

## Research on the Usage and Satisfaction of Smart Community Initiatives in Malaysia

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### Abstract

This study aims to explore and identify factors of respondent's on the definition of 'smart community facilities', their usage and satisfaction in Malaysia. Study carried out in four sites which were Kota Belud, Kemaman, Lundu and Putrajaya. Data was collected through qualitative method where interviews was carried out with several smart community members in answering factors that drives the usage/participation, satisfaction and continuance intention from using the 'smart community facilities'. Interpretation from the qualitative approach reveals that community thinks infrastructure, content and digital services will help to generate and build up 'smart community'. This will give the benefit for the whole community as well as improve individual efficiency, lifestyles and well-being. Findings demonstrated that the advance of Internet will enhance people usage on being 'smart' and efficient and it should be further improved with better infrastructures, systematic development with sophisticated digital technology services, facilities and structured content, and also safety-security measures in place.

**Keywords:** Smart Community, Initiatives, Usage, Satisfaction, Digital Services

**JEL Classifications:** M10, M15

### I . Introduction

In the last two decades, the concept of smart community has become more and

more popular in scientific literature and even at international policies. The applications of technology within communities are considered key elements to move for-

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ward into the future. For change and advancement to happen, policy makers, the government, broadband Internet marketers, telecommunication firms and others who are involved in broadband need to be able to develop relevant policies and marketing strategies to maintain or to further improve the Smart Community concept among Malaysian citizens. Nevertheless, most (smart city) studies previously conducted concentrated on established metropolitan cities whereby their residents' use of Information and Communications Technology (ICT) has already been high. On the other hand, not much has been documented on smart community projects in lesser developed districts, especially a smart community within the local residents.

In Malaysia, Malaysian Communications and Multimedia Commission (MCMC) act as a regulator body and reports to Communications and Multimedia Department which also concentrate in ensuring access of Internet - mobile & fixed line to Malaysian community. For this reason, this study aims to examine the factors that drive the usage/participation, satisfaction and continuance intention in MCMC's smart community initiatives as well as uncover the impact of MCMC's initiatives on the community itself. In this research project reveals as the first phase in getting to know the insight of people views on smart communities' initiatives within their local areas which was held in four sites of Smart Community local champion that selected by MCMC which took place in Kemaman (Terengganu), Putrajaya (Selangor), Lundu (Sarawak) and Kota Belud (Sabah). The main pur-

pose of this research study is to explore and identify factors of respondent's especially on the definition of 'smart community facilities', their usage and satisfaction. Besides that, this research also tries to gain the community thoughts and insights on the continuance intention and the future of the 'smart community'. Due to these objectives, this first phase research is needed in understanding the community needs and perspectives especially in Malaysia.

## II. Literature Review

### 1. Smart Community Definitions

The Smart Community concept is widely use as it was first started in Silicon Valley, California, America in 1993. That was during recession period when all the stakeholders have worked together to recover the downturn. Now, this Smart Community concept is heavily used in many developing countries especially, the urban and sub-urban areas. The trend is now towards increasing knowledge-intensity in economy, equally distribute natural resources and minimize the emissions (Wongbumru & Dewancker, 2014).

Today, varies Smart Community concepts and definitions are moves toward responsible community in the sense of wisely use of information and communication digital technology to enhance businesses performance and improve the wellbeing. This is done by preserving natural resources, energy and environment, using sustainable and green concept that

is 'for everybody, for the present day and for the future generation' (Grand Lyon & NEDO, 2016). Based on Caragliu, Del Bo and Nijkamp (2011) 'smart' city refers to investments in human and social capital, traditional and modern use of Information and Communication Technologies (ICT), communication infrastructure, fuel sustainable economic development and a high quality of life, for the betterment of managing natural resources, through participatory action and engagement.

As in today scenario, a city is in the need of a high-speed communication hub with a strong modern information and communication technologies' (ICTs) infrastructure that connects the city itself and also to other cities in the world at real time. Along the way, digital devices are rapidly growing to accommodate this need. According to Chourabi et al. (2012), a smart city concept is fundamentally define as efficiency on the intelligent management and integrated ICTs, as well as vigorous citizen participation, resulting to a new kind of governance and genuine citizen participation in public policy. This includes basic infrastructures from integrated ICTs to various social systems, for example the communication networks in which connect the homes, buildings, factories, and transportations. The ICT systems also designed by various services from private companies, local governments, and residents. Meanwhile, Ghazali et al (2016) stated on the usage of the ICT and technology is mainly to improve the services and performance quality which enable to boost financial and resources efficiencies.

