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RESEARCH ARTICLE

SELF-REGULATION OF INTERNET USAGE BY HUMAN DEVELOPMENT INDEX

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ABSTRACT

In this paper, the researchers used the Complex Adaptive System (CAS) to identify the complex adaptive behavior that is found between the human development index and internet users. Specifically, the study determined the emergence of the self-regulation of the internet usage by the human development index. It is also conceptualized in terms of the stabilizing factors of the human development index on internet usage and self-regulated control of the use of the internet. To get the synergy of interacting agents, the synergy calculator was used. A histogram of the frequencies versus the number of connections was drawn using the statistical software and finally identified the three clusters with equal frequency. The results show that a country's regulatory approach to the Internet can have a massive impact on its ubiquitousness throughout the country. It merely indicates the fact that for a quick-moving industry like the internet, it depends on the human development level of agents. The increasing internet use affects the HDI. The findings reveal that internet users with high self - regulation would provide less time to social network sites. Self – regulated internet users will control accessing for internet usage when they know that they could not get any benefit from using it. However, it additionally shows that the majority of internet users were ambivalent towards regulating the extent of internet usage and because of this ambivalence to self-regulate there is a likelihood to the internet users to the urge to access connections of internet.

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INTRODUCTION

The Internet has verified as one of the most outstanding creations of man because it is said to be the eighth wonder of the world (Sathiaseelan, 2013). Internet usage is one of the very core of human progress that influences development of man across the nations of the world (Hettiarachchi, 2018). The twenty-first century signaled the pace of innovation and technology due to the Internet. From microchips to cloud computing, huge data knowledge to web things, engineering science to artificial intelligence, the world is at the sting of a technological bang that might increase the gap between the economic powerhouses and laggards. Through the utilization of the Internet, the interaction between people became easy and quick. Trade became universal and digital, communication is fast and Internet economies began to emerge (Macdougald, 2011). The emergence, and expansion of the global networks of computing resources known as the Internet are also as vital as human development is prevailing. Widespread and consistent access to the Internet has changed the way people lived. In particular, Internet usage expand rapidly that the number of internet users doubled from late 1999 up to the current (Bradshaw, 2001).

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Due to the widespread from Internet usage, countries at their disposal have several tools to police their citizen's internet use by imposing the self-regulatory regime. Regulation is a vital element of competition policy within the context of telecommunications and internet usage. The general benefits of self-regulation include efficiency, increased flexibility, increased incentives for compliance, and reduced cost. According to Wallsten (2002), a carefully structured program emphasizing self-regulation is especially harmonious with an Internet setting because it mirrors the Internet itself, as a global, importantly private and decentralized network of communication. The development of a self-regulatory regime for the internet should comprise several complementary actions, tools, and mechanisms. Moreover, self-regulation will solely perform with the support of public authorities as long as they do not interfere with the self-regulatory process. Complex systems scientist discovered the network as a whole with many unexpected large-scale properties involving its overall structure, how information is spread out over its links, and the co-evolutionary relationships between the behavior of search engines and the web's link structure, all of which lead to what could be called complex adaptive system as a whole (Mitchell 2009, 10). Technological advances in computers, Big Data, artificial intelligence, global information, and communication networks have contributed to complex problem spaces.

The conceptual lens of complex theory sharpens our view of the interactions between agents of internet users and the human development index (Zhao, MacKinnon, & Gallup, 2015). Self – Regulation of Internet usage has emerged as an insightful framework for studying complex adaptive systems (CAS) using human development index (HDI) and Internet users' interactions (Cassidy & Barners, 2012). Since there is no empirical research has explored the role of regulation on Internet usage, using CAS in the study, the researchers were determined to know the effects of self – regulation on Internet usage and human development index and how this affects the interactions of connected agents.

Conceptual Framework of the Study: To explain that this is the complex adaptive system, the conceptual framework of the study is illustrated below. This study is anchored on the complex adaptive system (CAS) to determine the interactions between the human development index (HDI) and internet users with 186 countries as agents. We tend to conjointly conceptualize the interrelated clusters or sub-features in terms of(1) stabilizing factors of human development index on internet usage; and (2) self-regulated control of the use of the internet to determine the emergent feature which is self-regulation of internet usage by human development index. The researchers conjointly define the following variables enclosed within the framework:

The Human Development Index (HDI) is made from three distinct parts on basic dimensions of human development: to lead a long and healthy life, measured by lifespan at birth; the power to accumulate data, measured by mean years of schooling and expected years of schooling; and the ability to succeed in a decent commonplace of living, measured by gross worth per capita (Leiner et al. 2009).

