Influence of internet usage on social and subjective well-being of Sri Lankan GLIS

İnternet kullanımın Sri Lanka'daki bağımsız mucitlerin sosyal ve öznel iyi oluşuna etkisi

C. Nalaka Wickramasinghe[1], Nobaya Ahmad [2]

Abstract

The Internet has significantly contributed to the drastic growth of technological inventions and innovation in the world. The majority of the inventors in developing countries is independent inventors work on inventions by their own interest. The Internet has been one of the leading knowledge repositories for these independent inventors to search clues for their inventions. Owing to the self-driven behavior of the independent inventors, they might gain success and perceive happiness through the inventive activities that involved searching and creation of new knowledge. However, there is hardly any study that explains the influence of the Internet usage on social and psychological aspects of grassroots level inventors (GLIS). Therefore, the existing knowledge on how the Internet usage influence on social capital, connectedness, success and subjective well-being of inventive community in developing countries is not exact. Present study explores the influence of the Internet usage on social capital, community connectedness, inventive achievements and subjective well-being of the grassroots level inventive community of Sri Lanka. Findings suggest that the Internet has significant direct influence on the subjective wellbeing of GLIS in Sri Lanka. Further The Internet usages indirectly influence the subjective well-being through social capital and connectedness. However, The Internet usage has not significantly influenced on the objective inventive achievements of the GLIS in Sri Lanka.

Keywords: Subjective well-being, grassroots, inventors, happiness

Özet

İnternet, dünyadaki teknolojik buluşlara ve yeniliklere ilişkin gelişmelere önemli ölçüde katkıda bulunmuştur. Gelişmekte olan ülkelerdeki mucitlerin çoğunluğu, buluşlar üzerinde kendi ilgileri doğrultusunda çalışan bağımsız buluşçulardır. İnternet, bu bağımsız mucitlerin buluşlarına yönelik ipuçlarını aradığı önemli bilgi kaynaklarından biri olmuştur. Bağımsız mucitlerin içten gelen davranışları nedeniyle, bu kişiler, yeni bilginin araştırılması ve yaratılması süreçlerini kapsayan buluş faaliyetleri ile başarı kazanabilir ve mutluluğu algılayabilirler. Ancak, internet kullanımının halk düzeyindeki mucitlerin sosyal ve psikolojik yönleri üzerindeki etkisini açıklayan neredeyse hiçbir çalışma bulunmamaktadır. Bu nedenle, internet kullanımının buluşçu toplumun sosyal sermayesini, bağlanabilirliğini, başarısını ve öznel iyi oluşunu nasıl etkilediğine ilişkin mevcut bilgiler kesin değildir. Bu çalışma, internet kullanımının Sri Lanka'nın bağımsız mucitlerinin sosyal sermayesi, topluma olan aidiyeti, buluşçu başarıları ve öznel iyi oluşu üzerindeki etkisini araştırmaktadır. Bulgular, internetin Sri Lanka'lı bağımsız mucitlerin, öznel iyi oluşu üzerinde doğrudan anlamlı etkiye sahip olduğunu göstermektedir. Ayrıca internet kullanımları, sosyal sermaye ve bağlanabilirlik aracılığıyla öznel iyi oluşu dolaylı olarak etkilemektedir. Ancak, internet kullanımı, Sri Lanka'lı bağımsız mucitlerin amaçlanan buluşçu başarıları üzerinde anlamlı bir etkiye sahip değildir.

Anahtar sözcükler: Öznel iyi oluş, halk, mucitler, mutluluk

Introduction

The Internet has changed the nature of the transmission of information in modern world. Modern information and communication technologies leading by the Internet are pretended to be significant

[1] Dr. Department of Commerce and Financial Management University of Kelaniya, Sri Lanka, nalakacw@yahoo.com
[2] Dr. Faculty of Human Ecology University Putra Malaysia, Serdang, Selangor, Malaysia nobaya@putra.upm.edu.my

contributors to bring the technical and economic change to the different types of communities in different part of the world (Thakur, 2009). Further, it has been identified as the world largest knowledge depository and more efficient communication channel that can bring change to the underprivileged sections of the world. In general, the Internet has recognized as a tool that can increase the technology transfer across the developing countries to achieve success in technological and economic development (United Nations Development Program, 2001). Apart from the technological and economical influences of the Information and Communication Technology (ICT), there is an emerging argument about the positive influence of the Internet on the social and psychological aspects of life.

In 1990s, the Internet was explained to be negatively affected the social and psychological aspect of people; however according to the recent studies, the Internet usage has been recognized as an influential factor of knowledge development, social thinking and subjective well-being (Kraut et al, 2002; Contarello & Sarrica, 2007; Weiser, 2004). The Internet has changed the way social relationships are progressing in modern societies (Kraut et al., 2002). Furthermore, a study conducted based on the World Values Survey (2005-2007) data found that there is positive relationship between the Internet usage and happiness ((BCS-Chartered Institute for IT, 2010). Hence, the influence of the Internet usage is going beyond from just communication towards positive influence on the social and psychological aspects of life as well (Pigg & Crank, 2004). However, the density of the social and psychological influences of internet might be different from community to community or even individual to individual. Hence, findings of previous studies would not be sufficient to explain the influence internet usage in a different population.

According to the forgoing literature, independent inventors are the major source of technological innovations in most of the developing countries (Gupta, et al., 2003). The majority of the patent applications in developing countries have been forwarded by the ordinary people in the society (Weick & Eakin, 2005). However, owing to the drastic growth of the organization and cooperate innovations, attention given to these individual, independent or garage inventors has been very modest. Hence, there was hardly any published study that investigate about the nature of independent inventive community in developing countries. Hence, there was no formal definition even to recognize the independent inventors in developing countries (Wettansinha, Wongtschowski, & Waters-Bayers, 2008).

