A TEST MODEL FOR TELECENTRE VALUE CREATION

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ABSTRACT. This paper presents results of a research to create a model for telecentre value creation. The aim is to study the effect of diffusion and adoption of information and communication technology through telecentre implementation. The National Strategic Framework for Bridging Digital Divide states that the socio-economic value could not achieve its optimal level when the focus is on diffusion. Hence this study attempts to determine the effect of diffusion and adoption on value creation individually and combined. A conceptual model was developed based on review of related literatures and then operationalized into research variables that form the questionnaire. A survey was administered and descriptive and multivariate analyses were conducted to examine the model fit and verify the model for telecentre value creation. Results of the study found compelling strong relationships on both diffusion and adoption with value creation with adoption have stronger effect on value creation as compared to diffusion.

Keywords: digital divide, diffusion, adoption, socio-economic value

INTRODUCTION

ICT has been recognized as an enabler that transforms the social and economy of a country. Venkatesh et al. (2014) and Lo et al. (2014) state that the usage of ICT is one of the indicators to measure socio-economic development for a country. Within the context of rural ICT development, value creation refers to the socio and economic benefits that are gained through ICT adoption by the rural communities. Value creation has been recognized as the ultimate goal of the Malaysian National Strategic Framework for Bridging Digital Divide (NSF-BDD) (Yogeesvaran, 2007). The term digital divide usually refers to disparities between and within societies in the use of digital technologies (Holmes, 2003). Digital divide is seen as giving values towards the benefit of development generated through ICT rather than merely having physical access to ICT (EPU, 2007). In line with this, the NSF-BDD framework defines BDD based on a three-generation gap of ICT development namely access, adoption and value creation (Yogeesvaran, 2007). This indicates that prior to benefiting from ICT adoption, both socially and economically, the community must have access to ICT infrastructure and facilities, and should be adopting ICT towards certain extent. Having had such access, the diffusion gap is said to be closer. Similarly, the more intense the ICT adoption is, the smaller the adoption gap becomes. One of the efforts in realizing the aims of NSF-BDD for the rural community is through the implementation of telecentre projects through which ICT infrastructure and facilities are provided.

Telecentres have presented significant potentials to diffuse ICTs among the poor and to bridge the digital gap (Roman, 2004; Doshi & Gollakota, 2011; Bailey & Ngweyama, 2011). Telecentres that are built in the Malaysian rural neighborhoods are under-utilized as much as they could be in delivering socio-economic value (Harris, 2005; Muhammad Sani et al., 2011; Nor Fariza et al., 2012). Most of the rural folks are reported to use these telecentres just for normal and personal routine activities such as checking e-mails, browsing the Internet and using certain computer applications (Harris, 2005; Norizan & Jalaludin, 2008).

However, Zulkhairi et al. (2013), Muhammad Sani et al. (2011) and Gollakota and Doshi (2011) indicate that studies on such initiative were conducted mainly on the supply-side of the project, which include the provision of infrastructure, connectivity, telecentre management, and deployment costs. This support what has been highlighted by O'Neil since 2002. These show that telecentres utilization is yet to be optimized to gain socio-economic benefits (Roman, 2004; Gollakota & Doshi, 2011; Zulkhairi et al., 2013; Pick et al., 2014). Hence, the focus of this study is to identify the contributing factors towards telecentre value creation, which is defined as socio-economic benefits gained from the utilization of telecentre. This is in line with one of the objectives of the NSF-BDD particularly towards increasing the socio-economic value of the community. In this study value creation refers to the performance of actions that increase the worth of goods, services or even business that ICT can bring to the community (Zulkhairi et al., 2013).

CONCEPTUAL MODEL FOR TELECENTRE VALUE CREATION

The theoretical framework applied in this study is based on Diffusion of Innovation (DOI) theory (Rogers, 1995). The theory has been analytically discussed by Roman (2004) in relation to telecentre evaluation. In his analysis, Roman (2004) pointed out that, in applying the theory to telecentre research, three main aspects need to be considered: (1) the perceived attributes of innovations, (2) the communication process, and (3) the consequences of adoption. In line with Roman's, this study regards telecentre as the innovation.

