University of Wollongong
Research Online

Faculty of Commerce - Papers (Archive)

Faculty of Business

2006

Exploratory and Confirmatory Factor Analysis of the Perceived Switching Costs Model in the Business Services Sector

Venkata K. Yanamandram
University of Wollongong, venkaty@uow.edu.au

L. White
Macquarie University

Publication Details

This paper was originally published as: Yanamandram, V & White, L, Exploratory and Confirmatory Factor Analysis of the Perceived Switching Costs Model in the Business Services Sector, Australia and New Zealand Marketing Academy Conference (ANZMAC 2006), Brisbane, Queensland, 4-6 December 2006.

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

Exploratory and Confirmatory Factor Analysis of the Perceived Switching Costs Model in the Business Services Sector

Abstract
Switching costs has been recognised as a primary reason why dissatisfied customers stay with their suppliers. While a validated multidimensional scale of switching costs exists in a business-to-consumer context, there has been little empirical research effort devoted to operationalising different types of switching costs in business service relationships. This research strives to develop a model taking into consideration the various types of switching costs. Data was collected online from 453 Australian businesses using a key informant approach. While the initial Exploratory Factor Analysis (EFA) failed to produce the hypothesised six-factor model, a re-run of EFA identified a five-factor model, with Confirmatory Factor Analysis (CFA) demonstrating good fit statistics. The model has been empirically tested for unidimensionality, reliability and validity using CFA.

Keywords
Switching costs, business services, factor analysis, structural equation modeling

Disciplines
Business | Social and Behavioral Sciences

Publication Details
This paper was originally published as: Yanamandram, V & White, L, Exploratory and Confirmatory Factor Analysis of the Perceived Switching Costs Model in the Business Services Sector, Australia and New Zealand Marketing Academy Conference (ANZMAC 2006), Brisbane, Queensland, 4-6 December 2006.

This conference paper is available at Research Online: http://ro.uow.edu.au/commpapers/231

Exploratory and Confirmatory Factor Analysis of the Perceived Switching Costs Model in the Business Services Sector

Venkata Yanamandram, University of Wollongong
Lesley White, Macquarie University

Abstract

Switching costs has been recognised as a primary reason why dissatisfied customers stay with their suppliers. While a validated multidimensional scale of switching costs exists in a business-to-consumer context, there has been little empirical research effort devoted to operationalising different types of switching costs in business service relationships. This research strives to develop a model taking into consideration the various types of switching costs. Data was collected online from 453 Australian businesses using a key informant approach. While the initial Exploratory Factor Analysis (EFA) failed to produce the hypothesised six-factor model, a re-run of EFA identified a five-factor model, with Confirmatory Factor Analysis (CFA) demonstrating good fit statistics. The model has been empirically tested for unidimensionality, reliability and validity using CFA.

Background of the Research

There is evidence in the consumer literature that the costs associated with switching a service provider outweigh the negative effects of the dissatisfaction that customers are experiencing, which results in dissatisfied customers continuing to repeat purchase services (e.g. Colgate and Lang, 2001; Panther and Farquhar, 2004). Literature in business-to-business (B2B) marketing also suggests that a relationship may continue to exist due to the buyer's perceptions of high switching costs (Porter, 1980) even if the relationship is not a satisfactory one. Switching costs refer to the buyer's perceived costs of switching from the existing to a new supplier (Heide and Weiss, 1995; Jackson, 1985; Porter, 1980). Switching costs encompass the entire switching process, and not only include costs incurred at the actual moment of switching, but also include psychological costs of searching for information, assessing information, performing the transaction, and studying and getting used to the new service provider, special privileges, and cognitive effort (Fornell, 1992). These costs are seldom explicitly assessed, but they become relevant and evident when customers are faced with a reason to consider switching.