Owing to the drastic growth of cooperates, institutional and university inventors, ordinary people who engaged in inventive activities have become the lowest layer of the innovation system. According to the existing definitions, lowest layers of a social system are often called as the grassroots level. Hence, the present study define the independent inventors as grassroots level inventors. Grassroots Level Inventors (GLIs) is a local individual of a country, who involves in patentable inventive activities and trying to obtain patents for himself, for his own reasons and own rewards out of the formal organizational structures such as firms, universities and research labs (Wickramasinghe C. N., Ahmad, Rashid, & Emby, 2010). Owing to the independent nature of the grassroots level inventive activities, they do not receive the required information resources, knowledge and social attention as the employed inventors in multinational companies or research institutions. Hence, objective and subjective achievements and social connectedness of the GLIs heavily depend on the information, knowledge and resources they are gaining from the available sources. Owing to the self-driven behavior of the GLIs, they might gain happiness through the activities that search new knowledge and apply them in their inventions. However, there is hardly any study explain the influence of GLIs' knowledge searching in the Internet on their social and psychological aspects of lives. Therefore, the existing knowledge about how the Internet usage can influence on social capital, connectedness, success and subjective well-being of GLI community in developing countries is not exact.

Research Problem and Aim of the Study

The Internet was expected to provide information resources for poor and underprivileged communities in the society (Sarrica, 2010). Hence, the Internet might be a significant driving force of the continuation of the GLI community even in the modern knowledge society that does not favor for their presence. Even though the influences of the Internet usage on objective achievements of inventors have been studied in western countries, the influence of the Internet usage on social and subjective aspects of life has not been extensively studied. Especially the comprehensive efforts taken to explain the empirical evidences of objective, subjective and social impact of the Internet usage on GLI communities in lower and middle income countries are very rare.

Sri Lanka is multi-ethnic, lower middle-income island nation in South Asia with only 20 million population. Sri Lanka has comparatively higher income level and human development index than other South Asian countries. However, compared to the neighboring countries in South-East Asia, Sri Lanka has been fallen behind in technological development (Wickramasinghe & Ahmad, 2009). According to the recent statistics, 85% of patent applications in Sri Lanka are forwarded by the GLIs and this percentage has been kept increasing with the growth of the Internet (Wickramasinghe C. N., Ahmad, Rashid, & Emby, 2010). However, majority of the inventive success measures, such as number of patents, patent citations, commercialized inventions and profits are not very promising among the GLIs in Sri Lanka (Wickramasinghe C. N., Ahmad, Rashid, & Emby, 2011). These adverse objective outcomes have raised questions; why these GLIs keep engage in inventive activities? Do they gain positive psychological results through inventive activities that improve their subjective well-being and how the Internet usage have influenced on their inventive lives? This paper aim to explore the influence of the Internet usage on the social capital, community connectedness, objective and subjective well-being of the GLIs in Sri Lanka.

Correlates of Subjective Well-Being

Internet Usage: Internet usage has been identified as an influential factor of knowledge development, social thinking and subjective well-being (Kraut et al., 2002; Contarello & Sarrica, 2007; Weiser, 2004). Further the Internet has redefined the way social relationships are progressing (Kraut et al., 2002). In 1990s the Internet was thought to have negative impact on the social and psychological well-being of the society. However, recent empirical studies have found that the Internet either does not have impact (Jackson et al., 2004) or has positive impact on the happiness and satisfaction of people who use the Internet resources for their advantage (Kiesler et al., 2002). Meanwhile studies on independent inventors have found that the Internet usage is one of the main resource provider for the grassroots level inventors in Georgia (Georgia Tech Enterprise innovation Institute, 2008). Therefore, the Internet usage of GLIs is expected to have significant positive influence on their subjective well-being.

Social Capital: Recent literature has highlighted the importance of individual social capital as significant contributor of subjective well-being (Yip et al., 2007; Cheung & Chan, 2008; Helliwell & Putnam, 2004). Social capital improves the subjective well-being by giving opportunities to the community members to share knowledge, resources and feelings (Winkelmann, 2009). Hence, the present study assume the individual social capital as a significant positive predictor of subjective well-being of grassroots level inventors.

Community Connectedness: Previous studies have found that social connectedness (sense of community) positively correlate with the subjective well-being (Helliwell J. F., 2003; Helliwell & Putnam, 2004; Winkelmann, 2009; Helliwell J. F., 2007). Whereas, lack of social connections decreases the subjective well-being (Dolan, Peasgood, & White, 2008). Davidson and Cotter (1991) have found that a strong sense

of community has positive correlation with the happiness of the people (Davidson & Cotter, 1991). Yoon, Lee and Goh also found a positive relationship between social connectedness and subjective well-being (Yoon, Lee, & Goh, 2008). Owing to the majority of studies on community connectedness indicate positive correlation with subjective well-being, the present study hypothesized community connectedness as a significant positive predictor of the subjective well-being of GLIs.

Theoretical Model

Recent literature on the Internet usage has indicated the influence of the Internet usage on the social capital, community participation and empowerment of the different social segments of the society (Haythornthwaite & Kendall, 2010; Robinson & Martin, 2010; Pénard & Poussing, 2010). Number of studies have explained the influence of the Internet usage on the subjective well-being of other social groups through the social networks (Bruke, Marlow, & Lento, 2010; Sum, Mathews, Pourghasem, & Hughes, 2009). Further, the Internet usage has been identified as the main knowledge source of the successful inventors in the developed countries (Georgia Tech Enterprise innovation Institute, 2008). As far as is known, there is hardly any published studies made an effort to explore how the Internet usage influence on the social capital, connectedness, objective and subjective success of GLIs in developing countries like Sri Lanka.

According to the bottom-up theories, subjective well-being is the ultimate success in life. Whereas, all the objective achievements in life domains bring the positive or negative effects on the subjective well-being (Diener E. , 2009 a). Subjective well-being theories and findings of previous studies have suggested social capital, community connectedness and objective success as the positive mediating factors between the Internet usage and subjective well-being. Based on the theoretical and empirical evidences of the previous literature, the researchers developed correlational research model to explore how the Internet usage influence on the social capital, community connectedness, objective success and ultimately the subjective well-being of the GLIs in Sri Lanka (Figure 1).