The first dimension, perceived attributes of innovations, look into how the community perceives the telecentre and the services it provides. The five factors of adoption in the original DOI theory are identified namely relative advantage, compatibility, complexity, trialability, and observability. The second dimension is the communication process. This looks into the aspect of how telecentre projects are communicated and shared, and how other innovations are created or sought for at the telecentre. The last dimension is the consequences of adoption. This can be identified by studying the costs and benefits gained by the users. This includes the socio-economic impacts resulted from a telecentre project. Hence, the third dimension can be regarded as the "value creation" of telecentre as defined in this study.

Based on the above, value creation can be affected by both diffusion (communication process) and adoption of innovation (perceived attributes of innovation). This relationship is illustrated in Figure 1.
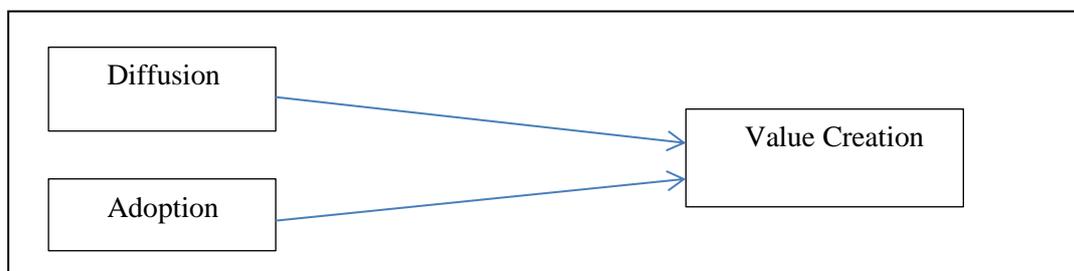

Figure 1. Conceptual Model for Telecentre Value Creation

METHODS

The research methods employed in this study is quantitative approach based on a survey of 430 respondents who are users of telecentres in the Northern Region of Peninsular Malaysia. The review of literature presented in the preceding section identifies the conceptual model that made up the three main components of the NSF-BDD, Roger's DOI, and Roman's theoretical framework for telecentres.

A questionnaire instrument was constructed by operationalizing components of the conceptual model along with questions pertaining to the demography of the respondents. Operationalization of the research variables were based on reviews of related literature particularly works by Roger (1995), Roman (2004) and Gollakota and Doshi (2011). All items in the constructs were measured using close-ended 5-point Likert-scale. The questionnaire was divided into four (4) sections that are demography of the respondent, perceived attributes of innovations (adoption), communication process of diffusion (diffusion), and consequences of innovation (value creation). The final questionnaires were distributed to 19 telecentres using stratified and proportionate sampling.

Reliability tests were conducted for each of the construct to check for internal consistency of responses. The reliability coefficient (Cronbach's alpha) for multiple items was used in the study. Results of the Cronbach's alpha shows alpha values greater than 0.6 for all the constructs, which according to Hair et al. (2006) indicate the responses were reliable with acceptable internal consistency. Hence, this enables further analysis of the data to be carried out.

FINDINGS

The majority of the respondents were youth (33.9%), followed by adults (21.9%), teenager (19.0%), senior citizen (13.9%), and children (11.3%). The majority of respondents were female (52.6%), married (44.0%), from the Malay ethnic (99.3%), and Muslim (99.1%). In terms of occupation, respondents comprised of self-employed (8.8%), civil servants (5.8%), housewives (5.4%), business (4.8%), and students (3.7%). About 48.4% of the respondents have monthly incomes between RM831 - RM3000, and 31.8% with incomes between RM521 - RM830. Only 9.6% of them have monthly incomes above RM3000. About 36.3% of the respondents completed secondary school while 10.0% were diploma holders with only 7.2% graduated from university and 8.2% have no formal education.

In terms of ICT usage, the study shows that 44.5% of the respondents owned computer at home. However, only 25.7% have Internet connection; with 57.1% chose fixed line and only 0.5% opted for Wifi. With regards to the respondents' preferences on using telecentre, it was found that 71.6% (308) of the respondents use telecentre. Those who do not use telecentres indicate the main reasons for not using due to inconvenient location, no necessity and not meant for them.

For the independent variables Diffusion and Adoption, the study found that both scored close to 4 which indicate that overall respondents agreed on the perceived attributes of innovation and the communication process of diffusion. The mean score for dependent variable was 3.82, which indicates that respondents agree that telecentre provides both social and economic benefits to the community.