In Japan for instance, the "smart com-

munity" is defined as an efficient control of electricity flow by utilizing IT technology that enables various new services of power suppliers and accommodating the demand of side users (Gao et al., 2016). Likewise in England and Singapore, where the smart community was built as pilot project that reflected governments initiatives in providing opportunities by accommodating good service to the citizens (Deakin & Al Waer, 2011). Other country like China are focuses more on ecology and industry base as the Housing and Urban-Rural Development of the People's Republic of China (MOHURD) has taken the effort to develop their new urbanization to smart cities (Anrong et al., 2016).

## 2. Smart Community in Asian Countries

This research study compiled few case studies in Asia especially, to build further understanding on Smart community/cities. In South Korea, the smart cities are centered with the national policy of 'Green growth' in which, offers foreign companies to participate the projects development. Urban development plans were fuelled by a global trend towards growing urban populations at the expense of rural communities were solely managed by the state and the large private conglomerates called 'Chaebols'. The U-Korea Master Plan in the year of 2006 has set a development strategy, which helped to solve the high urban density in South Korea. Both central and regional governments see U-cities (or e-cities) as a sustainable growth engine in the sectors of construction, e-city (ICT) infrastructure and

service solutions. The Korean government initiated and funded numbers of projects with the Ministry of Land, Transport and Maritime Affairs (MLTMA), Korea Institute of Construction and Transportation Technical Evaluation and Planning (KICTTEP), academia and other agencies that focuses on Smart Power Grid, Smart Consumer, Smart Transportation, Smart Renewable, and Smart Electricity Services. Examples on the big projects: the Mega Korean Construction Technology Project was aimed to increase the life quality, the Korean Land Specialization Program and the set-up of a Center for Sustainable Housing were designed to reduce the carbon footprint by 40% through the usage of technology (MEZ, 2017).

Another study on similar research is China. China has set forth a “new-type urbanization” policy and has announced that it will develop infrastructure, including energy, IT communications and traffic systems, and will concurrently reform social systems, including the social security system and the family registration system, in order to promote green and smart new-type urbanization. In March 2014, the government of China announced the New-Type Urbanization Plan (2014 - 2020), advocating the goal of raising the proportion of residents in urban areas to 60% (the current proportion is approximately 53.7%) by having around 100 million people with rural family registration settle permanently in urban areas by 2020. Land, urban and real estate are the important components of smart community development in China, and names like ‘low-carbon cities’, ‘green cities’, ‘green communities’ and

‘smart cities’ are widely used. Encouraged by the central government’s policy, regional governments formulated urban development plans including low-carbon city and eco-city plans one after another, resulting in the creation of too many such plans. While the central government is preventing uncontrolled development of low-carbon cities and smart cities by regional governments, the New-type Urbanization Plan (2014 - 2020), announced in 2013, set forth the policy of promoting such cities. Therefore, it is hoped that the low-carbon model community programme being implemented by the National Development and Reform Commission aims to build some model communities by the end of 2020 by selecting 1,000 places nationwide as low-carbon models (NTU, 2011).

In Hong Kong the development of the smart city was centered by the intensity and efficiency of the urban areas and transportation infrastructure in building an excellent railway system as urban mobility (Govada, Spruijt, & Rodgers, 2017) to connect between the rural and the city. Since the mid-twentieth century, strategic planning and smart growth initiatives have been implemented and pursued due to high density of Hong Kong’s land and population. Hong Kong also has a good foundation in technology that enables and integrates the urban environment with the high usage of smart-phones, broadband speeds and Wi-Fi coverage. Hong Kong now has a high-quality of infrastructures and facilities to increase productivity, knowledge and information-aware of the Smart Economy in which will be credited to their economy, social and

environment.

Other research study is Japan-India collaborative regional development framework that is to set-up infrastructure such as a Dedicated Freight Corridor (DFC) between Delhi and Mumbai, along with surrounding industrial parks, distribution centers, power stations, roads, ports, housing, and commercial facilities (NEDO, 2013). Japan's Mitsubishi consortium has major plans to build up a 'Smart Community Project' alongside Delhi-Mumbai Industrial Corridor (DMIC). There are many international Smart Community projects in different state of India. For example, smart energy and water service station for industrial and urban development in Maharashtra, smart community platform in industrial parks including water solutions, and transportations. In Gujarat for example, the efficient and stable supply of high-quality electricity was build at the industrial area in Rajasthan. The term 'Smart Community', basically can be referred as an energy-efficient community with high-quality of urban infrastructure and transportation systems, and low carbon and energy technology preserve (BS, 2012).