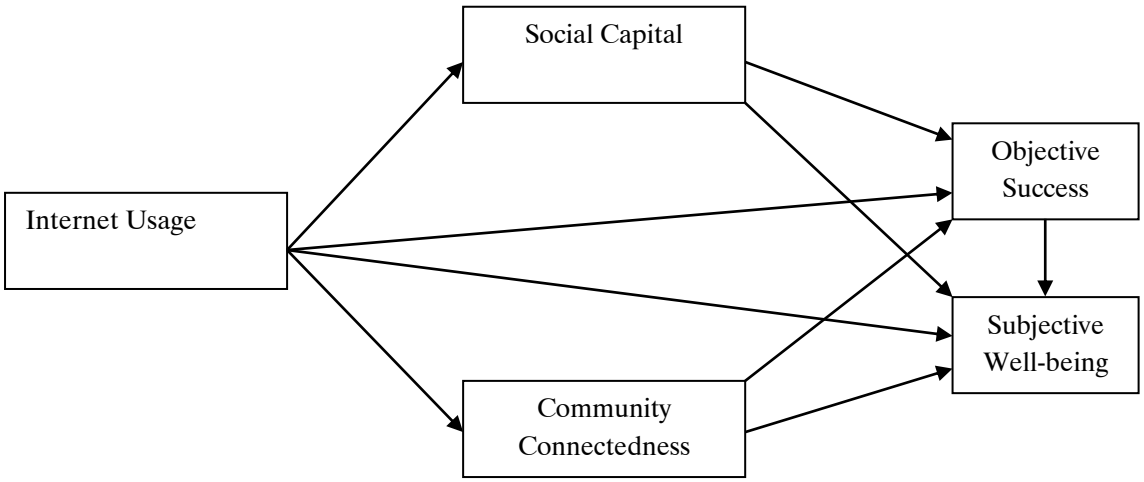


Figure 1: *Hypothesized theoretical model of the study*

Method

Conceptualization and Operationalization

Internet Usage

Internet can be used for various general and casual purposes; however, in the present study Internet usage is operationally defined as the GLIs' intensity to use the Internet for knowledge and information collection, sharing and communication. Rodgers and Sheldon (2002) have developed the Web Motivation

Inventory (WMI) scale by using four factors; researching, communicating, surfing, shopping. They developed 12 items 5-point likert scale including three items for each factor (Rodgers, Jin, Rettie, Alpert, & Yoon, 2005). In the present study, researchers wanted to measure the GLIs' usage of the Internet for their information, knowledge and communication needs. Therefore, items that measure the shopping motive was considered as irrelevant. Researchers modified the WMI scale items to develop a much shorter scale by reducing items through combining items together and validated them in a pilot study. Internet usage scale was used with the likert scale responses as 1=Strongly Disagree, 2=Disagree, 3=neutral, 4= Agree and 5= Strongly Agree. (α = .868).

Social Capital

Phillips and Pittman (2009) defined social capital (social capacity) as the extent to which members of a community can work together effectively to develop strong relationships to solve problems, make group decisions and collaborate effectively to plan, set goals, and get things done in communities (Phillips & Pittman, 2009, p. 6). Social capital improves the subjective well-being by giving opportunities to the community members to share knowledge, resources and feelings (Winkelmann , 2009). Hence, social capital is one of the primary features of socially organized communities and it allows members to resolve collective problems more easily (Wiesinger, 2007). As far as GLIs involve in inventive activities as individuals, measuring of their individual social capital considered to be more meaningful. Therefore, present study measured the social capital from the individual perspective to identify how the GLIs received required resources from their social relationships. Past studies has confirmed that individual level relationships with family, friends, neighbors and other social organizations have positively contributed to the subjective well-being (Helliwell & Putnam, 2004; Hooghe & Vanhoutte, 2009). Present study measured the individual social capital based on the Gaag's (2005) 17 item resource generator scale by integrating the response structure of Granovetter's (1973) strong, weak and absent of social ties. In the present study, 17 items of Gaag's individual social capital resource generator scale were translated to Sinhala language by changing only the currency of the tem number 4 to Sri Lankan rupees. But, the reaserchers modified the response options of the resources generator scale as 1= No, 2=official level, 3= Friend's friend, 4=friend, 5= relative and 6= family member. Higher summated score of the scale represent a strong social capital and lower summated scores represent a weak social capital. (α =.737).

Community Connectedness (Sense of Community)

Community connectedness is a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together (McMillan & Chavis, 1986). Even though there are well known instruments to measure the sense of community (community connectedness), generally they are very long instruments (Doolittle & MacDonald, 1978; Davidson & Cotter, 1986). However, Frost and Meyer (2009) measure the community connectedness of using relatively shorter scale and the scale was able to use to measure the connectedness of GLI community. Frost and Meyer's Community connectedness scale consists with 8-items that adapted from a 7-item community cohesion scale that has been used in the Urban Men's Health Study (UMHS). The modified scale has shown high validity and Cronbach alpha internal consistent value (Frost & Meyer, 2009). In the present study, Frost and Meyer's community connectedness scale was modified by just replacing the specific words related to GLI community. (α= .822).

Objective Success

According to the theoretical argument of the bottom-up theory of subjective well-being, all the material and objective outcomes will contribute to the subjective well-being (Snyder & Lopez, 2007). Hence, the tangible and explicit outcomes of the innovation process are not the ultimate success of the GLIs. Therefore in this study objective success was defined as a mediator variable of the subjective well-being of GLIs. The present study adopted the Hauschildt's innovation process approach to measure the objective success of the inventors (Hauschildt, 1991). Hauschildt (1991) had explained the importance of measuring the success of innovation at different stages of innovation process. According to him not every invention is going through all different stages of the innovation process. Therefore, measuring the success of inventors only by patent or commercialization measurements not show the reality of the innovation success. Adhering to Hauschildt's framework, present study has adapted five different objective measurements to measure the inventors' success at each stage of the innovation process: Idea generation stage by patent receives, competitive evaluation stage by award winnings, market entrance stage by commercialization, market survival stage by survival in market and income earning stage by profit earned. Researcher initially developed the objective success measurement and asked for advices and comments from selected panel of experts. When consulted the Weick, she advised to the researchers to use limited number of items with dichotomous responds, because that is straightforward to measure and avoid complex comparisons (Weick C, Personal Communication, 12th August 2008). Weick & Eakin (2005) also measured the commercial success of inventors using multi item dichotomous (0, 1) scale. Therefore, objective success is calculated as the summation of five items measured using dichotomous scale (0, 1); the patent grants, award and rewards, commercial startup, commercial continuation and profitable inventions. In the questionnaire researcher asked the respondents to state how many patent they received, how many awards and rewards they won, how many inventions started to commercialized, how many of they still commercialized and how many inventions earned profits. Respondents who reported values higher than one considered as one and others considered as zero. By calculating the summation of dichotomous responses, researcher generated the continuous objective success variable ranging from zero to five. That is higher than the four scale values, which was the minimum recommended range of scales in structural equation and path modeling (Hair, Black, Babin, & Anderson, 2009).

