying construct and that cross loadings should be zero	Principal Component Analysis (PCA)	Measurement items of the construct should converge and load on the corresponding factor with a high coefficient that is, above 0.6 and not below 0.4
Internal consistency reliability	An alternative to Cronbach's Alpha, this index attempts to measure the sum of an latent construct's factor loadings relative to the sum of the factor loadings plus error variance	Composite reliability (CR)	Leads to values between 0 (completely unreliable) and 1 (perfectly reliable). Proposed threshold value for confirmative research is above 0.8. Should not be below 0.6.
Convergent Validity	The amount of variance that a latent construct captures from its indicators relative to the amount due to measurement error.	Average Variance Extracted (AVE)	Values should be significant at the 0.050 level and higher than 0.700. For exploratory research designs, lower thresholds (0.5) are acceptable. The significance can be tested using bootstrapping or jackknifing. (Fornell and Larcker, 1981).
Discriminant Validity	Requires a latent construct to share more variance with its assigned indicators than with any other latent construct.	Fornell-Larcker Crierion	The AVE of each latent construct should be greater than the construct's highest squared correlation with any other construct (Fornell and Larcker, 1981)

Common method bias

Common method bias exists if, owing to a common method of collecting the data for all constructs, a single dominant factor accounts for majority of covariance in the dependent and independent variables (Urbach and Ahlemann, 2010). The existence of common method bias threatens the internal validity of a construct and Harman's one-factor test is conducted to check for the same (Podsakoff and Organ, 1986; Podsakoff *et al*., 2003). This test involves variance extraction using a single factor and no rotation. It was applied here using the 'principal component extraction' facility in SPSS. The maximum covariance explained by a factor was found to be approximately 45.12% with the Flipkart data and 42.37% with the IRCTC data.

There were five factors with eigenvalues above 1 in the case of Flipkart and six factors with eigenvalues above 1 in the case of IRCTC (Table 3).

Table 3: Eigenvalues and component variances obtained to assess Common Method Bias

IRCTC				Flipkart		
Component*	Initial Eigenvalues			Initial Eigenvalues		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.13	42.37	42.37	13.99	45.12	45.12
2	4.06	13.10	55.47	2.72	8.77	53.88
3	1.75	5.65	61.12	1.90	6.14	60.02
4	1.54	4.98	66.10	1.73	5.57	65.59
5	1.20	3.88	69.98	1.25	4.04	69.63
6	1.15	3.70	73.68	0.94	3.02	72.65
7	0.75	2.42	76.10	0.87	2.82	75.47
8	0.71	2.30	78.40	0.74	2.39	77.86
…						
…						
30	0.09	0.30	99.75	0.07	0.24	99.78
31	0.08	0.25	100.00	0.07	0.22	100.00

Extraction Method: Principal Component Analysis.

* For want of space, components 9 to 28 have been omitted.

In both cases, there is no single factor with a majority of the variance, and more than one variable having an eigenvalue above 1, suggesting the absence of common method bias (Urbach and Ahlemann, 2010). The remaining common method variance if any, was not likely to be problematic, as also observed by Froehle and Roth (2004).

Unidimensionality

To ensure that the construct scales are valid, it is necessary that the item indicators have a greater loading on the respective latent constructs that they are meant to reflect, than on other latent constructs. The loadings of item indicators on the various latent constructs were verified. With the IRCTC data, all item indicators loaded on their respective latent constructs at values above 0.5, as also higher than their loadings on other constructs, suggesting the absence of cross loadings, and the presence of Unidimensionality (Table 4a). Hence, all item indicators were retained.

Table 4a: Loadings of item indicators on Latent variables (for IRCTC)