Likewise in Philippine, the Philippine Department of Energy announced the latest energy plan, called "Philippine Energy Plan: PEP2012 - 2030," in December 2012. In particular, this plan calls for programmes in the power generation sector, including competition in retail sales, open access, mutual collaboration between grids, spot market, renewable energy market, promotion of local electrification and adaptation towards the Smart Grid Technology. In addition, from

the perspective of promoting renewable energy, the National Renewable Energy Programme, which was launched in July 2011, set renewable energy goals for the period up to 2030. In particular, the programme set the milestone goals of completing demonstration tests of smart grids and concentrated solar thermal power generation by 2015 and achieving grid parity by 2020. The other expectation is on the use of bio fuels and electric vehicles as an alternative fuel policy in the transportation sector are high. Particularly, in an electric vehicle programme, a demonstration project related to the introduction of 'e-trike' is being implemented with the support of the (APEREC, 2015).

A part from that, in Indonesia, 'sustainable society' was established among the industrial parks to meet the high growth in economic. In year 2013, NEDO and the Ministry of Energy and Mineral Resources (MEMR) of Indonesia executed Japanese smart community technologies and sustainable business model at Suryacipta City of Industry. This Smart community project in industrial park has demonstrated three technologies including technology for improving electricity quality, regulation and energy conservation technology, as well as ICT infrastructure as a platform (NEDO, 2017).

Lastly, in Singapore, the local governments set to design and employ solutions in which will further enhance their smart communities with the help of Geographic Information System (GIS) Technology. This platform includes creation of and utilizing the 3D maps of the country, enabling decision-makers to visualize future

look on the capital and predict community needs based on GIS Technology. This 'smart community' implementation will somehow embrace innovative approaches to build information, improving collaboration, improvise processes and able to analyze trends (Esri, 2017). In other words, the term of 'smart city' and/or 'smart community' shared common keywords as like sustainability, flexibility, likeability, intelligibility and high-quality livelihood. Therefore, it is important to study the 'smart community' perspective in Malaysia. This would help to add to the body of knowledge on the smart community and/or smart city concept as well as the insights on initiatives in Malaysia as one of the developing country towards the 'smart city'.

### 3. Rogers Adoption of Innovation

#### Models

This research uses the Theory Of Adoption And Diffusion Of Innovations introduced by Rogers (1983) as to help in on understanding the framework to describe the adoption and implementation of 'smart community'. In getting to know the insights from local community in their understanding of the smart community initiatives and effort, according to Rogers (1983), there are five-stages of adoption. Firstly, the knowledge and followed by persuasion. Third are decision (that is accepting or rejecting the new technology), implementation and lastly, confirmation. Innovation diffusion is a communication process concerned with the spread of messages about an innovation, over time, through the social

system, using a variety of communication channels (Rogers, 2003). Meanwhile, Rogers claimed that there are a few conditions (e.g. personal limitations of the potential user) and/or external obstacles (e.g. ineffective communication channels) may restrain the success of the adoption process (MacVaugh & Schiavone, 2010). Those individuals that fail to adopt are the non-adopters. This theory further enhanced by involving multilevel behavioral processes as the innovation-related decisions and actions of individual actors in a social system, in which are influenced by other individuals, aggregated actor cognitions (perceived as behavioral norms) and aggregated actor behaviors (number of actor-contacts who have adopted a new communication technology); and, structural forces that might arise from inside or external to the social system (Nan, Zmud, & Yetgin, 2014).

In the Information Technology (IT) adoption literature, Rogers' (Rogers, 1995; Rogers, 1983) model appears to be the most prominent and commonly used (Premkumar & Roberts, 1999; Thong, 1999). Research study as like Teo et al. (1997) examined the effecting factors of internet adoption among businesses in Singapore. The results indicated that organizational and technological factors were more significant rather than environmental factors in internet adoption. Technology policy, compatibility of the internet with organizational culture and infrastructure, and top management support were the major contingent factors affecting internet adoption. Other studies that uses IT adoption for examples are, the adoption of the internet (Lefebvre,

Harvey, & Lefebvre, 1991), open systems (Chau & Tam, 2000), electronic commerce (Grandon & Pearson, 2004), and management support (McGinnis & Ackelsberg, 1983; Quinn, 1985). Another similar studies on management support towards IT adoption was Thong and Yap (1995), whereby the top management results had a positive attitude towards its adoption, and also to those who are innovative and knowledgeable on IT. Besides that, culture and trust are the potential factors that influenced towards the IT adoption (Gefen, Rose, Warkentin, & Pavlou, 2005). Hence, this study uses Rogers' adoption of innovation theory to further understand on the local community towards the knowledge on smart community.

### III. Methodology

A qualitative approach was used in this research project that involves interviews with several community members in the Smart Community project sites. The four sites of Smart Community local champion that selected by Malaysian Communications and Multimedia Commission (MCMC) involved Kemaman (Terengganu), Putrajaya (Selangor), Lundu (Sarawak) and Kota Belud (Sabah). Interview method is used to engage and gather information in the subjects own words from which insights on their interpretations can be best obtained. By using this method, respondents are encouraged to talk about their experiences, feelings, and opinions on topic discussed.