Subjective Well-being

According to the literature, definitions of the subjective well-being consist with emotional aspect: mostly measured by the happiness and cognitive aspect: mostly measured by satisfaction with life. Subjective Happiness Scale (SHS) and Satisfaction with Life Scale (SWLS) are the most administrated scales to measure subjective well-being (Snyder & Lopez, 2007; Diener , 2009 a). The Satisfaction with Life Scale has been tested for its reliability and validity by the authors and test has shown high level of consistency, validity and reliability to measure the satisfaction of life of different type of domains (Diener, Emmons, Larsen, & Graiffin, 1985; Pavot & Diener, 1993). The Subjective Happiness Scale was widely used validated instrument in14 different studies with 2,732 participants (University of Pennsylvania, 2007). Results have signified that the Subjective Happiness Scale has the high internal consistency, which has been established to be stable across different types of samples. In order to measure both emotional and cognitive aspects of subjective well-being, integration the of Subjective Happiness Scale and Satisfaction With Life Scale was already practiced by the Pichler (2006), Rogatko (2010) and (Lyubomirsky , 2008) and therefore, Lyubomirsky recommended the researchers to use integrated scale in the present study (Lyubomirsky S, Personal Communication, 21st February 2010). Both the SHS and SWLS are available for free usage with copy left policy. Therefore, in the present study, subjective well-being was measured using summation of original Subjective Happiness Scale-4 items (Lyubomirsky & Lepper, 1997) and

Satisfaction with Life Scale – 5 items (Diener, Emmons, Larsen, & Graiffin, 1985). Both the scales have seven point likert ranging from strongly disagree (1) to strongly agree (7). (α = .776).

Population and Sample

Even though all the inventors are not applied for patents, patent databases has been recognized as the only available central depository of the innovation skills of a nation (Jaffe, Trajtenberg, & Romer, 2002; Koch, 1991). Hence, the researchers searched the Sri Lanka National Intellectual Property Office (SLNIPO) patent database for the GLIswho applied for the patents during the year 2000-2009. Researchers were able to identify 640 independent inventors as the target population of the study. Then the researchers selected 200 inventors using stratified random sampling technique based on their living districts. Sample represented the 31 percent of the target population. Researchers were planning evaluate the conceptual model using model fit indexes of the structural equation modeling. According to the literature minimum sample size is 200 when path model has more parameters to be estimated (Kline, 2010). Hence, the selected sample size was able to generate results with acceptable level of power.

Participants

Table 1 depicts the demographic profile of the respondents of the study. According to the Table 1, majority of the respondents are middle aged males. Then again two-third of the respondents was married and 60 percent of the respondents had completed either vocational or university level education. Majority of the respondents were self-employed who have freedom of choice about what they are doing. Further two –third of the respondents were living in rural areas of Sri Lanka.

Table 1: *Demographic profile of the respondents*

	Frequency	**%**		**Frequency**	**%**
Age			Education		
10-18	10	5.0	School	80	40
19-30	43	21.5	vocational	34	17
31-40	45	22.5	Lower Tertiary	65	32.5
41-55	60	30.0	Post graduate	21	10.5
56-65	36	18.0	Employment Sector		
65+	6	3.0	Government	34	17
Gender			Private	77	38.5
Male	190	95	Non Government	01	0.5
Female	10	5	Freelance	88	44
Marital status			Location		
Married	135	67	Rural	128	64
Unmarried	65	33	Urban	72	36

Demographic factors of the respondents, such as age, gender, marital status, education and employment status are comparatively identical with the previous studies on independent inventors in developed countries. Majority of those studies found that common independent inventor is a middle aged married male who has high level of education qualifications and involved in self-employed economic activities (Sirilli, 1987; Amesse & Desranleau, 1991; Weick & Eakin, 2005; Georgia Tech Enterprise innovation Institute, 2008). Conversely, previous studies have identified that majority of the independent inventors are living in metropolitan areas rather than rural areas. The urban and rural classification in Sri Lanka has been done based on the size of the lowest political administrates of the country. Nevertheless, in most

of the developed countries it has been classified based on the density of the population (United Nations, 2007). Apart from the differences occurred owing to this classification, in general Sri Lankan GLIsthose who represent the sample have shown similar demographic profile as the independent inventors in the developed countries. Hence, the sample represents a unbiased cross-section of the independent inventors' community.

Procedure

The required data was collected through self-administrative questionnaire at the Sri Lanka Independent Inventors Survey 2010 (SLIS 2010). The survey was carried out from month of February to August in 2010. Researchers invited the randomly selected respondents to participate for the data collection panels organized at the centers located in four metropolitan districts in Sri Lanka. After explaining the aim and objectives, researchers explained the structure of the questionnaire and specific instructions to answer it properly. After the clarifications, respondents were asked to answer the questionnaire. When collecting the filled questionnaires, researchers did quick scanning for the missing values, and researchers ensure that respondents answer all the questions in the questionnaire. After collecting the data, researchers entered the data in to the SPSS software package and conducted the exploratory data analysis (EDA). During the EDA researchers tested the assumptions of outliers, normality, linearity and multicolinearity. Owing to the fact that researchers were planning to adapt the path analysis statistical method for model development and comparison, data were tested for multivariate normality and multivariate outlier using critical value of the Mardia kurtosis (Mardia, 1970).

Results

Table 2 presents the bivariate correlation coefficients between the variables in the present study. it also depicts the expected score ranges, means and standard deviations of the variables.