While the concept of switching costs has been incorporated into theoretical models in buyer-seller relationships (e.g. Dabholkar, Johnston and Cathey, 1994; Dwyer, Schurr and Oh, 1987), the concept has either been operationalised as a unidimensional construct in empirical studies (e.g. Heide and John, 1990; Liu, Leach and Bernhardt, 2003; Sengupta, Krapfel and Pusateri, 1997) despite suggestions that multiple dimensions exist (e.g. Guiltinan, 1989; Klemperer, 1987), or has measured one or a few switching cost facets (e.g. Bell, Auh and Smalley, 2005; Kim, Park and Jeong, 2004; Lee and Feick, 2001; Weiss and Anderson, 1992) that leaves gaps in our understanding of switching costs. Examining a single facet of a multi-dimensional construct is unlikely to produce an adequate assessment of the construct (Kumar, Stern and Achrol, 1992), while employing a global measure provides little guidance for managing switching cost perceptions and increases measurement error as it forces respondents to mentally combine multidimensional ratings (Burnham, Frels and Mahajan,

2003). Distinguishing the various switching cost dimensions both conceptually and empirically should be beneficial for two reasons as argued by Jones, Mothersbaugh and Beatty (2002). First, different dimensions of switching costs are likely to be differentially related to certain consequences in ways that are both theoretically and practically important. Second, different strategies are likely to be necessary to effectively manage different switching cost dimensions as part of a company's overall retention program. While Jones, Mothersbaugh and Beatty (2002) and Burnham, Frels and Mahajan (2003) developed and validated a multidimensional scale in a business-to-consumer context, there has been little empirical research effort devoted to operationalising different types of switching costs in B2B marketing relationships. A notable exception is a study by Nielson (1996) who reviewed tested a two-part typology of B2B switching costs that included "hard and soft assets".

Rationale for the Current Study

To our knowledge, no attempt has been made to operationalise different types of switching costs in B2B service relationships. While business suppliers primarily strengthen switching costs through "hard assets" such as installed proprietary equipment that cannot be transferred to other exchange relationships (Wilson, Soni and Keeffe, 1995), providers of business services often lack the ability to utilise hard assets to lock in current customers (Liu, 2006). As a result, business service providers explore the establishment of "soft assets" such as procedural investments that enhance switching cost perceptions (Wilson, Soni and Keeffe, 1995). Scholars (Lohita, Brooks and Krapfel, 1994; Hu and Hwang, 2006) have recommended additional empirical research to develop and validate scales for measuring dimensions of switching costs for different context needs. Accordingly, we investigate the construct amongst dissatisfied B2B service customers, as research on the continuation of troubled business relationships is scarce (Tahtinen and Vaaland, 2006). This research incorporates consumer switching costs together with costs identified in the business services marketing literature and empirically tests their applicability to the B2B services sector. The items for each switching cost dimension were modified after review by an expert panel in order to test face validity, and finally pre-tested for assessment of substantive validity. The process resulted in the generation of 25 items, tentatively classified according to six dimensions: benefit-loss costs; uncertainty costs; pre-switching search and evaluation costs; set-up costs; post-switching behavioural and cognitive costs; and company-service provider relationship costs. Each dimension contained four items, and were measured using a 7-point rating scale, anchored by "Strongly Disagree" and "Strongly Agree".

Methodology

Recruitment e-mails were sent to 2,083 prospective participants who were identified from a database of Australian business managers. Each e-mail contained a hyperlink to the questionnaire and participants submitted responses online. The study investigated only dissatisfied B2B customers who decided to stay with their respective service providers. The mean score for overall dissatisfaction was 4.7 (σ = 1.29) on a 7-point scale (1 = dissatisfaction is extremely low; 7 = dissatisfaction is extremely high). A key informant approach was used to collect data from responding organisations, and each key informant was selected based upon the following three criteria: informant's knowledge on decisions relating to purchase of the service for their company (Campbell, 1955); informant's extent of participation in influencing, deciding or purchasing the service for their company (Phillips, 1981); and the

extent to which the views of the informant were representative of the views of the group responsible for buying the service described in the survey (Patterson, Johnson and Spreng, 1997). The use of these criteria resulted in retaining 453 data sets for a response rate of 31%. This response rate is consistent with studies investigating business relationships (e.g. Heide and John, 1990; Liu, 2006; Wathne, Biong and Heide, 2001; Weiss and Anderson, 1992). Of the 453 firms, 179 were small-sized firms (1-19 employees), 131 were medium-sized firms (20-199 employees), and 143 were large sized-firms (>= 200 employees). The set of services that the key informants chose to discuss represented a variety of industries including information and communication technology services (35%), basic banking and insurance services (30%), professional services (12%), facility services (9%), marketing and related services (4%), and other services. Responding organisations represented the following businesses: manufacturing, construction, internet, telecommunication, banking/financial, education, hospitality, professional, software/information technology, and other services. As a result, this study context allowed the capture of a sufficient variety of B2B relationships to test the model.

