Rural Informatics Engineering: Assessing Technology Readiness of Rural Community towards Implementation of e-learning

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Abstract: - This study investigates the technology readiness of rural community in Malaysia by using villagers of Kampung Tengah, Melaka, Malaysia as the case study. Samples consist of 150 respondents from Kampung Tengah Melaka was gathered through collection of manual distributed questionnaire. The dimensions of technology readiness investigated are insecurity, discomfort, optimism, innovativeness and all (inclusive of insecurity, discomfort, optimism, innovativeness dimensions). An analysis based on gender differences was conducted by using Kruskal-Wallis. The results show that there are significant differences for 'Discomfort' dimension based on the gender groupings. An inspection of mean shows 'Female' group had the highest means for 'Discomfort dimension. The results of this study may provide reference and guideline for better understanding of different gender group among rural community to improve the technology readiness level. Federal, state and municipal governments may use this result to develop better plan and implementation strategies to contribute for sustainable future of ICT-based initiatives. The effort for better understanding of the complexity of rural community in Malaysia may contribute better understanding for gender empowerment among rural communities in Malaysia towards the creation of e-learning.

Key-Words: - Technology readiness, gender empowerment, rural informatics engineering, digital divide

1 Introduction

Recent debate on gender and ICT has been overwhelming. Most of the debate exhibits arguments and findings on diverse gender studies encompassing aspects of ICT, digital artifacts and systems across disciplines. Platform for debates and discussion can be seen in specialized conferences, symposiums and seminars with thematic areas such as Empowering Women in ICT, Gender and Innovations, Feminist Theories, Gender and ICT Trough the Lifecycle, Feminist Interventions in Theories and Practices, and many more. These research and academic efforts are realized to among others gain understanding of how gender-based research may contribute to sustainable future of ICT-based initiatives towards the creation of digital artifact such as e-learning, e-commerce, web portal and artificial social system for rural community.

Focus of research has been diverse in the academia, and to list a few they have been on attitudes, anxiety, usefulness, user friendliness, experience, expectations, relationships, expertise, vision, visibility, roles, influence, and competency [1-4], via the use of Feminist approach [3] [5], action research [4], empirical research [2], focusing on gendered digital divide in rural areas [6], developing regions [4-5] and other backgrounds. In the research of gender differences and ICT in terms of usefulness, user friendliness and usage adopting Technology Acceptance Model (TAM) [1], there were differences in results between genders, there were no significant difference in overall ICT usage. In addition, the gap between men and women in terms of gaining access to ICT is determined by the mixture of gender and other socioeconomic factors [7].

The socialization process which undermines the women capabilities might be one reason that makes them reluctant to adopt the ICT. One alternative to promote gender equality is by targeting women in rural community and attempts to reduce digital divide with ICT initiatives, training and awareness campaigns.

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2 Literature Review

2.1 Gender Empowerment in ASEAN countries

Table 1. Global gender gap in ASEAN countries [8]

Country	Global gender gap index 2011 rank *(Out of 135 countries)*	Global gender gap index 2010 rank *(Out of 134 countries)*	Global gender gap index 2009 rank *(Out of 134 countries)*
Philippines	8	9	9
Singapore	57	56	84
Thailand	60	57	59
Brunei	76	77	94
Vietnam	79	72	71
Indonesia	90	87	92
Malaysia	97	98	100
Cambodia	102	97	104

** *No data on Laos and Myanmar* [8]

United Nations identify access to information technology as the third most critical concern facing women, after poverty and violence (as cited in [9]). Yi's (2011) report shows that Asian young women, in general, are becoming more educated than male and will take on a greater role in the economy especially in IT industries [10]. There are now more women than men join in tertiary education in most ASEAN countries [10]. Table 1 shows, the global gender gap rank among ASEAN countries with Philippines and Singapore hold the highest ranking among ASEAN countries, in 2011. However, Indonesia, Malaysia and Cambodia still ranks the lowest among ASEAN countries for the global gender gap index rank.

Table 2. Detailed ranking of gender equality ranking in ASEAN countries (2011) [8]

Country	Overall 2011 rank	Economic Participation & Opportunity 2011 rank	Educational Attainment 2011 rank
Philippines	8	15	1
Singapore	57	16	100
Thailand	60	41	82
Brunei	76	20	52
Vietnam	79	40	104
Indonesia	90	101	93
Malaysia	97	95	65
Cambodia	102	75	116

** *No data on Laos and Myanmar* [8]

Based on Table 2, in 2011, the Philippines is the only country among ASEAN countries, to have closed the gender gap in both education and health [8].

2.2 Gender and ICT

Evident from past literature that gender discrepancies in the inception of ICT is not a trivial matter. Most of the scholars in gender and ICT domain agree that ICT stakeholders must recognize the importance of narrowing digital divide among genders to serve effectively the intended target of empowerment with ICT [1-6] and that gender equalities should be prominent in ICT for development agenda. There is empirical evidence [3] of women engagement and agency in ICT, and thus suggested antithesis to the gender technology theories that suggested women as disconnected or passive from technology.