An **Internet user:** As defined by Collins is an individual who has access to the Internet at home, via computer or mobile device.

Self – Regulation: Is a regulatory system in which business representatives outline and enforce standards for their sector with very little or no government involvement.

Self – Regulated Control or **co-regulation:** Of the utilization of the internet is a regulatory system when one is aware of its limitation of using the internet, and being restricted to try and do, therefore.

Self – Regulation of internet usage – is an active process whereby internet users set goals to observe, regulate, and control their cognition, motivation, and behavior.

METHODOLOGY

The study utilized the data on the Human Development Index (HDI) and Internet Users (UNDP, 2015) to determine the emerging feature of the agents. The researchers defined the agents and their attributes. Using the Synergy calculator, they calculated the synergies and summarized the positive synergy. They draw the histogram of the frequencies versus the number of connections using the statistical software, and finally divided the three clusters with equal frequency. On determining the clusters, the scatter plot of the attributes from every cluster was drawn and described.

The emergent pattern for all countries was identified after drawing the overall scatter plot of the three clusters.

RESULTS AND DISCUSSION

The results focused on the interactions between the connected agents. They are illustrated by scatter plot within the figures shown below. Figure 2 shows the summary of the synergy with a total number of connected agents of 4,902. This was computed using the statistical software. The results were plotted to draw the histogram (see Figure 3) to determine the three clusters divided into equal frequency. Table 1 presents all agents clustered into three equal frequency-based on the results of the histogram. Cluster 1 is classified as agents of synergy with dissimilarity; cluster 2 are those agents with moderate similarity, and cluster 3 are agents with high synergy. The graph in Figure 4 is indicated on a scatter plot by a nonlinear flat trend with random fluctuations. The results reveal that Internet users do not depend apart from that fluctuates. Around 40, which is the point of reference, the amplitude is obtaining smaller. The variations on the number of internet users are low because it crosses the 75% HDI. Across 75% of HDI, internet users are almost the same. Below 75%, the use of the internet is high. Therefore, the human development index incorporates a stabilizing factor in internet usage which is verified in some wealthy countries wherever the internet is steady and will not be a luxury. However, it is still beyond the reach bulk of the world's population as a result of access to the internet may be a given. Although one cannot afford a private, subscription-based fixed or mobile account, Wi-Fi hotspots providing free internet access are not restricted in coffee shops, public places, and even in some mass transit stations, that lets everybody with a smart phone, tablet, or laptop computers access the Internet (Kirkpatrick, 2018). On the other hand, among countries below 75% HDI, internet users are more likely young people who tend to use the internet more often. The increasing use of the Internet might be a good influence on education, economy, personal relationships, and politics in these countries.

According to findings during a new report on online habits released by Hoot Suite and We Are Social, South-east Asia is one of the most internet-addicted regions worldwide, with the Philippines topping the world list with an average 10 hours and 2 minutes of screen time every day with principally the millennials ages 18 to 38. Thailand ranked 3rd where individuals spend an average of 9 hours and 11 minutes online each day, while those in neighboring Indonesia also devoted quite 8 hours and 36 minutes on the average. The scatterplot in Figures 5& 6 reflects two groups. The HDI at intervals 0.474 to 0.649 exhibits a nonlinear decreasing pattern in its number of internet users. However, a stronger jump from one cluster to the other jointly shows the interval of 0.784 to 0.890 which manifests a nonlinear flat trend in its number of internet users. Findings reveal that as you cross the 75% of HDI, the use of the internet shows gradual variations or fluctuations, whereas those agents under the 65% HDI have low internet usage. The results indicate a self – regulated control of the use of the internet. The graphs reveal that access to the internet of some agents is limited, and some are controlled and restricted by the government. Study shows several of the world's poverty-stricken individuals do not have the means or technology to go online. India, South-East Asia, East Africa, and North Korea are simply a few of the countries where most people do not have internet access.