	AE	AM	AP	DAB	IAB	IM	IP	IRB	LB	UB
AE1	**0.904**	0.406	0.856	0.412	0.337	0.302	0.501	0.473	0.692	0.765
AE2	**0.909**	0.284	0.860	0.511	0.441	0.166	0.470	0.532	0.733	0.797
AE3	**0.905**	0.342	0.793	0.481	0.397	0.258	0.498	0.503	0.670	0.715
AM1	0.217	**0.841**	0.261	-0.051	0.054	0.677	0.471	0.034	0.125	0.262
AM2	0.383	**0.806**	0.398	0.118	0.160	0.517	0.511	0.142	0.249	0.407
AM3	0.323	**0.776**	0.340	0.081	0.111	0.592	0.308	0.144	0.265	0.280
AP1	0.836	0.412	**0.922**	0.437	0.424	0.294	0.540	0.467	0.701	0.761
AP2	0.894	0.309	**0.933**	0.513	0.440	0.204	0.453	0.551	0.755	0.772
AP3	0.821	0.412	**0.907**	0.455	0.368	0.324	0.545	0.446	0.701	0.795
DAB1R	0.403	-0.102	0.375	**0.857**	0.299	-0.157	0.051	0.337	0.317	0.351
DAB2R	0.504	0.171	0.514	**0.919**	0.383	0.040	0.212	0.321	0.328	0.423
IAB1R	0.366	0.189	0.357	0.279	**0.783**	0.177	0.337	0.233	0.289	0.358
IAB2R	0.293	0.011	0.332	0.346	**0.797**	0.047	0.175	0.232	0.257	0.301
IAB3R	0.359	0.101	0.368	0.306	**0.800**	0.132	0.233	0.230	0.255	0.334
IM1	0.156	0.724	0.216	-0.062	0.102	**0.882**	0.537	0.054	0.087	0.272
IM2	0.293	0.661	0.304	-0.036	0.118	**0.903**	0.491	0.123	0.225	0.359
IM3	0.267	0.546	0.275	-0.032	0.199	**0.856**	0.552	0.169	0.215	0.314
IP1	0.530	0.488	0.551	0.163	0.368	0.532	**0.933**	0.252	0.351	0.593
IP2	0.482	0.484	0.507	0.121	0.250	0.581	**0.925**	0.197	0.323	0.544
IP3	0.487	0.525	0.490	0.160	0.268	0.545	**0.917**	0.224	0.314	0.613
IRB1	0.465	0.073	0.422	0.371	0.295	0.098	0.208	**0.923**	0.480	0.422
IRB2	0.406	0.141	0.364	0.297	0.207	0.114	0.231	**0.847**	0.377	0.315
IRB3	0.587	0.135	0.592	0.325	0.277	0.129	0.220	**0.925**	0.684	0.577
LB1	0.615	0.244	0.649	0.252	0.318	0.194	0.288	0.461	**0.852**	0.680
LB2	0.745	0.236	0.774	0.311	0.273	0.148	0.326	0.594	**0.905**	0.750
LB3	0.628	0.209	0.612	0.311	0.260	0.169	0.291	0.453	**0.841**	0.652
LB4	0.700	0.222	0.689	0.390	0.331	0.177	0.340	0.567	**0.902**	0.747
UB1	0.747	0.390	0.741	0.454	0.338	0.342	0.527	0.423	0.657	**0.835**
UB2	0.760	0.266	0.760	0.367	0.371	0.254	0.538	0.472	0.760	**0.907**

UB3	0.691	0.412	0.714	0.325	0.404	0.388	0.616	0.434	0.669	**0.870**
UB4	0.734	0.312	0.733	0.389	0.356	0.266	0.526	0.447	0.746	**0.885**

With the Flipkart data, however, two items – IAB3 and UB2 – had loadings of less than 0.5 on their respective latent constructs. Hence these items were dropped in the measurement model validation tests with the Flipkart dataset. All other item indicators loaded at values above 0.5 on respective latent variables, as also higher than their loadings on other constructs, indicating Unidimensionality in the modified scales (Table 4b).

Table 4b: Loadings of item indicators on Latent variables (for Flipkart)

	AE	**AM**	**AP**	**DAB**	**IAB**	**IM**	**IP**	**IRB**	**LB**	**UB**
AE1	**0.902**	0.707	0.852	0.261	0.226	0.685	0.764	0.287	0.605	0.785
AE2	**0.930**	0.679	0.882	0.303	0.260	0.657	0.816	0.335	0.592	0.791
AE3	**0.850**	0.526	0.694	0.326	0.276	0.470	0.698	0.228	0.439	0.668
AM1	0.662	**0.934**	0.677	0.341	0.309	0.856	0.694	0.301	0.441	0.670
AM2	0.678	**0.916**	0.668	0.286	0.318	0.798	0.672	0.362	0.489	0.682
AM3	0.612	**0.868**	0.622	0.301	0.259	0.719	0.626	0.236	0.423	0.650
AP1	0.697	0.541	**0.840**	0.294	0.277	0.527	0.705	0.127	0.408	0.584
AP2	0.853	0.670	**0.912**	0.310	0.241	0.699	0.809	0.291	0.566	0.747
AP3	0.855	0.698	**0.899**	0.205	0.189	0.678	0.776	0.354	0.614	0.746
DAB1R	0.221	0.143	0.189	**0.687**	0.333	0.149	0.230	-0.005	0.146	0.187
DAB2R	0.301	0.363	0.285	**0.906**	0.301	0.274	0.347	0.070	0.222	0.314
IAB1R	0.302	0.318	0.285	0.316	**0.949**	0.325	0.291	0.116	0.151	0.270
IAB2R	0.093	0.189	0.075	0.337	**0.617**	0.181	0.058	-0.149	0.022	0.082
IAB3R	0.005	0.011	0.045	0.245	**0.395**	0.100	0.015	-0.137	-0.017	-0.027
IM1	0.653	0.832	0.701	0.225	0.257	**0.945**	0.726	0.235	0.437	0.631
IM2	0.602	0.777	0.644	0.281	0.384	**0.907**	0.653	0.237	0.434	0.606
IM3	0.646	0.825	0.668	0.265	0.289	**0.931**	0.716	0.270	0.454	0.661
IP1	0.823	0.700	0.852	0.321	0.261	0.730	**0.947**	0.265	0.522	0.738
IP2	0.824	0.715	0.836	0.377	0.247	0.747	**0.959**	0.254	0.491	0.730
IP3	0.780	0.675	0.776	0.353	0.238	0.669	**0.946**	0.226	0.470	0.722
IRB1	0.277	0.289	0.259	0.095	0.075	0.247	0.237	**0.921**	0.319	0.283
IRB2	0.228	0.241	0.193	0.027	0.082	0.168	0.151	**0.880**	0.254	0.229