In the first phase, where qualitative approach was used, data was collected in 3 months period that started from May to July 2017. Based on interviews from these four sites that would be beneficial on the understanding the insights of the community and able to construct a strong framework for quantitative approach (second phase) in developing survey instrument (measurement) in the next phase of the project. In terms of respondents' selections, purposive sampling was used. Respondents were mostly members from Pusat Internet (Internet Centers), except for Putrajaya whom the respondents were from the residents and/or employees in the area. As the respondents were limited to only 8-10 persons for each site, the purposive sampling was done and it was more objective in answering factors that drives the usage/participation, satisfaction and continuance intention from the community. Semi structured interviews were used where-by the same open-ended questions were distributed similarly across the four sites. In Putrajaya and Kemaman, the semi structured questions were given via emails. Meanwhile, the face-to-face interviews were conducted at PI1M within a period of 30 minutes for each interviewee in the other two sites (Lundu and Kota Belud). This approach provides opportunities for both interviewer and interviewee to discuss on the topic in more detail.

### IV. Findings

In the interview session, few questions

**Table 1.** Demographic Information.

Site	Gender	Race	Education	Age	Income (RM\$)
Putrajaya	5 Males 4 Females	9 Malays	7 = Diplomas 2 = Degrees	7 = 30s 1 = 40 1 = 50	1 = >2000 4 = 1000-1999 1 = 3000-3999 3 = 4000-4999
Kemaman	6 Males 3 Females	1 Indian 8 Malays	5 = Certificates 2 = Degrees 1 = Diploma 1 = PhD	1 = >20 6 = 20s 1 = 30 1 = 40	1 = none 4 = 1000-1999 2 = 2000-2999 2 = 3000-3999
Kota Belud	5 Males 5 Females	10 Malays	9 = Certificates 1 = Degree	2 = 20s 4 = 30s 1 = 40 2 = 50s 1 = 60	2 = > 1000 4 = 1000-1999 1 = 2000-2999 2 = 3000-3999 1 = <5000
Lundu	8 Males 1 Females	9 Malays	8 = Certificates 1 = Degree	1 = >20 3 = 20s 3 = 40s 2 = 50s	4 = none 2 = > 1000 3 = 1000-1999
Total	37 Respondents				

had been asked which, mainly on the current state of usage/participation, satisfaction and continuance intention from the community on 'smart communities' facilities'.

Below list are the findings of the interviews that were conducted at four selected sites:

### 1. Demographic Data

Total respondents from this qualitative approach are 37 and they were from various backgrounds of demographics. Respondents are mainly students, workers, and entrepreneurs who live in the areas. Below table indicates demographic detail of the four sites, which collected from the interviews (refer Table 1):

### 2. What do They Know on 'Smart Community' Facilities?

Majority of the respondents across four sites have smart phones and access to the internet. The usage is either via the center as like PI1M/KOIL or/and wifi connection at home on daily basis with min usage of an hour. Almost all of them have social media accounts, for example, Facebook, Instagram and Youtube. They even download mobile application as like What's App to communicate among the families and groups of friends. Some of the respondents use this tool to communicate, engage and also promote their products. Others uses and access to the internet for work and education purposes.

In Kemaman, majority of the respondents are KOIL members and they strongly said that KOIL is the 'smart' cen-



tre for the community. Members are able to sit in computer classes and entrepreneurship classes to enhance individual skills. Likewise in Lundu and Kota Belud, respondents use Pusat Internet 1 Malaysia (PI1M) centers, which similarly like KOIL centre in Kemaman. Main services provided are like computer and media social classes, where by majority members were taught from basic computer to entrepreneurship skills. From the interviews, 6 respondents were PI1M members have started their businesses - Small and medium-sized enterprises (*SMEs*) in Kota Belud. For example, businesses selling traditional delicacies like *kuih penjaram or penyaram, kuih kapit, kuih lidah and cendol*. This helped to boost their income. It is proven that a lady respondent whom has been to be successful in horse and buffalos riding business in Kampung Pantai Emas, Kota Belud. This respondent managed to attain a monthly income of RM7000-RM8000.

Uniquely, respondents at Putrajaya CCTV and phone connections for security purposes and they think this is the 'smart' way to monitor safety around the community. Meanwhile, one respondent stated 'smart community' facility should be on providing bicycle lanes to encourage healthy lifestyle and can be one of the family outings during the weekends.