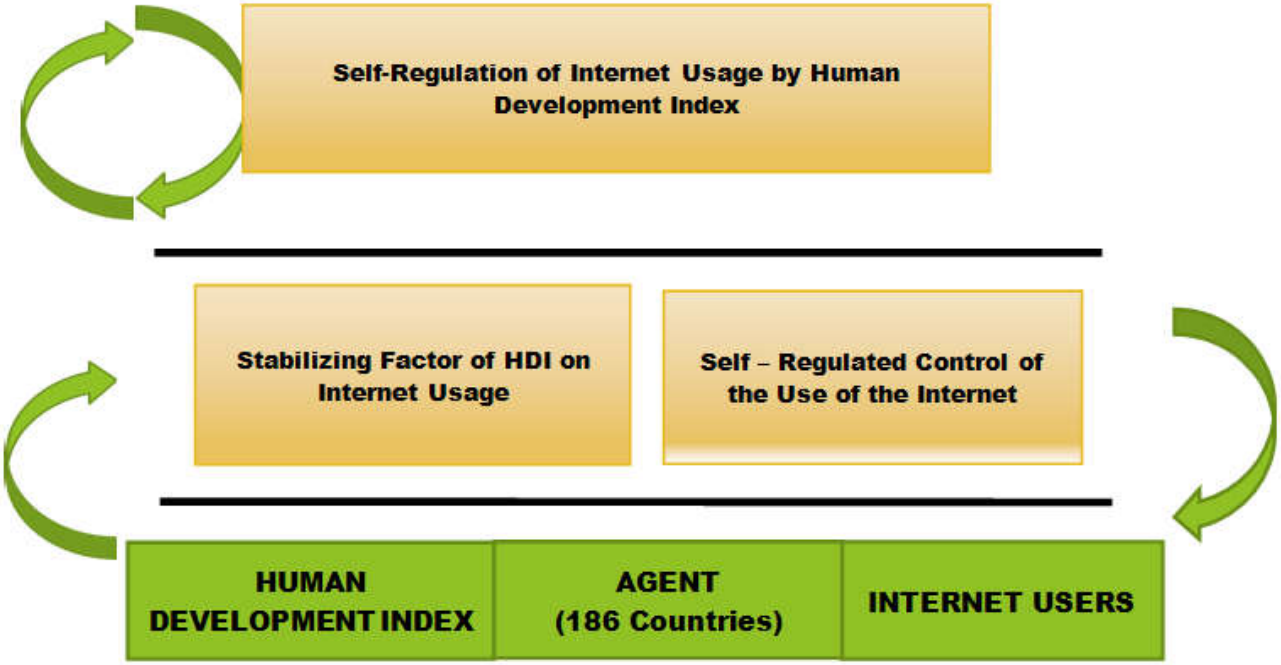


Figure 1. The conceptual framework of the emerging structure of the interacting agents

Summary

Agents	Number of Connected Agents
Guinea	57
Sierra Leone	58
South Sudan	58
Sweden	58
Guinea-Bissau	58
Liberia	58
Switzerland	58
Congo, Dem. Rep.	58
Burundi	59
Netherlands	59
Chad	59
United Kingdom	59
Luxembourg	59
Liechtenstein	59
Eritrea	59
Denmark	60
Central African Republic	60
Iceland	60
Niger	61
Norway	61