To understand the relationships on the effects of diffusion and adoption of the telecentre, simple and multiple regression analyses were carried out on the Diffusion and Adoption (independent variables), with Value Creation (dependent variables). In addition, relationships between the independent variables Diffusion and Adoption were tested individually and combined to determine their effects on Value Creation. To test these relationships, three hypotheses were formulated as follows:

H₁: A significant positive relationship exists between Diffusion and Value Creation.

H₂: A significant positive relationship exists between Adoption and Value Creation.

H₃: A significant positive relationship exists between Diffusion and Adoption with Value Creation.

Constructs for Measuring Value Creation

Factor analysis was carried out to validate the construct for measuring value creation. The instrument used in the survey identified 20 items to measure Value Creation. Some of these items were almost identical and gives almost similar interpretation that resulted in high inter-correlation. To reduce the complexity of the measurement, factor analysis was carried out which attempts to bring intercorrelated items together under more general, underlying variables (Kootstra, 2004). However, factor analysis can only be carried out with the assumption that the data is normally distributed. Using gender to test the normality, a Shapiro-Wilk's test ($p>0.05$) and the skewness and kurtosis z-values showed that the data is approximately normally distributed for both genders. The Shapiro-Wilk's test of normality shows the p-value = 0.064 for male and p-value = 0.075 for female with skewness of 0.367 (SE = 0.245) and a kurtosis of 0.870 (SE = 0.485) for the males and a skewness of 0.023 (SE = 0.224) and kurtosis of 0.183 (SE = 0.444) for females. In addition, a small variance inflation factor of 1.262 (VIF < 5) indicates multicollinearity was not an issue.

Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity were calculated to measure the sampling adequacy. A KMO > 0.5 and a significant Bartlett's test ($p < 0.05$) will indicate that the sample is adequate for multivariate analysis. The results show that the tests meet the conditions for conducting the factor analysis. Varimax with Kaiser Normalization was used as the rotation method. Factor analysis stopped after 5 iterations when the rotation converged. Three components (factors) were extracted together accounted for 69.17% of total variance explained. Items in the Rotated Component Matrix with factor loadings > 0.5 were grouped under the corresponding component. Based on the groupings, the three components that measure Value Creation were identified as (1) Telecentre able to increase social value, (2) Telecentre able to increase economic value, and (3) Telecentre is time worth spent for. These three components (factors) made the construct space for measuring Value Creation.

Model for Telecentre Value Creation

This section presents the results of the hypotheses tests, which will be used to create the Model for Telecentre Value Creation.

Hypothesis 1: Diffusion contributes to value creation.

The result shows a significant relationship between Diffusion and Value Creation at $p < 0.01$, indicating the null hypothesis is rejected. Hence, hypothesis 1 is supported. The regression coefficient R is 0.392 which is moderately strong and the regression model accounts for 15.4% of the variance. This means that Diffusion of innovation by means of telecentre has a significantly moderate effect on Value Creation.

Hypothesis 2: Adoption contributes to value creation.

The result shows a significant relationship between Adoption and Value Creation at $p < 0.01$, indicating the null hypothesis is rejected. Hence, hypothesis 2 is supported. The regression coefficient R is 0.544 which is strong and the regression model accounts for 29.6% of the variance. This means that Adoption of innovation by means of telecentre has a significantly strong effect on Value Creation.

Hypothesis 3: Both Diffusion and Adoption combined contributes to Value Creation.

The result shows a significant relationship between Diffusion and Adoption with Value Creation at $p < 0.01$, indicating the null hypothesis is rejected. Hence, hypothesis 3 is supported. The regression coefficient R is 0.568, which is strong and the regression model accounts for 32.3% of the variance. This means that Diffusion and Adoption of innovation by means of telecentre has a significantly stronger effect on Value Creation.