Results

A two-stage analysis was undertaken on the data set. In the first stage, EFA was performed using SPSS 13.0, while in the second stage, the scales obtained as a result of the analyses in the first stage were subjected to CFA using AMOS 5.0 with maximum-likelihood (ML) estimation to assess internal consistency, convergent validity, discriminant validity and to determine the overall fit of the measurement model.

For the first stage of analysis, Common Factor Analysis (Principal Axis Factoring using Direct Oblimin rotation) rather than Principal Components Analysis (PCA) was conducted on the data set, as the purpose was to understand the relationships amongst a set of underlying dimensions (Netemeyer, Bearden and Sharma, 2003). The KMO measure of sampling adequacy (.899) and Bartlett's test value ($p < .000$) indicated that the sample scores were suitable for EFA. A *Priori Criterion* of six factors was specified for extraction that explained 68.2% of the variance in the items. Using Pattern matrix for interpretation, we retained all items with primary loadings greater than .50 (Hair et. al., 1998) and with no cross loading exceeding half the primary component loading (Finn and Kayande, 2004) or an item that loads at .32 or higher on two or more factors (Costello and Osborne, 2005). This resulted in the deletion of one item from set-up costs and one item from post-switching costs. EFA was re-run using both *Priori Criterion* of six factors (first matrix) and Latent Root Criterion (Eigen value > 1) (second matrix). Hair *et al*. (1998) suggest that for any factor to be meaningful, at least 5% of the total variance explained should be attributable to that factor. However, the final factor (set-up costs) in the first matrix explained only 3.1% of the total variance. Further, the second matrix produced a factor with items from uncertainty and set-up costs grouping together.

Given that scale (factor) dimensionality is considered a prerequisite to reliability and validity (Gerbing and Anderson, 1988; Hair *et al*., 1998), unidimensionality was assessed by separate principal components factor analysis (PCA) with varimax rotation (Sharma and Patterson, 2000). The procedure resulted in extraction of five factors using the Latent Root Criterion, with set-up and uncertainty costs loading together as a factor, in addition to one item from set-up costs cross-loading weakly (.26) on both pre-switching search costs and post-switching learning costs. Patterson (2004) in a study of switching barriers, conceptualised set-up costs

as involving learning and search costs, while Jones, Mothersbaugh and Beatty (2002) conceptualised pre-switching, post-switching and set-up costs under a broader sub-construct, learning costs. As pre-switching costs and post-switching costs were separately and adequately represented in our model, deletion of set-up costs as a factor was considered not to affect the content validity of overall switching costs. Further examination of the rotated component matrix suggested deletion of two strong cross-loading items – one from customer-service-provider relationship costs and another from pre-switching costs. The item deletions did not appear to impair the content validity of the respective measures. PCA re-run on the data set showed the resultant five factors (using Latent Root Criterion; Scree Plot) were "clean" in that they loaded (factor loadings exceeding +/- 0.68) on one factor alone; explained 79.6% variance in the items; with the final factor explaining 7.0% variance. Next, inter-item correlations and corrected item-to-total correlations were examined. Clark and Watson (1995) advocated average inter-item correlations of above .40 as exemplary, while Bearden and Netemeyer (1998) advocated corrected item-to-total correlations above .50 as exemplary. Each dimension of the switching costs had inter-item correlation above .41 and corrected item-to-total correlation above .58.