Total Yes 4902 Total No 29508

Figure 2. Summary of the Number of Connected Agents

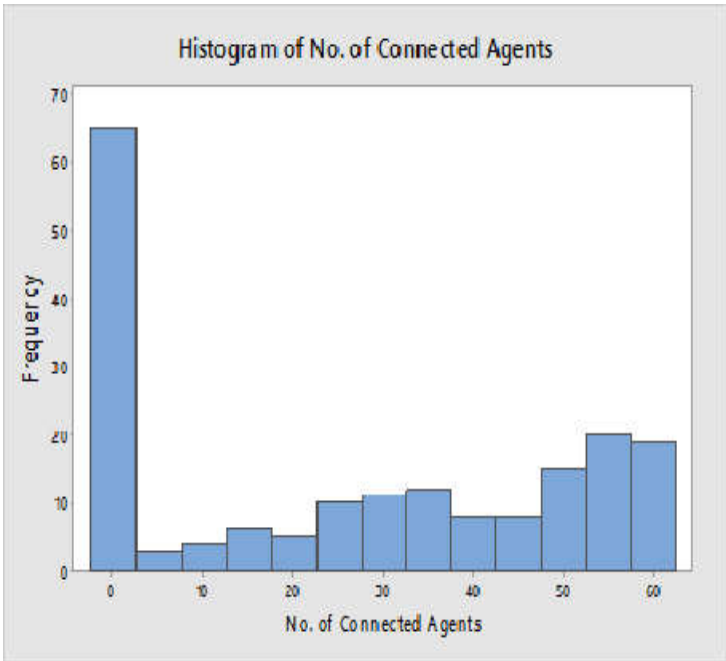


Figure 3. Histogram of the Number of Connected Agents

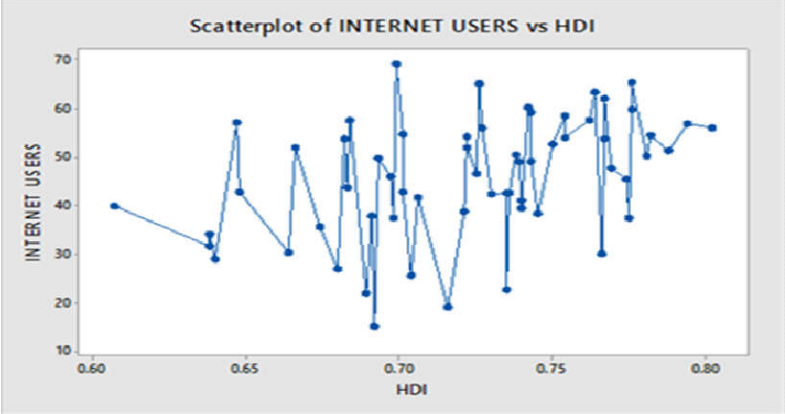
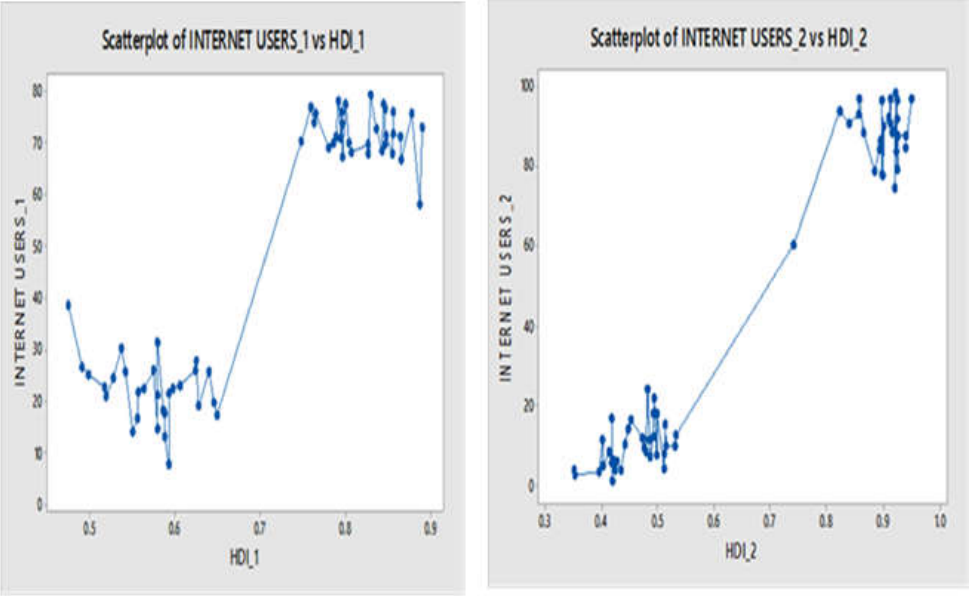


Figure 4. Relationship of Agents between HDI and Internet Users



Figures 5 & 6. Relationship of Agents between HDI and Internet Users

Table 1. Summary of Agent with Low Synergy, Moderate Connections, and High Synergy

CLUSTER 1 Agents with Low Synergy	CLUSTER 2 Agents with Moderate Connections	CLUSTER 3 Agents with High Synergy
Maldives	Pakistan	Norway
Cuba	Cameroon	Niger
Colombia	Congo, Rep.	Iceland
Panama	Sudan	Central African Republic
China	Lesotho	Denmark
Dominica	Zimbabwe	Eritrea
Peru	Kenya	Liechtenstein
Dominican Republic	Slovenia	Luxembourg
Ecuador	Czech Republic	United Kingdom
Libya	Nigeria	Chad
Mauritius	Nepal	Netherlands
Mexico	Malta	Burundi
El Salvador	Bangladesh	Congo, Dem. Rep.
Micronesia, Fed. Sts.	Chile	Switzerland
Costa Rica	Slovak Republic	Liberia
Philippines	Latvia	Guinea-Bissau
Jordan	Kiribati	Sweden
Fiji	Swaziland	South Sudan
Serbia	Cote d'Ivoire	Sierra Leone
Cape Verde	Myanmar	Guinea
Paraguay	Brunei	South Korea
Botswana	Cambodia	Germany
Jamaica	Lithuania	Japan
Egypt	Cyprus	Canada
Bosnia and Herzegovina	Greece	New Zealand
South Africa	Lao	Andorra
Bolivia	Hungary	Burkina Faso
Bhutan	Kuwait	Afghanistan
Belize	Portugal	Togo
Sri Lanka	Saudi Arabia	Madagascar
Georgia	Poland	Mali
St. Lucia	Syria	Australia
St. Vincent and the Grenadines	Zambia	Qatar
Romania	Croatia	Djibouti
Moldova	Equatorial Guinea	Benin
Iran	Bahamas	Ethiopia
Indonesia	Barbados	Malawi
Morocco	Oman	Comoros
Bulgaria	Italy	Mozambique
Samoa	Argentina	Gambia
Thailand	Sao Tome and Principe	Ireland
Mongolia	Vanuatu	Papua New Guinea
Kyrgyz Republic	Azerbaijan	Solomon Islands
Tonga	Russia	Haiti
Seychelles	Kazakhstan	Finland
Tunisia	St. Kitts and Nevis	Belgium
Turkey	Malaysia	Austria
Turkmenistan	Montenegro	Singapore
Armenia	Lebanon	Estonia
Ukraine	Timor-Leste	Uganda
Guyana	Tajikistan	Bahrain
Brazil	Antigua and Barbuda	Tanzania
Algeria	Ghana	United Arab Emirates
Gabon	Iraq	Mauritania
Uzbekistan	Nicaragua	Rwanda
Grenada	Belarus	Angola
Venezuela	Trinidad and Tobago	Senegal
Vietnam	India	Yemen
Albania	Honduras	France
Palestine	Namibia	United States
Guatemala	Macedonia, FYR	Israel
Suriname	Uruguay	Spain