DISCUSSION AND CONCLUSION

Results of this study show that Adoption has stronger effect than Diffusion and accounts for higher variability. This may suggest that while both diffusion and adoption of the telecentre contributes to higher socio-economic value, adoption appears to be more prominent in the model. The combination of diffusion with adoption has greater impact to socio-economic value of the community in which the telecentre resides compared to if they were to be focused separately. This implies that the infrastructure, location and facilities provided to the telecentre should be in place and properly maintained to attract members of the community to use the facilities provided. Only when this is in place can adoption functions, and with adequate applications and content that meets the needs of the community, socio-economic value creation can be significantly increased. This is in line with the concept of the NSF-BDD, in which socio-economic value creation can be better achieved and reached optimal level when emphasis is given to adoption, assuming that diffusion has already occurred. Hence adoption needs to be given more emphasis in order to get better returns on value creation. This study has therefore provided evidence empirically that the implementation of telecentre in Malaysia guided by the NSF-BDD framework is geared not only towards bridging the digital divide between rural and urban communities, but also perceived to be able to support the social and economic development of the rural areas through implementation of the telecentre initiatives.

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REFERENCES

Bailey, A., & Ngwenyama, O. (2011). The challenge of e-participation in the digital city: Exploring generational influences among community telecentre users. *Telematics and Informatics*, 28(3), 204-214.

Economic Planning Unit (EPU) (2007). Rangka Kerja Strategik Kebangsaan bagi Merapatkan Jurang Digital (NSF-BDD). Presented at *Bengkel Pusat Perkhidmatan dan Ilmu Komuniti Peringkat Negeri Pulau Pinang*, 13 Jun 2007.

Gollakota, K. & Doshi, K. (2011). Diffusion of technological innovations in rural areas. *Journal of Corporate Citizenship*, 41, 69-82.

Hair, J. F., Black, W., Babin, B., Anderson, R. & Tatham, R. (2006). *Multivariate Data Analysis.* Prentice Hall, Inc.: Upper Saddle River, NJ, USA.

Harris, R. W. (2005). Effective Design and Delivery of Rural Community ICT Services. Paper presented at the *Economic & Social Commission for Asia & the Pacific*, Kuala Lumpur, Malaysia.

Holmes, N. (2003) The digital divide, the UN, and the computing profession. *Computer*, 36(12), 144-143.

Kootstra, G.J. (2004). *Exploratory Factor Analysis: Theory and Application*. Retrieved on 5 April 2015 at http://www.let.rug.nl/nerbonne/teach/stats/factoranalyseGerritJan040507.pdf

Lo, M. C., Cheuk, S., & Atang, A. (2014). Telecentre, Tourism and Their Impacts on Bario, Malaysia. *Middle-East Journal of Scientific Research,* 21(6), 950-961.

Nor Fariza Mohd, Norizan Abdul Razak, & Jalaluddin Abdul Malek (2012). Telecentres as training Centres of E-learning for the Marginalized Community: The Malaysian Experience. *WSEAS Transactions on Information Science and Application*, 9(5), 147-157.

Norizan Abdul Razak & Jalaluddin Abdul Malek (2008). Bridging digital divide in Malaysia: Cyber learning for the marginalized community. In *Distance Learning and the Internet Conference,* 19-22.

O'Neil, D. (2002). Assessing Community Informatics: A Review of Methodological Approaches for Evaluating Community Networks and Community Technology centres. *Internet Research: Electronic Networking Applications and Policy*, 12(1), 76-102.

Pick, J. B., Gollakota, K., & Singh, M. (2014). Technology for Development: Understanding Influences on use of Rural Telecenters in India. *Information Technology for Development*, 20(4), 296-323.

Roman, R. (2004). Diffusion of Innovation as a Theoretical Framework for Telecenters. *Information Technologies and International Development*, 1(2), 53-56.

Rogers, E. (1995). *Diffusion of Innovations (4th Edition)*. New York Free Press.

Venkatesh, V., Sykes, T. A., & Venkatraman, S. (2014). Understanding e-Government portal use in rural India: role of demographic and personality characteristics. *Information Systems Journal*, 24(3), 249-269.

Yogeesvaran, K. (2007). National strategic framework for bridging the digital divide and the need for upgrading and expanding ICT infrastructure. *MyBroadband 2007 Conference and Exhibition 10-12 Sept 2007*, MATRADE Exhibition & Convention Centre, Kuala Lumpur.

Zulkhairi, M. D., Nor Iadah, Y., Huda, I.,Mohd Khairudin, K., Zahurin, M. A. & Nafishah, O. (2013). Towards meeting information needs of rural community: transforming access to value creation, *AWERProcedia Information Technology & Computer Science*. 3, 1129-1134. Available from: http://www.world-educationcenter.org/index.php/P-ITCS.