### 3. State the Advantage(s) or Disadvantage(s) of the Usage

All of the respondents agreed on the usage of the 'smart' phone that helps them and/or ease on their daily routine work. Those that used PI1M and/or KOIL,

they feel that the place is convenient and provide facilities besides computers with Internet access, computer classes, entrepreneurship training, photocopies (include fax and scan), and also postage services. With only RM5 lifetime membership fee, the centre provides more to help the community. Besides proximity, the members feel attached to the centre as the assistance were also from the locals. So, the intensity and engagement as community is strongly build. In Putrajaya, the community like the CCTV installation as they feel secured, break-in and vandalism can be minimized. However, majority agree that this usage especially internet via computer and phones should be guarded, monitored and controlled by the centre and/or adults to avoid misused. For the youngsters, too many applications and connections would slow down and put less attention to their daily work. Like in business, especially in catering, due to time laps or late orders also would jeopardize the business.

### 4. Would You Want to Continue and Propose to others? Why?

Respondents want to continue and would like to propose to others. More people should know on the facilities offered and utilize the usage at the centre (PI1M/ KOIL) and should be shared among the community. More memberships will encourage more local entrepreneurs to take classes to help them in promoting their products/services. Internet usage will help in daily work and in the know of current issues worldwide. Furthermore, the CCTV should be used wisely as part

of security control measurement for the community living within the same area.

### 5. What do You Foresee the Future on 'Smart Community'?

It is hope that more KOIL and PI1M centers can be built to accommodate the community especially the kampong/rural areas. This will enhance knowledge especially in online and digital perspective that will help in their daily work and also help energy savings. Like in Kota Belud, Lundu, online tourism would further enhance in promoting attractive beaches, national parks, waterfalls and cultural events which, potentially invite local and foreign tourists. Using online advertising, locals are also being able to promote their home stay to tourists. For fishermen, with social media extension, their local products like dried and salted fish, anchovies and seafood would be made well-known. One respondent in Lundu hope that one mobile application to be applied to ease the fishermen in location fishing spot and weather alert. Meanwhile, the youngsters can help to initiate and communicate via social media as part of the marketing tool to promote the family business. This will potentially boost the community's livelihood.

In future, 'smart' alert device would help to alert the victims who live at the low landed (flood) areas. With this device, the evacuation process will be faster and minimize lost. The Water Level and Security Monitoring System and Alternative Communication Network should also be in place to minimize disaster. One respondent from Kemaman, addressed this

matter and hope that the flood will further improve. Before, the respondent was one of the flood victim occurred in year 2013.

In Putrajaya, five respondents said that CCTV is considered as one of the smart facilities due to security purposes. With CCTV installation, the place is safe and well-guarded. Meanwhile, only one respondent stated on bicycle lanes to be implemented in future to encourage healthy lifestyle and can be one of the family outings during the weekends. On the other hand, one of the respondents does not know the meaning of smart facilities. This respondent was hoped that an awareness campaign was to be held to create exposure amongst the residents.

## V. Discussion and Conclusion

This study revealed the first phase research project that involved interviews (qualitative approach) at four sites of MCMC's Smart Community local champion which took place in Kemaman (Terengganu), Putrajaya (Selangor), Lundu (Sarawak) and Kota Belud (Sabah). Data collected showed these four sites received the benefits of 'smart community facilities'. Significantly, the advance of Internet will enhance people usage on being 'smart' and efficient.

There are few themes and categories based on Roger's Theory of Adoption and Diffusion of Innovation that have been developed in the interviews' findings. Categories like informational, content, digital services and infrastructure were

**Table 2.** Themes and Categories Developed from Interviews

No.	Themes	Category
1.	Latest information Lots of information Education	Informational
2.	Facilities Promotion Increase Knowledge Entrepreneurship skills Class offered Shared to community Content on smart community	Content
3.	mobile operating system energy efficiency technology ease to connect	Digital services
4.	Improve infrastructure Widen infrastructure Proximity Comfortable Security	Infrastructure
5.	e-business promotion networking help in work	Promotion
6.	Secure Safe Avoid misused CCTV	Security
7.	Membership fee	Cost
8.	Brings more benefit	Benefit
9.	Help to work faster	Efficient
10.	Healthy Lifestyle More family time	Lifestyle

found in the findings. Besides that security, promotion and security were also found in the study. It is best shown in below table (Table 2). As stated by Meijer & Thaens (2016) in their understanding of socio-technical framework for studying smart city projects which reveal on innovation covers technological, instrumental, collaborative and symbolic

values. Therefore, data interpretation from the qualitative approach reveals that community thinks the infrastructure, content and digital services helped to generate and build up ‘smart community’. This will give the benefit for the whole community as well as improve individual efficiency, lifestyles and well-being. Once, the ‘smart community’ implemented the

society would rather feel safe and secure.