For the second stage of analysis, a model depicting each of the five dimensions of switching costs was constructed for the purpose of performing CFA. Reliability tests were conducted using squared multiple correlations (R^2) for each measurement item. As a rule of thumb, measurement variables are reliable when R^2 of each one is greater than 0.5 (Byrne, 2001; Holmes-Smith, 2001). The first run of the measurement model showed that R^2 for all but two items from benefit-loss costs were greater than 0.5. Consequently, the two items were deleted. In the second run of testing the measurement model, R^2 values for all measurement items were greater than 0.5. Further, construct reliability should be greater than 0.7 and variance extracted > 0.50 to indicate reliable factors (Hair *et al*., 1998, Holmes-Smith, 2001). The construct reliability (C.R.) and variance extracted (V.E.) exceeded the minimum acceptable values, and are listed in table 1 with Cronbach alpha (α) values. As evidence of convergent validity, the critical ratio of every measurement item exceeded 1.96 (values varied between 9.81 and 33.68) and each switching cost item loaded significantly (>. 75) on its respective construct (Anderson and Gerbing, 1988). Further, discriminant validity was evident as the correlation between factors were lower than 0.80 (with the highest correlation being .52 between uncertainty costs and pre-switching costs).

For the assessment of the model, though the traditional chi-square is reported, reliance on the chi-square test as the sole measure of fit in a structural equation model is not recommended due to its sensitivity to sample size, especially for cases in which the sample size exceeds 200 respondents (e.g. Hair *et al*., 1998; Tabachnick and Fidell, 1996). Hence, alternative fit indices were employed to assess the "goodness of fit" of the measurement model (Byrne, 2001). The criteria are: Normed chi-square or chi-square /df, Comparative Fit Index (CFI), Non-Normed Fit Index or rho 2 (NNFI), Incremental Fit Index (IFI), Relative Fit Index (RFI) and Goodness-of-Fit (GFI) (Byrne, 2001; Hair *et al*., 1998). Usually, a value of at least 0.90 is required to accept a model, while a value of at least 0.95 is required to judge the model fit as 'good' (Holmes-Smith, Coote and Cunningham, 2004). Another approach to model fit is to accept a model that approximates the true model through the index, Root Mean Square Error of Approximation (RMSEA), with typically a RMSEA of less than 0.05 indicating close fit, and values between 0.05 and 0.08 indicating acceptable fit. The CFA indicated a good fit to the data observed (chi-square = 183.16, df = 80; chi-square /df = 2.29; CFI = .98; NNFI = .97; IFI = .98; RFI = .95; GFI = .95; RMSEA = .05).

Table 1: Reliability Test Values

Factors (with final items)	C.R.	V.E.	α
Benefit-loss costs (2 items) 1. By continuing to use the same service provider, we receive certain benefits that we would not receive if we switched to a new one. 2. Our service provider provides us with particular privileges we would not receive elsewhere.	.84	.72	.83
Pre-switching costs (3 items) 3. We cannot afford the time to obtain the information to fully evaluate other service providers. 4. Comparing our current service provider with potential service providers takes too much effort, even when we have the information. 5. Analysing the information on alternative service providers takes too much time.	.89	.72	.88
Post-switching costs (3 items) 6. Learning to use the features offered by a new service provider could take time. 7. If we switched from our current service provider, we would have to learn the new service provider's systems. 8. Getting used to how a new service provider works could be difficult.	.93	.82	.93
Uncertainty costs (4 items) 9. We don't know what we will end up having to deal with, while switching to a new service provider. 10. Switching to a new service provider will probably result in some unexpected hassle. 11. We worry that the service offered by other service providers won't work as well as expected. 12. We are not sure what the level of service would be if we switched to a new service provider.	.90	.69	.90
Customer-service provider relationship costs (3 items) 13. We have put a considerable amount of time into building and maintaining the relationship with our current service provider. 14. A lot of effort has gone into building and maintaining the relationship with the current service provider. 15. Overall, we have invested a lot in the relationship with the current service provider.	.98	.94	.93

Discussion and Further Research

Five factors of B2B switching costs have exhibited good unidimensionality, reliability, convergent validity and discriminant validity. Moreover, the CFI and other criteria indices for the overall model have been found to exceed the obligatory requirements. Consequently, while switching costs in B2B services marketing relationships can be conceptualised as a five-factor structure consisting of benefit-loss costs; uncertainty costs; pre-switching search and evaluation costs; post-switching behavioural and cognitive costs; and company-service provider relationship costs, a limitation of the study is that a convenience sample of Australian business managers was recruited. Hence, the model needs to be validated with another data set before drawing conclusions on the factor structure. Despite this concern, the instrument can be used to longitudinally measure switching cost perceptions of current customers to better manage these costs as part of an overall strategy of customer retention.