The manufacturing culture of IT work has an adverse impact on the participation and progress of woman [11] based on the distinct comparison of attributes between men and woman. Examples include; (i) men is more strict than woman [12], and (ii) women are not able to work straight hours and keep up with technology as compared to men [13]. While supporting that ICT is the key driver for rural development, rural women are still deserted in the aspect of access to ICT. Tremendous poverty and deprived IT infrastructure in rural areas may further limit women's access to information technology and education [9].

There is a need for more strategies and actions to satisfy the requirements rural women towards gender empowerment, such as with ICT policy development [6] and through the usage of telecentres [14]. Similarly, towards the effective use of ICT, socio-cultural factors with focus on gender perspective must be given significant attention in designing technology for the wide acceptance of ICT [4]. This is because the past encounters repeatedly show that rural communities have unique technological requirements and not much is known about how rural communities use modern technologies [15].

2.3 Gender empowerment towards ICT in Malaysia

It is important to realize that ICT should be adopted by all regardless of gender, races or ages. Thus, some research have been undertaken to look at gender equality in ICT usage from Malaysia perspective. In the education sector, several researches have been carried out to look at gender issues and ICT for learning. The research revealed the dominance of man in terms of skills including programming and computer repair and maintenance [16-17]. Male has also reported to had greater

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computer experience and greater self-perceived control [17].

From ICT usage in work, a consultation work sponsored by the Ministry of Women, Family and Community Development, Malaysia, lead by Wazir Jahan in 2003 has conducted a survey to investigate the performance and achievement of women in ICT industry [18]. The research revealed that man is more competitive and is more attracted working in the private sectors due to higher income. Comparing the salary received, man received higher salaries even though they have the same set of skills and experience with women. They are given highest priority because they are perceived to be more skilled in this area.

Furthermore, Su Luan et al. (2005) reports on a descriptive study, that assess existing levels of information and communication technology (ICT) competencies among the academic employees of Universiti Putra Malaysia (UPM) according to gender [19]. Their research revealed that academician in the university does not regard ICT use as a male dominated ritual. These examples of research and academic efforts are realized to among others gain understanding of how gender-based research may contribute to better understanding towards sustainable future of ICT-based initiatives in Malaysia.

2.4 Technology Readiness Index

The technology readiness index (TRI) was developed to measure people's propensity to adopt new technologies for accomplishing tasks [20-22]. In order to measure positive or negative response of technology as high, medium and low, technology readiness can be categorized into four dimensions of technology readiness dimensions; insecurity, discomfort, innovativeness and optimism. The four technology readiness dimensions are briefly explained as follow [20-22]:

i. **'Optimism'**: *'A positive view towards technology. Beliefs in the benefits of technology as it increase efficiency & create added values at work & home'.*

ii. **'Innovativeness'**: *'Believes as a thought leader, and at the forefront of attempting new technology-based products or services.*

iii. ***'Discomfort':*** *A perceived lack of control over technology and a feeling of lack of confidence in using the new technologies properly.' 'Certain paranoia that individual had regarding technology based product and services. They believed technology excluded people rather than including them.'*

iv. **'Insecurity':** *'Distrust of technology-based transactions and feeling skeptical about their ability to work properly.'*

3 Research Method

The Technology Readiness Index (TRI) is copyrighted by Parasuraman and Rockbridge Associates, Inc. (1999) was adopted from the technology readiness index (TRI) into Malay language [20-22] with written consent from the authors. The questionnaire was distributed to 150 villager of Kampung Tengah, Melaka, Malaysia.

4 Results

4.1 Descriptive statistics

The total valid data's gathered from the questionnaires are 150 respondents. As mention above, here are the results of questionnaires presented in descriptive statistics. Male respondents composed 58.7% of respondents while the percentage of female respondent is 41.3%.

4.2 Total Optimism Dimension Analysis

Using Shapiro-Wilk's W test, the p-value is .000 is less than 0.05, thus the distribution is not normal. Since data is not normal, Kruskal-Wallis test was used.

Research Hypothesis 1:

Is there enough evidence that on the average total score on total optimism dimension of technology readiness is different based on different gender groups of Kampung Tengah, Melaka *(male and female groups)*?

Sig-value was 0.092.This is greater than alpha level 0.05. We fail to reject the null hypothesis and conclude that the analysis does not support the research hypothesis that the average mean rank for frequency of total optimism dimension is different for gender groups *(male and female groups).*

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4.3 Total Innovative Dimension Analysis

Using Shapiro-Wilk's W test, the p-value is .003 is less than 0.05, thus the distribution is not normal. Since data is not normal, Kruskal-Wallis test was used.