The current findings on the usage and satisfaction can still be further improved with better infrastructures, systematic development with sophisticated digital technology services, facilities and structured content, and also safety - security measures in place. Similarly literature reviews discussed in earlier section on smart community in Asian countries which facing the same problems that are on infrastructures and Internet networks. In need the continuous effort for community towards accepting and adopting the innovation. However, cost would still be the most important factor in implementing 'smart community' initiatives. Although, this paper only discuss the success stories of smart community/cities in Asia

and not otherwise. Besides, cost, efficiency and security, the government should tighten the local legislation and public affairs. Also having a good collaboration from private companies and industries to make the 'smart community' a reality.

On the other hand, the Information Technology Adoption from Rogers is still valid and practical for this study. It is hope that from this understanding of the community insights' the next step and challenge is to develop and construct similar framework for quantitative approach in developing survey instrument (measurement) to gather more concrete perception on the impact of 'smart community' initiatives in local perspectives especially in Malaysia.

## References

- Anrong, D., G. Li, J. Li and X. Kong (2016), Research on Smart Community Planning of Yishanwan, China towards New Urbanization, *International Review for Spatial Planning and Sustainable Development*, 4(1), 78 - 90.
- APERC. (2015), *A Study on Smart Communities in the APEC Region*.
- Bacon, C. J. (1992), The Use of Decision Criteria in Selecting Information Systems/Technology Investments. *MIS Quarterly*, 335 - 353.
- Briggs, R. O., M. Adkins, D. Mittleman, J. Kruse, S. Miller and J. F. Nunamaker Jr (1998), A Technology Transition Model Derived from Field Investigation of GSS Use Aboard the USS Coronado. *Journal of Management Information Systems*, 15(3), 151 - 195.
- BS. (2012), "Smart Community" Project at Sanand yet to take off. Retrieved from [http://www.business-standard.com/article/companies/-smart-community-project-at-sanand-yet-to-take-off-112090100030\\_1.html](http://www.business-standard.com/article/companies/-smart-community-project-at-sanand-yet-to-take-off-112090100030_1.html)
- Caragliu, A., C. Del Bo and P. Nijkamp (2011), Smart Cities in Europe, *Journal of Urban Technology*, 18(2), 65 - 82. <https://doi.org/10.1080/10630732.2011.601117>
- Chamers, T. and D. Lee (2004), Web-based Training in Corporations: Organizational Considerations, *International Journal of Instructional Media*, 31(4), 345.
- Chan, S. C. H. and E. W. T. Ngai (2007), A Qualitative Study of Information Technology

- Adoption: How Ten Organizations Adopted Web-based Training. *Information Systems Journal*, 17(3), 289 - 315. <https://doi.org/10.1111/j.1365-2575.2007.00250.x>
- Chau, P. Y. K. and K. Y. Tam (2000), Organizational Adoption of Open Systems: a "Technology-Push, Need-Pull" Perspective, *Information & Management*, 37(5), 229 - 239.
- Chere, C. and T. L. Gibson (1995), Lessons Learned from 100+ Years of Distance Learning. *Adult Learning*, 7(1), 15.
- Chourabi, H., T. Nam, S Walker., J. R. Gil-Garcia, S. Mellouli, K. Nahon and H. J. Scholl (2012), Understanding Smart Cities: An Integrative Framework, In *System Science (HICSS), 2012 45th Hawaii International Conference on IEEE*, 2289 - 2297.
- CSD. (2017), *Hong Kong Population Estimates*, Hong Kong, Retrieved from <http://www.censtatd.gov.hk/hkstat/sub/so150.jsp>
- Dahiya, B. (2014), Southeast Asia and Sustainable Urbanization, *Global Asia*, 9(3), 84 - 91.
- Davis, F. D. (1989), Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 319 - 340.
- Deakin, M. and H. Al Waer (2011), From Intelligent to Smart Cities, *Intelligent Buildings International*, 3(3), 140 - 152.
- Esri. (2017), Building Smart Communities with GIS Technology, Retrieved August 18, 2017, from <http://esri.com.sg/industries-government-national-development-smart-communities>
- Floyd, S. W. and S. A. Zahra (1990), The effect of fit between competitive strategy and its adoption on organizational performance in small banks. *Technology Analysis & Strategic Management*, 2(4), 357 - 372.
- Gao, W., L. Fan, Y. Ushifusa, Q. Gu and J. Ren (2016), Possibility and Challenge of Smart Community in Japan. *Procedia-Social and Behavioral Sciences*, 216, 109 - 118.
- Gefen, D., G. M. Rose, M. Warkentin and P. A. Pavlou (2005), Cultural Diversity and Trust in IT Adoption: A Comparison of Potential E-voters in the USA and South Africa. *Journal of Global Information Management*, 13(1), 54.
- Ghazali, M., T. Okamura, T. Abdullah, M. S. Sunar, F. Mohamed and N. Ismail (2016), In the Quest of Defining Smart Digital City in Medini Iskandar Malaysia, Iskandar Puteri, Malaysia, In *Proceedings of the SEACHI 2016 on Smart Cities for Better Living with HCI and UX*, ACM, 19 - 23.
- Govada, S. S., W. Spruijt and T. Rodgers (2017), Introduction to Hong Kong's Development, In *Smart Economy in Smart Cities*, Springer, 171 - 186,
- Grand Lyon and NEDO. (2016), Lyon Smart Community, Retrieved August 18, 2017, from [http://www.economie.grandlyon.com/fileadmin/user\\_upload/fichiers/site\\_eco/20121121\\_gl\\_lyon\\_smart\\_community\\_dp\\_en.pdf](http://www.economie.grandlyon.com/fileadmin/user_upload/fichiers/site_eco/20121121_gl_lyon_smart_community_dp_en.pdf)
- Grandon, E. E. and J. M. Pearson (2004), Electronic Commerce Adoption: An Empirical Study of Small and Medium US Businesses, *Information & Management*, 42(1), 197 - 216.
- ISD. (2017), *Hong Kong: The Facts Country Parks and Conservation*, Hong Kong, Retrieved from [http://www.gov.hk/en/about/abouthk/factsheets/docs/country\\_parks.pdf](http://www.gov.hk/en/about/abouthk/factsheets/docs/country_parks.pdf)
- Kuan, K. K. Y. and P. Y. K. Chau (2001), A Perception-Based Model for EDI Adoption in Small Businesses Using a Technology - Organization - Environment Framework, *Information*