Table 2: *Pearson product movement correlation coefficients of variables in the model*

		Expected Range	Mean	SD	1	2	3	4	5
1.	Subjective well-being	9-63	41.100	7.051	1				
2.	Objective Success	0-5	2.520	1.490	.341**	1			
3.	The Internet Usage	4-20	12.845	4.393	.348**	.161*	1		
4.	Social Capital	17-102	54.200	9.405	.314**	.192**	.303**	1	
5.	Community Connectedness	8-56	43.275	6.265	.414**	.129	.161*	.098	1

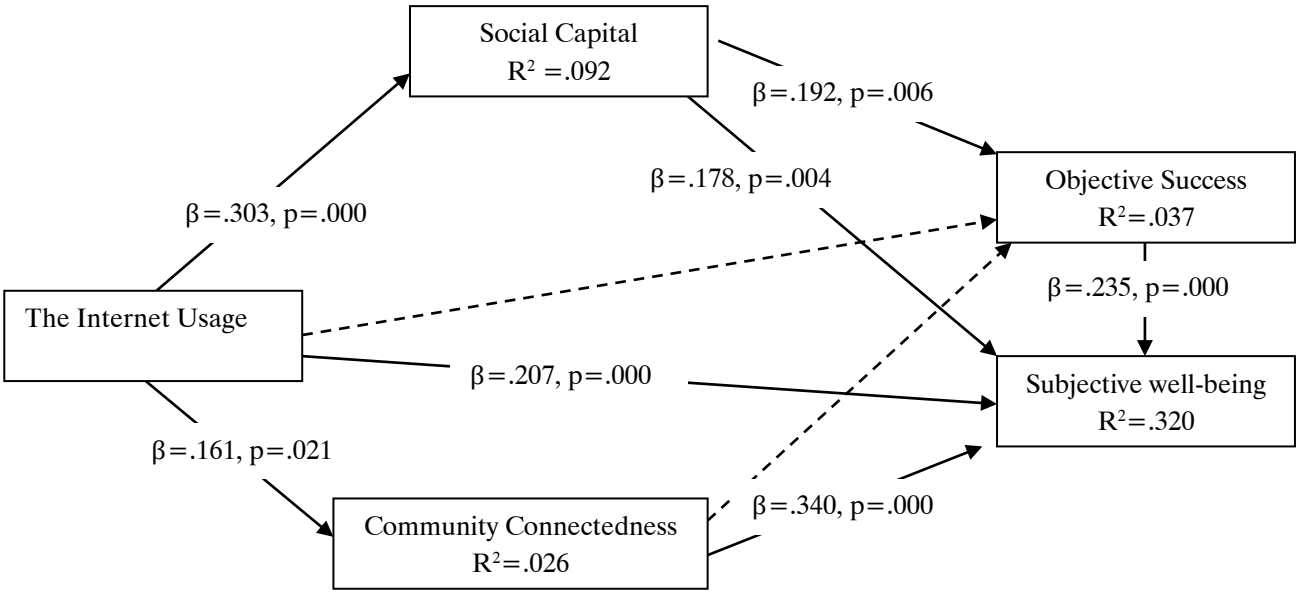
**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

According to the Table 2, the respondent GLIs have higher moderate level subjective well-being (M = 41.1, SD=7.051). Then again they have achieved only moderate level objective success (M = 2.52, SD = 1.490). Even though the respondents have shown high level of community connectedness (M = 43.275, SD = 6.265), they have achieved only moderate level social capital (M = 54.200, SD = 9.405). Respondent inventors are moderate level Internet users (M = 12.845, SD = 4.393).

According the Pearson product movement correlation coefficients (r), all the exogenous variables of subjective well-being have shown moderate level correlation at .01 level. However, relationship between objective success and the Internet usage ($r = .161$, $p < .05$), objective success and social capital ($r = .192$, $p < .01$) have shown only low level correlation. Further, the relationship between objective success and

community connectedness (r = .129, p > .05) was not statistically significant at .05 level. Hence, the results indicate that inventor's community connectedness has no influence on their objective achievements. According to the correlation analysis, there was no threat of multicolinearity between exogenous variables of the hypothetical model. Hence, the researchers continued the data analysis with path analysis using AMOS software version 19. After two iterations of modifications by removing insignificant paths of the model, the researchers were able develop the optimal model of the study (Figure 2).



χ^2(df, p) =4.899 (3, .179), GFI=.990, IFI=.984, TLI=.943, CFI=.983, RMSEA=.056, HOETER ,05= 318

Figure 2: *Modified final model of the study*

All the model fit indices presented in Figure 2 satisfied the generally accepted cut-off levels recommended by the Kline (2010). Hence, the modified model presented in Figure 2 considered to be the statistically significant final model of the present study. All the exogenous and mediator variables of the model were able to explain 32% of the variance of the ultimate dependent variable; subjective well- being (r^2 =.320). Hence, the Internet usage, social capital, community connectedness and objective success were able to explain 32% of the variance of the happiness and satisfaction of GLIs in Sri Lanka.

According to the Figure 2, the Internet usage has significant positive direct influence on the social capital (β = .303, p = .000), community connectedness (β = .161, p = .021) and the subjective well-being (β = .207, p = .000) of the GLIs in Sri Lanka. Even though the expectations were high on the influence of the Internet on the technological development of developing countries, the results indicates that there is no significant direct influence of the Internet usage on the objective success of the GLIs in Sri Lanka. However, through the social capital, the Internet usage indirectly influence on the objective success. Bias-corrected percentile bootstrapping of 2000 samples indicates that the indirect influence was statistically significant (β = .058, Two tailed sig. = .001). Hence, the Internet usage has significant indirect influence on the objective achievements of the GLIsin Sri Lanka through the influence of social capital. However the strength of the influence is not very strong.

Unlike on the objective success, the Internet usage have significant direct influence on the subjective well-being of the GLIsin Sri Lanka (β = .207, p = .000). Further, through social capital and community

connectedness, the Internet usage has indirect influence on the subjective well-being. According to the bootstrapping results, indirect influence of the Internet usage on subjective well-being through social capital and community connectedness was statistically significant ($\beta = .122$, $p = .001$).