Research Hypothesis 2:

Is there enough evidence that on the average total score on total innovative dimension of technology readiness is different based on gender grouping of Kampung Tengah, Melaka *(male and female groups*)?

Sig-value was 0.187.This is greater than alpha level 0.05. We fail to reject the null hypothesis and conclude that the analysis does not support the research hypothesis that the average mean rank for frequency of total innovative dimension of technology readiness is different for gender groups *(male and female groups).*

4.4 Total Discomfort Dimension Analysis

Using Shapiro-Wilk's W test, the p-value is .000 is less than 0.05, thus the distribution is not normal. Since data not normal, Kruskal-Wallis test was used. Subsequently, we compare the mean of two independent groups *(male and female groups).*

Research Hypothesis 3:

Is there enough evidence that on the average total score on total discomfort dimension of technology readiness is different based on gender groupings of Kampung Tengah, Melaka *(male and female groups)*?

Sig-value was 0.046. This is less than alpha level 0.05, so we can conclude that there is statistically significant difference in the total discomfort dimension of technology readiness across two groups of male and female. An inspection of the mean ranks in Table 3, suggests Female group had the highest level on the total discomfort dimension of technology readiness. This may be due to the cultural influences and distinct primary role of women in rural communities as the caretaker of the family and men as the breadwinner.

Table 3: Mean rank of two independent groups
(total discomfort dimension of technology readiness)

	Gender	N	Mean Rank
Total Discomfort	Male	88	69.59
	Female	62	83.90
	Total	150	

4.5 Total Insecurity Dimension Analysis

Using Shapiro-Wilk's W test, the p-value is .000 is less than 0.05, thus the distribution is not normal. Since data is not normal, Kruskal-Wallis test was used.

Research Hypothesis 4:

Is there enough evidence that on the average total score on total insecurity dimension of technology readiness is different based on gender groups of Kampung Tengah Melaka *(male and female groups)*?

Sig-value was 0.200.This is greater than alpha level 0.05. We fail to reject the null hypothesis and conclude that the analysis does not support the research hypothesis that the average means rank for frequency of total insecurity dimension of technology readiness is different based on gender groups *(male and female groups).*

4.6 Total Overall of Technology Readiness Dimensions (Discomfort, Insecurity, Innovative, Optimism) Dimension Analysis

Using Shapiro-Wilk's W test, the p-value is .006 is less than 0.05, thus the distribution is not normal. Since data is not normal, Kruskal-Wallis test was used.

Research Hypothesis 5:

Is there enough evidence that on the average total score on the total overall dimension of technology readiness *(inclusive of discomfort, insecurity, innovative, optimism dimensions)* is different based on gender of Kampung Tengah, Melaka *(male and female groups)*?

Sig-value was 0.325.This is greater than alpha level 0.05. We fail to reject the null hypothesis and conclude that the analysis does not support the research hypothesis that the average mean rank for frequency of total overall of technology readiness is different for gender groups *(male and female groups).*

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5 Conclusion

This study investigates the technology readiness of rural community in Malaysia by using villagers of Kampung Tengah, Melaka as the case study. Data gathered from this empirical research will be analysed by using Kruskal-Wallis. Samples consist of 150 respondents from Kampung Tengah Melaka was gathered through collection of manual distributed questionnaire. The dimensions of technology readiness investigated are optimism, innovativeness, insecurity, discomfort, and all *(inclusive of optimism, innovativeness, insecurity, and discomfort dimensions).*

Out of the five research hypothesis, only one hypothesis is proven. The result showed that there were significant differences for 'Discomfort' dimension based on gender groupings. An inspection of mean shows 'Female' group had the highest means for 'Discomfort' dimension of technology readiness. This may be due to the cultural influences and distinct the primary role of women in rural communities as the caretaker of the family and men as breadwinner. Due to this empirical evidence, more specialized awareness campaign and training and development courses on relevant technologies such as e-learning, among rural women should be designed.

Studies that investigate the gender inequalities are important to guide in planning and strategizing better uptake of ICTs especially among the rural communities. The results of this study may provide reference and guideline for customization and better understanding for different gender group to improve the technology readiness level. Federal, state and local municipal governments may use this result to develop better plan and implementation strategies towards sustainable future of ICT-based initiatives. The growing number of studies on e-learning and educational website in Malaysia [23-24], also provides the motivation of emphasis being given towards development of policy and future e-learning based initiatives at rural areas in Malaysia.

Even though this study has the intrinsic limit of the small dimension of the inquired population, some general insights can be drawn based on the sample. Future work may involve qualitative inquiry and further empirical investigation and analysis based on other demographic profiling such as age, race and income. The ongoing effort for better understanding of the complexity of rural community in Malaysia may contribute better understanding for gender empowerment among rural communities in Malaysia towards the creation of e-learning.

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