IRB3	0.347	0.355	0.337	0.021	-0.010	0.290	0.297	**0.931**	0.422	0.365
LB1	0.532	0.455	0.535	0.276	0.196	0.447	0.484	0.313	**0.815**	0.644
LB2	0.446	0.336	0.429	0.138	0.070	0.320	0.360	0.351	**0.783**	0.532
LB3	0.479	0.364	0.466	0.134	0.073	0.333	0.375	0.256	**0.838**	0.591
LB4	0.570	0.475	0.560	0.212	0.090	0.456	0.486	0.331	**0.875**	0.682
UB1	0.745	0.631	0.685	0.271	0.257	0.617	0.688	0.254	0.568	**0.851**
UB2	0.147	0.035	0.088	-0.025	-0.083	-0.004	0.088	-0.030	0.233	**0.184**
UB3	0.748	0.683	0.729	0.315	0.214	0.621	0.662	0.287	0.659	**0.902**
UB4	0.712	0.632	0.662	0.276	0.210	0.573	0.674	0.341	0.707	**0.868**

Note: IAB3R and UB2 were dropped as the loadings were less than 0.5

Discriminant validity

Discriminant validity refers to the extent to which a latent construct shares variance with its own indicators relative to the variance it shares with those of any other latent construct. One way to assess discriminant validity is the Fornell-Larcker criterion (Fornell and Larcker, 1981), which is examined using the cross-correlation matrices of the constructs, separately with both data sets. When this was done using the IRCTC data set, it was found that AE and AP shared a variance of 0.924 with each other's indicators, which was more than the variances that they shared with their own indicators (0.906 and 0.920 respectively). Likewise, with the Flipkart data set, we found that AE and AP shared a variance of 0.911 with each other's indicators, which turned out to be greater than the variances they shared with their own indicators (0.894 and 0.885 respectively). Clearly, the Fornell-Larcker criterion was not satisfied, in both datasets.

To resolve this issue, we referred to underlying theories on attitude. Argyriou and Melewar (2011) have discussed the considerable diversity in perspectives on the concept of attitude and its formation. There are two major schools of thought on attitude formation. The constructive school represented by researchers such as Schwarz (1997), Feldman and Lynch (1988) and Schwarz and Bohner (2001) argues that attitude formation is a temporary evaluation of an object constructed in situ at the time of judgment. It is an affective process, based on emotions and feelings, which guide categorization at the time of evaluation. In contrast, the functional school (e.g. Fazio, 1989) argues that attitude is a stable object-related association stored and later evoked in memory, when needed. Fishbein and Ajzen (1975) and Fishbein and Middlestadt (1995) argue that attitude formation is a strictly cognitive process, stemming from analytical, deliberative and evaluative categorization. Past associations and feelings towards an object are stored in memory. Attitudes are thus stable over long periods of time, and may only change gradually with new experiences with the object. Thus, the functional school believes that attitudes are not an instantaneous affective phenomenon at the time of evaluation.

Both attitude towards the medium (AM) and attitude towards the service provider (AP) can be understood to develop cumulatively over time, in accordance with the functional school. However, attitude towards the episode (AE) would be relatively ephemeral, as it pertains only

to a particular episode, and this is more in accordance with the constructivist school. The current study's focus – TGCC – represents interactions between the customer and the technological medium, which represents the provider. Thus, between the three episode constructs, AM and AP would be relatively more relevant than AE in capturing TGCC. For this reason, we decided to drop AE but retain AP and AM and assess the Fornell-Larcker criterion for the revised set of nine constructs. After dropping AE, we found that this criterion was met by both data sets (Tables 5a and 5b). Hence, we decided to persist with the remaining nine constructs.

Table 5a: Cross-correlation matrix with IRCTC data for assessing Discriminant Validity

	AM	**AP**	**DAB**	**IAB**	**IM**	**IP**	**IRB**	**LB**	**UB**
AM	**0.808**								
AP	0.412	**0.920**							
DAB	0.061	0.509	**0.888**						
IAB	0.133	0.445	0.389	**0.794**					
IM	0.736	0.300	-0.049	0.155	**0.881**				
IP	0.539	0.559	0.161	0.319	0.598	**0.925**			
IRB	0.130	0.531	0.367	0.292	0.128	0.242	**0.899**		
LB	0.260	0.781	0.362	0.337	0.196	0.356	0.599	**0.875**	
UB	0.393	0.843	0.439	0.420	0.356	0.630	0.510	0.810	**0.875**

Table 5b: Cross-correlation matrix with Flipkart data for assessing Discriminant Validity