- & Management*, 38(8), 507 - 521.
- Kumar, T. M. V. and B. Dahiya (2017), Smart Economy in Smart Cities, In *Smart Economy in Smart Cities*, Springer, 3 - 76.
- Lefebvre, L. A., J. Harvey and E. Lefebvre (1991), Technological Experience and the Technology Adoption Decisions in Small Manufacturing Firms, *R&D Management*, 21(3), 241 - 249.
- Lin, H.-F. (2014), Understanding the Determinants of Electronic Supply Chain Management System Adoption: Using the Technology - Organization - Environment Framework, *Technological Forecasting and Social Change*, 86, 80 - 92. <https://doi.org/10.1016/j.techfore.2013.09.001>
- Looi, H. C. (2005), E-Commerce Adoption in Brunei Darussalam: a Quantitative Analysis of Factors Influencing Its Adoption, *Communications of the Association for Information Systems*, 15(1), 3.
- MacVaugh, J. and F. Schiavone (2010), Limits to the Diffusion of Innovation: A Literature Review and Integrative Model, *European Journal of Innovation Management*, 13(2), 197 - 221. <https://doi.org/10.1108/14601061011040258>
- Meijer, A. and M. Thaens (2018), Urban Technological Innovation: Developing and Testing a Sociotechnical Framework for Studying Smart City Projects, *Urban Affairs Review*, 54(2), 363 - 387. <https://doi.org/10.1177/1078087416670274>
- Kotterink, B. (2014), *Mapping Smart Cities in the EU*, European Union, Retrieved from [https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjl-8zjlOXVAhUIOo8KHYYtA1oQFggnMAA&url=http%3A%2F%2Fwww.europarl.europa.eu%2FRegData%2Fetudes%2Fetudes%2Fjoin%2F2014%2F507480%2FIPOL-ITRE\\_ET\(2014\)507480\\_EN.pdf&usg=AF](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjl-8zjlOXVAhUIOo8KHYYtA1oQFggnMAA&url=http%3A%2F%2Fwww.europarl.europa.eu%2FRegData%2Fetudes%2Fetudes%2Fjoin%2F2014%2F507480%2FIPOL-ITRE_ET(2014)507480_EN.pdf&usg=AF)
- McGinnis, M. A. and M. R. Ackelsberg (1983), Effective Innovation Management: Missing Link in Strategic Planning? *Journal of Business Strategy*, 4(1), 59 - 66.
- MEZ. (2017), *Smart Cities in South Korea*, Retrieved from <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwi-7N2Ut-PVAhVBsY8KHQimCusQFggnMAA&url=http%3A%2F%2Fwww.rvo.nl%2Fsites%2Fdefault%2Ffiles%2Fsmart%2520Cities%2520South%2520Korea.pdf&usg=AFQjCNHM0c1RhLFOJYprBaz8BN9iX>
- Nan, N., R. Zmud and E. Yetgin (2014), A Complex Adaptive Systems Perspective of Innovation Diffusion: An Integrated Theory and Validated Virtual Laboratory, *Computational and Mathematical Organization Theory*, 20(1), 52 - 88.
- NEDO. (2013), India-Japan Smart Community Project in DMICDC Region, Retrieved from <http://www.nedo.go.jp/content/100537411.pdf>
- NEDO. (2017), Smart Community Demonstration Systems Begin Operations in Indonesia, Retrieved from [http://www.nedo.go.jp/english/news/AA5en\\_100220.html](http://www.nedo.go.jp/english/news/AA5en_100220.html)
- NTU. (2011), INTRODUCTION OF TANGSHAN CAOFEIDIAN ECOCITY, Retrieved from <http://www3.ntu.edu.sg/TCTforum/ppt/DrLinPeng.pdf>
- Oliveira, T., M. Thomas and M. Espadanal (2014), Assessing the Determinants of Cloud Computing Adoption: An Analysis of the Manufacturing and Services Sectors, *Information & Management*, 51(5), 497 - 510. <https://doi.org/10.1016/j.im.2014.03.006>