Statistical results of the present study indicate that the Internet usage is a significant predictor of the social capital, community connectedness and subjective well-being of the GLIs. However, the Internet usage was not a significant predictor of the inventive success of GLIs in Sri Lanka.

Discussion and Conclusion

The aim of this paper to explore the influence of the Internet usage on the social capital, community connectedness, Objective success and Subjective well-being of the GLIs in Sri Lanka. The findings of the study can be used to explain how the Internet usage directly and indirectly influence on the objective success of the GLIs. Further the findings explain how all factors ultimately influenced on the subjective well-being of the GLIs in Sri Lanka.

Factors Influencing the Objective Success of GLIs

Research report of the National Endowment for Science, Technology and the Arts (NESTA) on the new realities of innovations indicates that the Internet is rapidly creating product users as GLIs(NESTA, 2008). Not only the Internet has created the new inventors, the Internet has identified as a critical success factor of modern innovative businesses (Sparks & Thomas, 2001). Further, the Internet usage has been considered as one of the major contributors of the improvements of the performance of Research and Development (R & D) activities and innovation (Kafouros, 2006). As far as number of inventions has grown with the expansion of the Internet, there are evidences that the Internet usage have influenced on inventors (World Intelectual Property Organization, 2007). Findings of the 2007 Georgia's independent inventors also indicated that the Internet is among the top three resources of commercially successful inventors (Georgia Tech Enterprise innovation Institute, 2008).

Even though there was hype on the impact of the Internet on technological achievements of developing countries (Mansell, 2001; Steinmueller, 2001), findings of the present study do not support that argument. According to the previous literature the Internet is popular medium among the inventors to share explicit knowledge among each other (Ibrahim & Fallah, 2005); however as the path analysis results of the present study, the Internet usage is not significantly influenced the objective success of GLIsin Sri Lanka. The findings suggest that even though there is moderate level the Internet usage among the grassroots level inventors, there might be significant gap between inventors' the Internet usage as information and communication medium to gain knowledge. The comments made by the respondents at the post survey discussions also suggested that the majority of them do not have the Internet connections at their homes and they are not aware how to search for patent and innovation information in the Internet (Wickramasinghe, 2010). The results indicate the impact of the Internet on inventive success artificially inflated hype than the real situation in the developing country like Sri Lanka. There is lack of Internet access and knowledge divide about the usage of digital content in Sri Lanka (Gamege & Halpin, 2007). Therefore digital divide still might be a valid reason for low impact of the Internet usage on the objective success of grassroots level inventors.

Connectedness, networking and knowledge sharing have been identified as the major factors that contribute to the success of independent inventors in the develop countries like United Stated of America (Whalley, 1991). However, according to the findings of the present study Community connectedness is not a significant predictor of the objective success. Unlike industrial countries, there was no platform for collaboration among the GLIs in Sri Lanka. Finding of the community connectedness indicates the

physically scattered and individualistic nature of the GLIs community in Sri Lanka. Even though they are emotionally attached to each other, physically there was no attachment among inventors to support each other. Therefore, emotional attachment is unable to provide fruitful contribution for the inventive activities through knowledge and resource sharing among the members of the community. According the comments made by the GLIs at the panel discussions, there is a desperate need for forming a common platform that would allow the convergence of GLIs in Sri Lanka to build stronger ties. Hence, technological policy developers have to consider this as prioritized need that require to be satisfied sooner rather than later.

According to the previous literature, as independent inventors have limited resources and knowledge by their own, they need to have public support to achieve inventive success (Meyer, 2004). Indicating the importance of public support on inventive success, social capital was the only significant influential predictor of the objective success of the GLIs in Sri Lanka. It suggests that GLIs in Sri Lanka receive the required resources from their individual social relationships rather than within the inventive community. By providing opportunities to the inventors to interact with social structures and groups those who can contribute to their inventive activities, Sri Lanka would be able to increase the successful achievements in technological inventions in the future.

Factors Effecting the Subjective Well-Being of the GLIs

Social networking have positive impact on social capital and subjective well-being (Bruke, Marlow, & Lento, 2010). The Internet provides various solutions to establish the social communication between diverse people (Contarello & Sarrica, 2007). Therefore, the Internet usage is expected to be positive predictor of social capital, connectedness and subjective well-being. The results of the present study validate the previous research findings and hypothesized relationship between the Internet usage, social capital, connectedness and subjective well-being. Grassroots inventors those who use the Internet might have more options to interact with other inventors and influential parties to share their knowledge and to gain assistance. This interaction might have positively influence to expand their social capital and connectedness towards fellow inventors.

According to the findings of the study, Internet usage and community connectedness are not the significant predictors of the objective success. However, along with the social capital and objective success, Internet usage and community connectedness significantly contributed to the subjective well-being of the GLIs in Sri Lanka. Finding suggests Internet usage as significant predictor of social capital, community connectedness and ultimately the subjective well-being of the inventive community of Sri Lanka. Although the GLIshave not achieved high level objective success in their inventive activities, whatever they have achieved from their inventions positively influence on their subjective well-being. Hence, the inventive activities have been the significant life domain of the GLIsof Sri Lanka that contribute to their subjective well-being. This might be the reason why the GLIs are continuing in inventive activities, even they do not achieve higher objective success.

The Internet has been identified as a tool that can make technological knowledge transferring from developed to developing countries. Hence, most of the developing countries have given serious attention on developing the Internet based information and communication technologies to bridge the digital divide without concerning “for what”. However, present study found that the Internet usage among the GLIs in Sri Lanka is moderate and there is no significant influence of the Internet usage on objective success of the inventors. Hence, current the Internet usage might not influence on the innovation development in Sri Lanka. Therefore, technological knowledge transferring has not been happened in Sri Lanka as expected. However, findings of the study revealed that the Internet usage has been a significant

predictor of the happiness and satisfaction of life among the inventors. Therefore, the Internet has been significant contributor of the subjective quality of life of the inventors. That suggests that inventors use the Internet as social communication medium rather than technological knowledge source.