	AM	**AP**	**DAB**	**IAB**	**IM**	**IP**	**IRB**	**LB**	**UB**
AM	**0.906**								
AP	0.724	**0.885**							
DAB	0.345	0.303	**0.802**						
IAB	0.329	0.262	0.376	**0.802**					
IM	0.875	0.723	0.277	0.332	**0.928**				
IP	0.733	0.865	0.369	0.261	0.754	**0.951**			
IRB	0.332	0.300	0.053	0.045	0.267	0.262	**0.911**		
LB	0.498	0.606	0.235	0.133	0.476	0.521	0.377	**0.828**	
UB	0.741	0.790	0.330	0.260	0.689	0.770	0.337	0.738	**0.876**

Internal consistency reliability

Internal consistency reliability, also known as composite reliability, is a measure of internal consistency in a construct. It is defined as the sum of a latent variable's factor loadings relative to the sum of the factor loadings plus error variance. Based on prior literature, Urbach and Ahlemann (2010) recommend that a value above 0.6 be considered acceptable. It was found that the composite reliability scores for all nine constructs were above 0.7, with both data sets, indicating that the requirement of internal consistency was adequately met (Figures 4a and 4b).

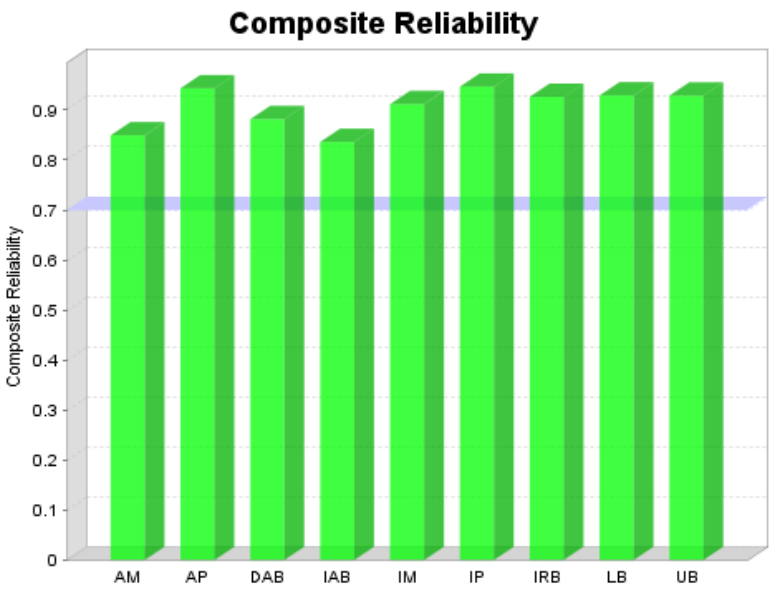

Figure 4a: Composite reliability for the IRCTC data set

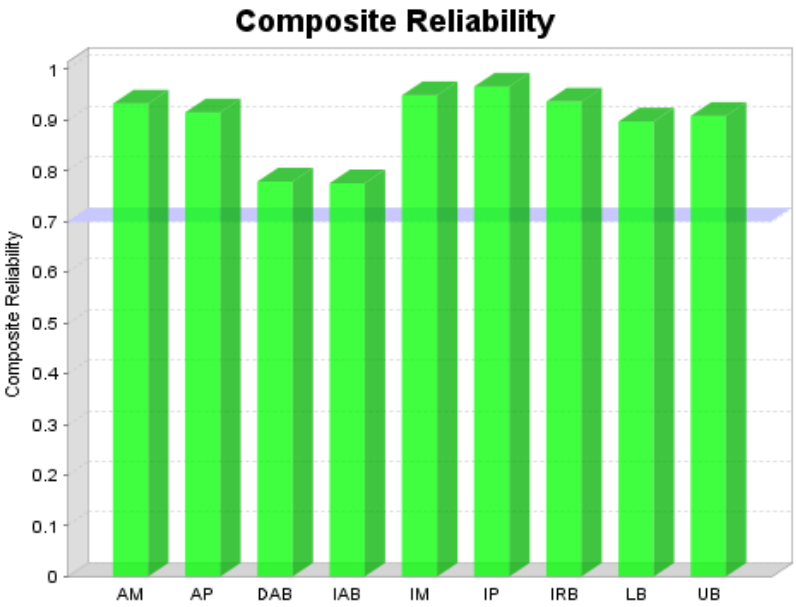

Figure 4b: Composite reliability for the Flipkart data set

Convergent validity

This represents the amount of variance that a latent construct captures from its indicators relative to the amount due to measurement error. To establish this, Urbach and Ahlemann (2010) recommend that the value of Average Variance Extracted (AVE) should be at least 0.5. Figures 5a and 5b reveal that the AVE scores for all nine constructs with both data sets, satisfy this requirement, revealing the presence of adequate convergent validity in the models.