- Phahlamohlaka, J., Z. Dlamini, T. Mnisi, T. Mashiane and L. Malinga (2014), Towards a Smart Community Centre: SEIDET Digital Village, In *IFIP International Conference on Human Choice and Computers*, Springer, 107 - 121.
- Premkumar, G. and M. Roberts (1999), Adoption of New Information Technologies in Rural Small Businesses, *Omega*, 27(4), 467 - 484. [https://doi.org/10.1016/S0305-0483\(98\)00071-1](https://doi.org/10.1016/S0305-0483(98)00071-1)
- Quinn, J. B. (1985), *Managing Innovation: Controlled Chaos*.
- Ramanathan, R., E. Philpott, Y. Duan and G. Cao (2017), Adoption of Business Analytics and Impact on Performance: a Qualitative Study in Retail. *Production Planning & Control*, 28(11 - 12), 985 - 998.
- Riemenschneider, C. K., D. A. Harrison and P. P. Mykytyn (2003), Understanding IT Adoption Decisions in Small Business: Integrating Current Theories, *Information & Management*, 40(4), 269 - 285.
- Rogers, E. M. (1983), *Diffusion of Innovations* (Third edit), New York, <https://doi.org/citeulike-article-id:126680>
- Rogers, E. M. (1995), *Diffusions of innovations* (4th ed.), New York: The Free Press.
- Rogers, E. M. (2003), *Diffusion of Innovations, 5th Edition*, Simon and Schuster, Retrieved from <https://books.google.com/books?id=9U1K5LjUOwEC&pgis=1>
- Saunders, C. S. and S. Clark (1992), EDI Adoption and Implementation: A Focus on Interorganizational Linkages, *Information Resources Management Journal (IRMJ)*, 5(1), 9 - 20.
- Soliman, K. S. and B. D. Janz (2004), An Exploratory Study to Identify the Critical Factors Affecting the Decision to Establish Internet-Based Interorganizational Information Systems, *Information & Management*, 41(6), 697 - 706.
- Teo, T. S. H., M. Tan and W. K. Buk (1997), A Contingency Model of Internet Adoption in Singapore, *International Journal of Electronic Commerce*, 2(2), 95 - 118.
- Thong, J. Y. L. (1999), An integrated model of information systems adoption in small businesses. *Journal of Management Information Systems*, 15(4), 187 - 214.
- Thong, J. Y. L. and C.-S. Yap (1995), CEO Characteristics, Organizational Characteristics and Information Technology Adoption in Small Businesses, *Omega*, 23(4), 429 - 442.
- Turnbull, P. W. and A. Meenaghan (1980), Diffusion of Innovation and Opinion Leadership, *European Journal of Marketing*, 14(1), 3 - 33.
- Wang, Y.-M., Y.-S. Wang and Y.-F. Yang (2010), Understanding the Determinants of RFID Adoption in the Manufacturing Industry, *Technological Forecasting and Social Change*, 77(5), 803 - 815.
- Wongbumru, T. and B. Dewancker (2014), Smart Communities for Future Development: Lessons from Japan, *Built*, Retrieved from [http://www.builtjournal.org/built\\_issue\\_3/05\\_Review\\_Article.pdf](http://www.builtjournal.org/built_issue_3/05_Review_Article.pdf)
- Zhu, K., K. L. Kraemer and S. Xu (2006), The Process of Innovation Assimilation by Firms in Different Countries: a Technology Diffusion Perspective on E-Business, *Management Science*, 52(10), 1557 - 1576.