The sample of the study was taken from the population of Sri Lankan patent applied grassroots level inventors. Therefore finding might not be applicable in all the inventors in developing countries. However, developing countries with similar social, economic and cultural conditions as Sri Lanka, can be utilized the findings of the study to help their GLIsto be happy and successful. Basically the inventor assessment programs in developing countries should not overemphasis the assessing inventors based on pure objective measures such as number of patents, patent citations, awards and rewards, commercialized inventions or profitability. Overemphasis on these factors would create pessimistic thinking and uncertainty among the inventors about their inventive lives. It would create extra burden on the inventors. This might be counter-productive when the inventors give up inventive activities or find much easier ways to achieve subjective success of life than being an inventor. Therefore, independent inventors in developing countries should be considered as national assets and should be evaluated more constructive way that can increase their subjective well-being than the destructive straightforward "successful" or "unsuccessful" binary type of evaluations.

References

Amesse, F., & Desranleau, C. (1991). The independent inventor and the role of entreprenurship: A survey of the canadian evidence. *Reserach policy* , 13-27.

Bain, S., Fedynich, L., & Knight, M. (2010). The successful graduate student: a review of the factors for success. *Journal of Academic and Business Ethics*, available online through http://www.aabri.com/jabe.html.

BCS-Chartered Institute for IT. (2010). *The Information Dividend: Why IT makes you Happier.* Swindon,: British Information Society Ltd.

Bruke, M., Marlow, C., & Lento, T. (2010). Social network activity and social well-being. *CHI 10 Proceedings of the 28th international conference on Human factors in computing systems* . Atlanta: The ACM Guide to Computing Literature.

Cheung, C. K., & Chan, R. K. (2008). Facilitating achievement by social capital in Japan. *The journal of Socio-Economics, 37*, 2261-2277.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* New Jersey: Lawrence Erlbaum Associates Inc.

Contarello, A., & Sarrica, M. (2007). ICTs. social thinking and subjective well-being- the InternetInternet and its represantation in everyday life. *Commputers in Human behavior , 32* (2), 1016-1032.

Davidson, W. B., & Cotter, P. R. (1986). Measurement of Sense of community within the sphere of city. *Journal of Applied Psychology , 16* (7), 608-619.

Davidson, W. B., & Cotter, P. R. (1991). The Relationship between sense of Community and Subjective Well-being: A first look. *Journal of Community Psychology , 19*, 246-253.

Diener, E. (2009 a). Subjective Well being. In E. Diener, *The Science of well-being the collected works of Ed Diener* (pp. 11-58). BV: Springer.

Diener, E., Emmons, R. A., Larsen, R. J., & Graiffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment , 49* (1), 71-76.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology , 29* (1), 94-122.

Doolittle, R. J., & MacDonald, D. (1978). Communication and a sense of community in a metropolitan neighborhood: A factor analytic examination. *Communication Quarterly , 26*, 2-7.

Frost, D. M., & Meyer, I. H. (2009). Internalized Homophobia and Relationship Quality among Lesbians, Gay Men, and Bisexuals. *Journal of counseling psychology , 56* (1), 97–109.

Gaag, M. V. (2005). *Measurement of individual social capital .* Amsterdam: Netherlands organization of scientific research.

Gamege, P., & Halpin, E. F. (2007). E-Sri Lanka: bridging the digital divide. *The Electronic Library, 25*(6), 693 - 710.

Georgia Tech Enterprise innovation Institute. (2008). *2007 survey of Georgea's Independent Inventors.* Altanta: Georgia Tech Reserach Corparation.

Gupta, A. K., Sinha, R., Koradia, D., Patel, R., Parmar, M., Rohit, P., et al. (2003). Mobilizing grassroots' technological innovations and traditional knowledge, values and institutions: articulating social and ethical capital. *Futures , 2003* (35), 975-987.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate Data Analysis* (7 th edition ed.). Chollerstrasse: Prentice Hall.

Hauschildt, J. (1991). Towards measuring the success of Innovations. In D. F. Kocaoglu, *Technology Management : the New International Language* (pp. 605-608). IEEE Xplore.

Haythornthwaite, C., & Kendall, L. (2010). InternetInternet and Community. *American Behavioral Scientist , 53*, 1083-1094.

Helliwell, J. F. (2003). How'slife? Combining individual and national variablesto explain subjective well-being. *Economic Modelling , 2003* (20), 331-360.

Helliwell, J. F. (2007). Well-Being and Social Capital: Does Suicide Pose a Puzzle? *Social Indicators Research , 81* (3), 455-496.

Helliwell, J. F., & Putnam, R. D. (2004). The social context of well-being. *The Royal Society* (359), 1435–1446.

Helliwell, J. F., & Putnam, R. D. (2004). The Social context of well-being. *Philosophical Transactions of the Royal Society* (359), 1435-1446.

Hooghe, M., & Vanhoutte, B. (2009). Subjective Well-Being and Social Capital in Belgian Communities. Subjective and Objective Well-Being Indicators in Flanders (Belgium). *international conference on 'From GDP to well-being'.* Ancona.

Ibrahim, S., & Fallah, M. H. (2005). Where Do Inventors get their ideas? *Technology Management: A Unifying Discipline for Melting the Boundaries* (pp. 359-367). IEEE.

Jaffe, A. B., Trajtenberg, M., & Romer, P. M. (2002). *Patents, citations, and innovations: a window on the knowledge economy.* Massachusetts: MIT press.

Kafouros, M. I. (2006). The impact of the InternetInternet on R&D efficiency: theory and evidence. *Technovation , 2006* (26), 827–835.

Kelly, T. (2010, May 14). Is the InternetInternet the Secret to Happiness? *Time* , pp. available online at http://www.time.com/time/health/article/0,8599,1989244,00.html.

Kline, R. B. (2010). *Principles and practice of structural equation modeling* (3rd edition ed.). New York: The Guilford Press.

Koch, A. (1991). Patent information to stimulate innovation in small and medium sized companies. *World Patent Information , 13* (4), 201-205.

Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2002). InternetInternet paradox revisited. *Journal of social issues , 58* (1), 49-74.

Lyubomirsky, S. (2008). *The how of happiness: A scientific approach to getting the life you want.* New York: Penguin Press.