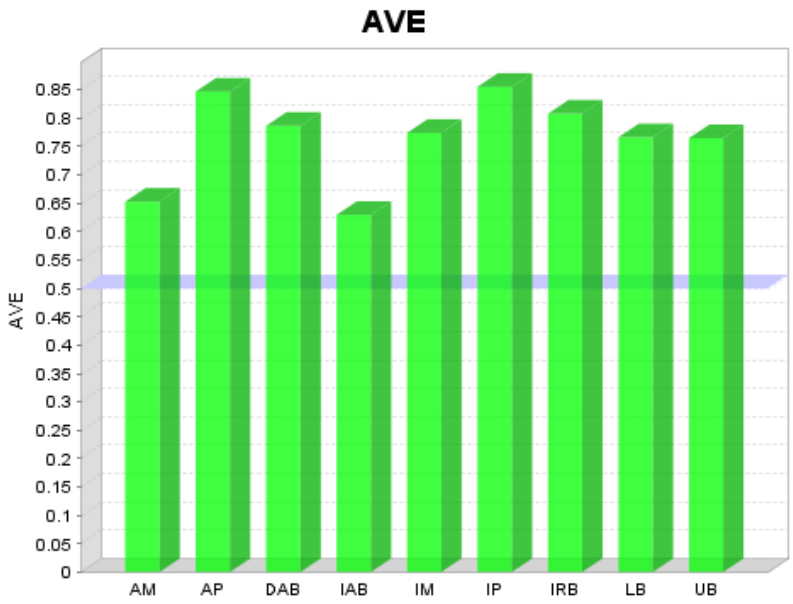

Figure 5a: Average variance extracted (AVE) in the constructs with the IRCTC dataset

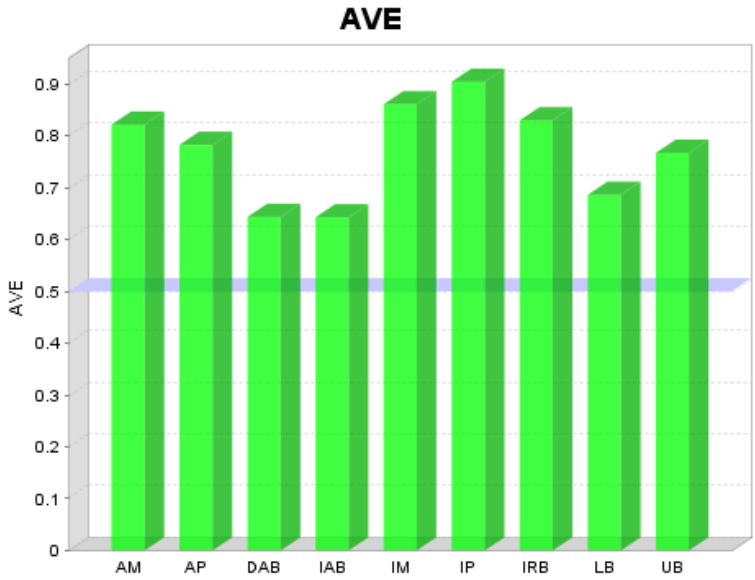

Figure 5b: Average variance extracted (AVE) in the constructs with the Flipkart dataset

As described so far, we tested and refined the ten scales adapted for the TGCC context using the PLS-SEM method for CFA. Based on the tests, it was decided to retain nine of the ten in the refined set of scales. The adapted scales before and after refinement are presented in

Appendix B, for IRCTC and Flipkart respectively. This is the overarching contribution of the paper.

Discussion

In developing scales pertaining to the online shopping context of TGCC, the paper has simultaneously addressed two relatively less attended areas of research on service operations – the role of technology in customer contact and measurement of customer contact. The belief, attitude and intention constructs of Froehle and Roth (2004) used in our paper are well grounded in theory. The paper has shown how scales developed in one type of technology context (TMCC) can adapt to another (TGCC).

A significant contribution of this paper lies in the finding that two of the three attitude constructs found distinctively valid in the TMCC context by Froehle and Roth (2004) are adequate to represent attitude in the TGCC context. This also suggests that it is not appropriate to directly use the scales developed for one technology-related context to another. A rigorous adaptation process is necessary, which may result in the modification of scale items as well as constructs. In turn, this shows that customer contact itself is a fine and nuanced phenomenon, whose dimensions manifest in different ways across different settings. The paper has also demonstrated how a systematic and rigorous scale development process can be conducted using the PLS-SEM approach. This is another distinct way in which our study differs from that of Froehle and Roth (2004), who took a covariance-based SEM approach.

The adapted set of scales developed in this paper can be a useful tool for practitioners in the domain of online shopping, to measure the beliefs, attitudes and intentions of their customers. Potential beneficiaries include service providers, service designers, industry associations as well as regulators in the government. Assessing these psychosocial aspects of customer contact in different contexts can be critical in helping develop and maintain online service systems, particularly in fast growing competitive economies like India.