Future research might attempt to develop nomological networks that explicate a range of differential antecedents and consequences of the various switching costs.

References

Anderson, J., Gerbing, W., 1988. Structural equation modelling in practice: A review and recommended two stage approach. Psychological Bulletin 27(1), 5-24.

Bearden, W.O., Netemeyer, R.G., 1998. Handbook of Marketing Scales: Multi-Item Measures for Marketing and Consumer Behaviour Research, Sage Publications, Thousand Oaks, USA.

Bell, S. J., Auh, S., Smalley, K., 2005. Customer relationship dynamics: Service quality and customer loyalty in the context of varying levels of customer expertise and switching costs. Journal of the Academy of Marketing Science 33 (2), 169-183.

Burnham, T.A., Frels, J.K., Mahajan, V., 2003. Consumer switching costs: A typology, antecedents, and consequences. Journal of the Academy of Marketing Science 31 (2), 109-126.

Byrne, B., 2001. Structural Equation Modeling with AMOS. Lawrence Erlbaum Associate. New Jersey, U.S.A.

Campbell, D.T., 1955. The informant in quantitative research. American Journal of Sociology 60, 339-42.

Clark, L.A., Watson, D., 1995. Constructing validity: Basic issues in scale development. Psychological Assessment 7 (3), 309-319.

Colgate, M., Lang, B., 2001. Switching barriers in consumer markets: an investigation of the financial services industry. Journal of Consumer Marketing 18(4), 332-47.

Costello, A.B., Osborne, J.W., 2005. Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. Practical Assessment, Research and Evaluation 10 (7), 1-9.

Dabholkar, P.A., Johnston, W.J., Cathey, A.S., 1994. The dynamics of long-term business-to-business relationships. Journal of the Academy of Marketing Science 22 (2), 130-45.

Dillman, D.A., 1978. Mail and Telephone Surveys: The Total Design Method, Wiley-InterScience, New York.

Dwyer, F.R., Schurr, P.H., Oh, S., 1987. Developing buyer-seller relationships. Journal of Marketing 51, 11-27.

Finn, A., Kayande, U., 2004. Scale modification: alternative approaches and their consequences. Journal of Retailing 80(1), 37-52.

Fornell, C., 1992. A national customer satisfaction barometer: The Swedish experience. Journal of Marketing 56 (January), 6-21.

Gerbing, D.W., Anderson, J.C., 1988. An updated paradigm for scale development incorporating unidimensionality and its assessment. Journal of Marketing Research 25 (2) 186-192.

Guiltinan, J., 1989. A classification of switching costs with implications for relationship marketing. In: Childers TL, Bagozzi RP, Peter JP, editors. AMA Winter Educators' Conference: Marketing Theory and Practice. American Marketing Association, Chicago, IL, 216-20.

Hair, J.F.J., Anderson, R.E., Tatham, R.L., Black, W.C., 1998. Multivariate Data Analysis, 5th edn, Prentice Hall, Upper Saddle River, New Jersey.

Heide, J.B., John, G., 1990. Alliances in industrial purchasing: The determinants of joint action in buyer-supplier relationships. Journal of Marketing Research 27 (1), 24-36.

Heide, J.B., Weiss, A.M., 1995. Vendor consideration and switching behavior for buyers in high-technology markets. Journal of Marketing 59 (3), 30–43.

Holmes-Smith, P., 2001. Introduction to Structural Equation Modelling using LISREL. Perth, ACSPRI-Winter training program.

Holmes-Smith, P., Coote, L., Cunningham, E., 2004. Structural Equation Modeling: From the Fundamentals to Advanced Topics, ACSPRI-Summer Training Program, Canberra, Australia.

Hu, A.W., Hwang, I., 2006. Measuring the effects of consumer switching costs on switching intention in Taiwan mobile telecommunication services. Journal of American Academy of Business 9 (1), 75-85.

Jackson, B.B., 1985. Winning and Keeping Industrial Customers: The Dynamics of Customer Relationships, Lexington Books, Lexington.