On the other hand, the adoption of internet usage cannot be explained solely by the level of HDI, however, by another factor, too. According to some research studies, agents that need formal approval for Internet Service Providers (ISPs) to start operations had fewer Internet users, whereas countries that regulate ISP prices have higher prices for internet users (Clarke, 2002). In the speech of Hilary Clinton entitled "Remarks on Internet Freedom" she strengthened the importance of Internet access in US foreign policy, stating its role in serving people to get new facts and making governments more accountable (US Department, 2010).

Further, within the developing agents of the world however not restricted to some parts of Africa, Asia, and Latin America, there is limited infrastructure in place to allow people of these countries to access the internet. Moreover, though connections are available, many cannot afford either the devices needed or the account access. In general, Figure 7 presents upward oscillating movements with random fluctuation of points around the trend. The scatter plot showing the increasing human development index gives a positive effect on the internet users in a fluctuating pattern. The variations of HDI from 35% to 65% are high, and 75% of agents have low

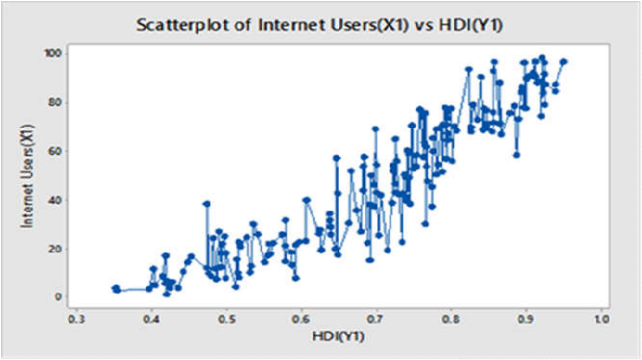


Figure 7. Scatterplot of Agents with Human Development Index and Percentage of Internet Users

variations. The graph shows the emergent feature which is self – regulation of internet usage by the human development index. The findings reveal that internet users with high self - regulation are likely to allocate less time to social network sites. Self – regulated internet users will control accessing for internet usage when they know that they could not get any benefit from using it. However, it also shows that the majority of internet users were ambivalent towards regulating the extent of internet usage. Because of the ambivalence to self-regulate, there is a likelihood to the internet users to the urge to access connections of the internet. Self- regulation seems to work well as long as the group of agents exerting power is relatively cohesive (Scarpa, 1999). As HDI of agents increases utilization of the internet, this would encourage agents such opportunities to innovate, while agents, where the population focus is on basic survival due to extreme poverty and having a low HDI, accessing the internet is not a priority. Thus, the scatter plot implies that internet usage is dependent on the level of HDI.

Conclusion

The results show that a country's regulatory approach to the Internet can have a big impact on its ubiquity throughout the country. It indicates the fact that for a fast-moving industry such as the internet, it absolutely depends on the human development level of agents. The increasing internet use positively affects the HDI. The findings reveal that internet users with high self - regulation would provide less time to social network sites. Self-regulated internet users will control accessing for internet usage when they know that they could not get any benefit from using it. However, it also implies that the majority of internet users were ambivalent towards regulating the extent of internet usage and because of this ambivalence to self-regulate there is a likelihood to the internet users to the urge to access connections of the internet.

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