The scales developed will also be useful for future researchers in the area of online shopping, to advance their work. We suggest two possible directions that future research can explore to further understanding on this topic. First, the scales developed can be tested and validated with data from multiple empirical TGCC contexts and adapted to those contexts as necessary. Differences in the reliability and validity results obtained across contexts can churn multiple nuanced insights, and eventually pave the way towards establishing a universal set of scales on TGCC. Second, future studies must examine path relationships between belief, attitude and intention constructs. How do the beliefs drive the attitudes and in turn, the intentions and how do the influences vary across different TGCC contexts? Answers to this question can deepen our understanding of TGCC in particular and the role of technology in customer contact in general.

Limitations and conclusion

Our study has some limitations. Using a convenience sample for collecting the data is a barrier to the generalizability of our conclusions. Future work can consider testing the scales with data collected by a probabilistic sampling method. Another limitation is that the measurements essentially reflect individual perception, as they are generated using a questionnaire based

measurement approach. The responses are subjective evaluations of the construct but we also note that using self–reported scales is a common accepted practice in much social science and management research. To some extent however, the use of a systematic and rigorous methodology offsets these limitations and helps establish results with reasonable robustness that can be presented for discussion and future work.

Despite these shortcomings, our study has helped revive attention to technology-generated settings of customer contact. Both practitioners and researchers will benefit from having robust measurement scales with well-developed constructs underlying them. Customer contact theory has much scope to be developed further in technology related settings and has much to offer to the growing field of service operations management.

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Appendix A: Items and scales of Froehle and Roth (2004) alongside adapted items in initial list of current study

	Original Item (Froehle and Roth, 2004)	**Scale & Anchors**	**Adapted item** (for IRCTC)	**Adapted item** (for Flipkart)	**Adapted scale**
IRB- Information Richness Belief					
IRB1	How close to actual face-to-face interaction was your communication with Iotanet customer service?	7 (extremely) to 1 (not at all)	How close to actual face-to-face interaction with a booking agent, was your interaction with the IRCTC website?	How close to actual face-to-face interaction with a salesperson, was your interaction with Flipkart?	7 (extremely close) to 1 (not close at all)
IRB2	How much did your communication with Iotanet customer service feel like a face-to-face, in-person conversation?	7 (extremely) to 1 (not at all)	How much did your interaction with the IRCTC website feel similar to a face-to-face communication with a booking agent?	How much did your interaction with Flipkart feel like a face-to-face communication with a salesperson?	7 (extremely similar) to 1 (extremely dissimilar)
IRB3	How much did your communication with the service provider feel like a face-to-face, in-person conversation?	7 (extremely) to 1 (not at all)	While interacting with IRCTC ticketing website, I felt just like I am interacting with a human booking agent.	While interacting with Flipkart, I felt just like I am interacting with a human salesperson.	7 (strongly agree) to 1 (strongly disagree)

LB- Learning Belief					
LB1	After your communication with Iotanet customer service, how much more knowledgeable were you about your issue?	7 (extremely) to 1 (not at all)	After your interaction with the IRCTC ticketing website, how much more knowledgeable were you about travel related matters that were relevant to you?	After your interaction with Flipkart, how much more knowledgeable were you about what you were seeking there?	7 (extremely more knowledgeable) to 1 (not even slightly more knowledgeable)
LB2	I believe my communication with Iotanet customer service enabled me to look at the situation from a new perspective.	7 (strongly agree) to 1 (strongly disagree)	I believe my interaction with the IRCTC ticketing website enabled me to see my travel related matters from a new perspective.	I believe my interaction with Flipkart enabled me to see shopping related matters from a new perspective.	7 (strongly agree) to 1 (strongly disagree)
LB3	I believe my communication with Iotanet customer service was educational.	7 (strongly agree) to 1 (strongly disagree)	I believe that my interaction with IRCTC ticketing website has been educational.	I believe that my interaction with Flipkart has been educational.	7 (strongly agree) to 1 (strongly disagree)
LB4	I believe my communication with Iotanet customer service provided me with new knowledge.	7 (strongly agree) to 1 (strongly disagree)	I believe that my interaction with IRCTC ticketing website has provided me with new knowledge.	I believe that my interaction with Flipkart has provided me with new knowledge.	7 (strongly agree) to 1 (strongly disagree)

UB- Usefulness Belief					
UB1	I believe communicating with Iotanet customer service was a useful experience.	7 (strongly agree) to 1 (strongly disagree)	I believe that my interaction with IRCTC website was a useful experience.	I believe that my interaction with Flipkart was a useful experience.	7 (strongly agree) to 1 (strongly disagree)
UB2	How much additional value did the experience of communicating with Iotanet customer service add for you?	7 (extremely) to 1 (none)	How much additional value did the experience of interacting with IRCTC ticketing website create for you?	How much additional value did the experience of interacting with Flipkart create for you?	7 (extremely high value) to 1 (no value at all)
UB3	The experience of communicating with Iotanet customer service was how useful to you?	7 (extremely) to 1 (none)	The experience of interacting with IRCTC ticketing website was how useful to you?	The experience of interacting with Flipkart was how useful to you?	7 (extremely useful) to 1 (not at all useful)
UB4	I believe that the experience of communicating with Iotanet customer service added value to the service.	7 (strongly agree) to 1 (strongly disagree)	I believe that my interactions with the IRCTC ticketing website added value to the booking experience.	I believe that my interactions with the Flipkart website added value to my shopping experience.	7 (strongly agree) to 1 (strongly disagree)
DAB- Duration Appropriateness Belief					
DAB1	I believe the time I spent actively communicating (talking to someone, reading or writing emails, chatting) with Iotanet customer service should have been	13 (much longer) to 1 (much shorter)	I believe the time I spent actively interacting on IRCTC website, while making a reservation, should have been:	I believe the time I spent actively interacting with the Flipkart website, while making a purchase, should have been:	7 (much longer) to 4 (just right) to 1 (much shorter)