Jones, M.A., Mothersbaugh, D.L., Beatty, S.E., 2002. Why customers stay: Measuring the underlying dimensions of services switching costs and managing their differential strategic outcomes. Journal of Business Research 55, 441-450.

Kim, M. K., Park, M. C., Jeong, D. H., 2004. The effects of customer satisfaction and switching barrier on customer loyalty in Korean mobile telecommunication services. Telecommunications Policy 28, 145-159.

Klemperer, P. 1987. Markets with Consumer Switching Costs. The Quarterly Journal of Economics 102(2), 375-94.

Kumar, N., Stem, L.W., Achrol, R.S., 1992. Assessing reseller performance from the perspective of the supplier. Journal of Marketing Research 24 (May), 238-253.

Lee, J., Feick, L., 2001. The impact of switching costs on the customer satisfaction-loyalty link: mobile phone service in France. Journal of Service Marketing 15, 35-48.

Liu, A., 2006. Customer value and switching costs in business services: Developing exit barriers through strategic value management. Journal of Business and Industrial Marketing 21(1), 30-37.

Liu, A.H., Leach, M.P., Bernhardt, K.L., 2003. Examining customer value perceptions of organizational buyers when sourcing from multiple vendors. Journal of Business Research 58, 559-568.

Lohita, R., Brooks, C.M., Krapfel, R.E., 1994. What constitutes a transaction-specific asset? An examination of the dimensions and types. Journal of Business Research 30, 261-70.

Netemeyer, R. G., Bearden, W.O., Sharma, S., 2003. Scaling Procedures: Issues and Applications, Sage Publications, Thousand Oaks.

Nielson, C.C., 1996. An empirical examination of switching cost investments in business-to-business marketing relationships. Journal of Business and Industrial Marketing 11 (6), 38-60.

Panther, T., Farquhar, J.D., 2004. Consumer responses to dissatisfaction with financial service providers: An exploration of why some stay while others switch. Journal of Financial Services Marketing 8(4), 343-353.

Patterson, P.G., 2004. A contingency model of behavioural intentions in a services context. European Journal of Marketing 38 (9/10), 1304-1315.

Patterson, P.G., Johnson, L.W., Spreng, R.A., 1997. Modeling the determinants of customer satisfaction for B2B professional services. Journal of the Academy of Marketing Science 25 (1), 4-17.

Phillips, L.W., 1981. Assessing measurement error in key informant reports: A methodological note on organizational analysis in marketing. Journal of Marketing Research 18 (November), 395-415.

Porter, M.E., 1980. Competitive Strategy: Techniques for Analysing Industries and Competitors, Free Press, New York.

Sengupta, S., Krapfel, R., Pusateri, M., 1997. Switching costs in key account relationships. The Journal of Personal Selling and Sales Management 17 (4), 9-16.

Sharma, N., Patterson, P.G., 2000. Switching costs, alternative attractiveness and experience as moderators of relationship commitment in professional, consumer services. International Journal of Service Industry Management 11 (5), 470-490.

Tabachnick, B.G., Fidell, L.S., 1996. Using Multivariate Statistics. Harper Collins, New York.

Tahtinen, J., Vaaland, T., 2006. Business relationships facing the end: Why restore them? Journal of Business and Industrial Marketing 21 (1), 14-23.

Wathne, K.H., Biong, H., Heide, J.B., 2001. Choice of supplier in embedded markets: Relationship and marketing program effects. Journal of Marketing 65(April), 54-66.

Weiss, A. M., Anderson, E., 1992. Converting from independent to employee salesforces: The role of perceived switching costs. Journal of Marketing Research 29(1), 101-115.

Wilson, D., Soni, P., Keeffe, M., 1995. Modeling Customer Retention as a Relationship Problem, ISBM Report #13-1995, Institute for the Study of Business Markets, The Pennsylvania State University, USA.

Addressing Reviewer Comments:

The paper status is that the paper be accepted without revisions and hence no changes have been made. Reviewer-1 commented that the mean score for dissatisfaction could have been provided. This was in fact mentioned in the original paper on page 2 under methodology and is also mentioned in this final paper. Other requirements such as names and affiliations and formatting issues have also been addressed in this final paper.