Lyubomirsky, S., & Lepper, H. S. (1997). A Measure of subjective happiness: priliminary relaibility and construct validation. *Social Indicator Research* (46), 137-155.

Mansell, R. (2001). Digital Opportunities and the Missing Link for Developing Countries. *Oxford Review of Economic Policy, 17*(2), 282-295.

Mardia, K. V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika, 57*(3), 519-530.

McMillan, D. W., & Chavis, D. M. (1986). Sense of Community: A Definition and Theory. *Journal of Community Psychology , 14*, 6-23.

Meyer, M. (2005). Independent inventors and public support measures: insights from 33 case studies in Finland. *World Patent Information, 27(2005)*, 113-123.

NESTA. (2008). *The New inventors: How users are changing the rules of innovation.* London: NESTA.

Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological Assessment , 5* (2), 163-172.

Pénard, T., & Poussing, N. (2010). InternetInternet Use and Social Capital: The Strength of Virtual Ties. *Journal of Economic Issues , 44* (3), 569 - 595.

Phillips, R., & Pittman, R. H. (2009). A Framework for community and economic development. In R. Phillips, & R. H. Pittman, *An Introduction to Community Development* (p. 355). Oxon: Routlege.

Pigg, K. E., & Crank, L. D. (2004). Building Community Social Capital: The Potential and Promise of Information and Communications Technologies. *Community Informatics , 1* (1), Online.

Robinson, J. P., & Martin, S. (2010). IT Use and Declining Social Capital? More Cold Water From the General Social Survey (GSS) and the American Time-Use Survey (ATUS). *Social Science Computer Review , 28*, 45-63.

Rodgers, S., Jin, Y., Rettie, R., Alpert, F., & Yoon, D. (2005). InternetInternet motives of users in the United States, United Kindom, Australia and Korea: A cross-cultural replication of the WMI. *Journal of Interactive Advertising , 6* (1), 61-67.

Sarrica, M. (2010). ICTs Meanings and Practices: Contributions from the Social Representation Approach. *Journal of Community Informatics , 6* (3),Online.

Sirilli, G. (1987). Patents and inventors: An empirical Study. *Research policy* , pp. 157-174.

Snyder, C. R., & Lopez, S. J. (2007). *Postive Psychology: the scientific and practical explorations of human strangths.* California: Sage Publications Inc.

Sparks, A., & Thomas, B. (2001). The use of the InternetInternet as a critical success factor for the marketing of Welsh agri-food SMEs in the twenty-first century. *British Food Journal , 103* (5), 331 - 347.

Stachowicz, J., & Somka, J. M. (2004). Social capital as critical success factor for innovation development processes in industrialised regions, case study RIS-Silesia in the Silesia Voivodship (Poland). *IDEAS* , Available at http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa04/PDF/552.pdf.

Steinmueller, W. E. (2001). ICTs and the possibilities for leapfrogging by developing countries. *International Labour Review, 140*(2), 193-210

Sum, S., Mathews, R. M., Pourghasem, M., & Hughes, I. (2009). InternetInternet Use as a Predictor of Sense of Community in Older People. *CyberPsychology & Behavior , 12* (2), 235-239.

Thakur, D. (2009). ICTs and Community Participation: An Indicative Framework. *Community Informatics , 5* (1), Online.

Tymon, W. G., & Stumpf, S. A. (2003). Social capital in the success of knowledge workers. *Career Development International , 8* (1), 12-20.

UNDP. (2001). *Human Development Report 2001: Making new technologies works for human development.* New York: Oxford University Press.

United Nations. (2007). *Demographic Yearbook 2007.* New York: Department of Economic and Social Affairs, United Nations.

University of Pennsylvania. (2007). *Positive Psychology Questionnaires*. Retrieved February 23, 2009, from University of Pennsylvania- postive psychology centre: http://www.ppc.sas.upenn.edu/ppquestionnaires.htm#SLS

Whalley, P. (1991). The Social Practice of Independent Inventing. *Science, Technology and Human Values, 16*(2), 208-232.

Weick, C., & Eakin, C. F. (2005). independent Inventors and innovation: An empirical study. *Entrepreneurship and innovation* , 5-15.

Weiser, E. B. (2004). The Function of InternetInternet use and their social and psychological consequences. *Cyber psychology and Behavior , 4* (6), 723-743.

Wettansinha, C., Wongtschowski, M., & Waters-Bayers, A. (2008). *Recognising Local innovations: Experiences of Prolinnova partners* (Revised Edition ed.). Leusden, Philippines: Porlinnova International Secretariat.

Wickramasinghe, C. N. (2010, February-July). Panel discussions with Sri Lankan Grassroots Level inventors. *Unpublished Raw Data* .

Wickramasinghe, C. N., & Ahmad, N. (2009). Revolution of Digital Communication and the Asian Competitive Creativity Chasm. *Asian Journal of Technology Innovations , 17* (1), 13-29.

Wickramasinghe, C. N., Ahmad, A., Rashid, S., & Emby, Z. (2010). Re-establishing Grassroots Inventors in National Innovation System in Less Innovative Asian countries. In S. Chu, W. Ritter, & S. Hawamdeh, *Managing Knowledge for Global and Collaborative Innovations* (pp. 67-80). Singapore: World Scientific.

Wickramasinghe, C. N., Ahmad, N., Rashid, S., & Emby, Z. (2011). Impact of Subjective Well-Being on Success of Technological Knowledge Creation among Independent Inventors in Developing Countries: A First Look at Sri Lanka. *Journal of the Knowledge Economy* , Online First.

Wiesinger, G. (2007). he importance of social capital in rural development, networking and decision-making in rural areas. *Revue de géographie alpine , 95* (4), 43-56.

Winkelmann, R. (2009). Unemployment, Social Capital, and Subjective Well-Being. *Journal of Happiness Studies , 10* (4), 421-430.

WIPO. (2007). *The WIPO Patent Report 2007 Edition.* Geneva: WIPO.

Yoon, E., Lee, R. M., & Goh, M. (2008). Acculturation, Social Connectedness, and Subjective Well-Being. *Cultural Diversity and Ethnic Minority Psychology , 14* (3), 246-255.