DAB2	I believe the overall length of time I spent actively communicating (talking to someone, reading or writing emails, chatting) with Iotanet customer service was	13 (too long) to 1 (too short)	I believe the overall length of time I spent on IRCTC website, while making a reservation was:	I believe the overall length of time I spent on Flipkart, while making a purchase was:	7 (too short) to 4 (just right) to 1 (too long)
IAB – Intimacy Appropriateness Belief					
IAB1	How impersonal did you consider your communication with Iotanet customer service to be?	13 (too much) to 1 (not enough)	How impersonal did you consider your interaction with the IRCTC ticketing website to be?	How impersonal did you consider your interaction with Flipkart to be?	7 (more impersonal than necessary) to 4 (just right) to 1 (less impersonal than necessary)
IAB2	How intimate do you believe your communication with Iotanet customer service was?	13 (too much) to 1 (not enough)	How intimate do you believe your interaction with IRCTC ticketing website was?	How intimate do you believe your interaction with Flipkart was?	7 (more intimate than necessary) to 4 (just right) to 1 (less intimate than necessary)
IAB3	How friendly and personal was your communication with Iotanet customer service?	7 (extremely) to 1 (not at all)	How friendly and personal has your interaction with IRCTC website been?	How friendly and personal has your interaction with Flipkart been?	7 (more than necessary) to 4 (just right) to 1 (less than necessary)
AM – Attitude towards the Medium					
AM1	I was pleased by using [this medium].	7 (strongly agree) to 1 (strongly disagree)	I am pleased with the internet as a medium to plan travel and make reservation.	I am pleased with the internet as a medium to do shopping.	7 (strongly agree) to 1 (strongly disagree)

AM2	How satisfying was using [this medium]?	7 (extremely) to 1 (not at all)	How satisfying was the internet as a medium to plan travel and make reservation?	How satisfying was the internet as a medium to do shopping?	7 (extremely satisfying) to 1 (not satisfying at all)
AM3	I enjoyed using [this medium].	7 (strongly agree) to 1 (strongly disagree)	I enjoy using the internet to plan travel and make reservation.	I enjoy using the internet to do shopping.	7 (strongly agree) to 1 (strongly disagree)
AE – Attitude towards the Episode					
AE1	I was pleased by the experience of communicating with Iotanet customer service.	7 (strongly agree) to 1 (strongly disagree)	I was pleased by the experience of planning my travel and making reservation through IRCTC website.	I was pleased by the experience of online shopping through Flipkart.	7 (strongly agree) to 1 (strongly disagree)
AE2	How satisfying was the experience of communicating with Iotanet customer service?	7 (extremely) to 1 (not at all)	How satisfying was the experience of planning your travel and making reservation on IRCTC ticketing website?	How satisfying was the experience of shopping on Flipkart?	7 (extremely satisfying) to 1 (not satisfying at all)
AE3	How disappointing was the experience of communicating with Iotanet customer service?	7 (extremely) to 1 (not at all)	How disappointing was the experience of planning your travel and making reservation on IRCTC ticketing website?	How disappointing was the experience of shopping on Flipkart?	7 (not disappointing at all) to 1 (extremely disappointing)
AP – Attitude towards the Service Provider					
AP1	I am pleased with Iotanet	7 (strongly agree) to 1 (strongly disagree)	In general, I am pleased with IRCTC as a provider of travel planning and reservation.	In general, I am pleased with Flipkart as a provider of books and other products.	7 (strongly agree) to 1 (strongly disagree)
AP2	How satisfied are you with Iotanet?	7 (extremely) to 1 (not at all)	In general, how satisfied are you with IRCTC as a provider of travel planning and reservation?	In general, how satisfied are you with Flipkart as a provider of various products?	7 (extremely satisfied) to 1 (not satisfied at all)

AP3	I enjoy using Iotanet.	7 (strongly agree) to 1 (strongly disagree)	I enjoy using the IRCTC for doing travel planning and reservation.	I enjoyed using Flipkart for shopping.	7 (strongly agree) to 1 (strongly disagree)
IM – Intention towards the Medium					
IM1	I would use [this medium] again to contact Iotanet customer service.	7 (strongly agree) to 1 (strongly disagree)	I would use the internet again to plan my travel and/or to make a reservation.	I would use the internet again to purchase something that is available online.	7 (strongly agree) to 1 (strongly disagree)
IM2	I intend to use [this medium] the next time I need to contact Iotanet customer service.	7 (strongly agree) to 1 (strongly disagree)	I intend to use the internet again the next time I need to plan my travel and/or make a reservation.	I intend to use the internet again the next time I need to purchase something that might be available online.	7 (strongly agree) to 1 (strongly disagree)
IM3	How likely are you to use [this medium] again the next time you need to contact Iotanet customer service?	7 (extremely) to 1 (not at all)	How likely are you to use the internet again to plan your travel and/or make a reservation?	How likely are you to use the internet again to purchase something that might be available online?	7 (extremely likely) to 1 (not likely at all)
IP – Intention towards the Provider					
IP1	I intend to continue using Iotanet.	7 (strongly agree) to 1 (strongly disagree)	I intend to continue using IRCTC travel website.	I intend to continue using Flipkart.	7 (strongly agree) to 1 (strongly disagree)
IP2	How likely are you to use Iotanet again?	7 (extremely) to 1 (not at all)	How likely are you to use the IRCTC travel website again?	How likely are you to use Flipkart again?	7 (extremely likely) to 1 (not likely at all)
IP3	I intend to use Iotanet again in the future.	7 (strongly agree) to 1 (strongly disagree)	I intend to use the IRCTC travel website again in future.	I intend to use Flipkart again in future.	7 (strongly agree) to 1 (strongly disagree)

Appendix B: Adapted scales before and after refinement for IRCTC and Flipkart

Indicator	IRCTC				FLIPKART			
	Initial Model (500 iterations)		Revised Model (500 iterations)		Initial Model (500 iterations)		Revised Model (500 iterations)	
	Loading of indicator on respective construct	Construct self-correlation; Greater than other-correlation?	Loading of indicator on respective construct	Construct self-correlation; Greater than other-correlation?	Loading of indicator on respective construct	Construct self-correlation; greater than other-correlation?	Loading of indicator on respective construct	Construct self-correlation; greater than other-correlation?
IRB- Information Richness Belief								
IRB1	0.923	0.899; Yes	0.922	0.899; Yes	0.921	0.911; Yes	0.921	0.911; Yes
IRB2	0.847		0.843		0.88		0.88	
IRB3	0.925		0.928		0.931		0.931	
LB- Learning Belief								
LB1	0.852	0.875; Yes	0.854	0.875; Yes	0.815	0.828; Yes	0.816	0.828; Yes
LB2	0.905		0.904		0.783		0.782	
LB3	0.841		0.84		0.838		0.837	
LB4	0.902		0.902		0.875		0.875	
UB- Usefulness Belief								
UB1	0.835	0.875; Yes	0.835	0.875; Yes	0.851	0.763; Yes	0.854	0.876; Yes
UB2	0.907		0.907		0.184		Dropped	
UB3	0.87		0.871		0.902		0.904	
UB4	0.885		0.885		0.868		0.869	

DAB- Duration Appropriateness Belief								
DAB1	0.857	0.889; Yes	0.853	0.888; Yes	0.687	0.804; Yes	0.667	0.802; Yes
DAB2	0.919		0.922		0.906		0.918	
IAB – Intimacy Appropriateness Belief								
IAB1	0.783	0.793; Yes	0.783	0.794; Yes	0.949	0.692; Yes	0.946	0.802; Yes
IAB2	0.797		0.799		0.617		0.625	
IAB3	0.8		0.798		0.395		Dropped	
AM – Attitude towards the Medium								
AM1	0.841	0.808; Yes	0.843	0.808; Yes	0.934	0.906; Yes	0.934	0.906; Yes
AM2	0.806		0.806		0.916		0.916	
AM3	0.776		0.774		0.868		0.868	
AE – Attitude towards the Episode								
AE1	0.904	0.906; No; Less than AE-AP correlation of 0.924; AE dropped in revised model	-	-	0.902	0.894; No; Less than AE-AP correlation of 0.911; AE dropped in revised model	-	-
AE2	0.909		-		0.93		-	
AE3	0.905		-		0.85		-	
AP – Attitude towards the Service Provider								
AP1	0.922	0.920; No; Less than AE-AP correlation of 0.924	0.921	0.920; Yes	0.84	0.885; No; Less than AE-AP correlation of 0.911	0.84	0.885; Yes
AP2	0.933		0.931		0.912		0.913	
AP3	0.907		0.908		0.899		0.9	

IM – Intention towards the Medium								
IM1	0.882	0.881; Yes	0.881	0.881; Yes	0.945	0.928; Yes	0.945	0.928; Yes
IM2	0.903		0.904		0.907		0.907	
IM3	0.856		0.856		0.931		0.931	
IP – Intention towards the Provider								
IP1	0.933	0.925; Yes	0.933	0.925; Yes	0.947	0.951; Yes	0.948	0.951; Yes
IP2	0.925		0.925		0.959		0.959	
IP3	0.917		0.916		0.946		0.946	

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