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Characteristic of Information and Communication Technology (ICT) Innovation and Its Application: A Descriptive Study in Lhokseumawe City

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ABSTRACT

This study analyses the characteristics of Information and Communication Technology (ICT) innovation in several districts in Aceh. This study was conducted in Lhokseumawe City. ICT has opened more accesses, shortened a long distance and made everything became closer as well as it has benefited us with more effective and useful time. Skill and competence to operate the Information and Communication Technology (ICT) tools could eventually provide all human beings with more simple and easy life. However, the availability of information and communication technology (ICT) provided by some governmental organizations in Aceh gave no positive impact on economic and social improvements to their communities, yet has led to another form of exclusivity and created an obvious technological gap where government remained working on a manual basis. This study employed descriptive qualitative approach using purposive sampling technique in selecting the participants. Data was collected through observation, interview and relevant document review. Data analysis was undergone through three steps using interactive methods: 1) Data reduction, 2) Display, and 3) Conclusion. The results showed that governance espouses to use Information and Communication Technology (ICT) system for every public sector although some other public sectors such as public policy, financial report and organization planning did not use it. While, the ICT system was incompatible at the government system. In addition, the result also found that ICT was not mutually integrated within the organization.

Keywords: *Innovation, information and communication technology, commitment, development, Aceh.*

INTRODUCTION

Technology evolution mainly occurs as a result of a hard work in searching the benefit of it. The technology was introduced to help and facilitates human activity, which then develops and becomes part of their life (Pacey, 1983). Those who can engage with technology will advantageously be the beneficiaries of it. In contrast, those who cannot adapt with the technology will not be able to take advantages of it. In its further development, people who able to generate a technological innovation and simultaneously utilize it, they will have greater opportunities to manage other resources that can increase their personal capacity.

In a global communications era today, many information technology media such as the Internet has become a commonly-used tools in our daily life. Moreover, its existence has opened wider access and shortened the distance that may provide us with very useful time efficiency. The Ability to utilize information and communication technology with various applications allow a human being to run their business easily and smoothly such as the use of email, social networking and even teleconference and so forth. Governments, within their institutions, start to develop technology-based programs such as e-government, e-learning, e-commerce, however, the content is obviously dependent on the penetration of access to the internet and new innovations on its software and contents.

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The access to information and its delivery to heterogeneous communities with their backgrounds and characteristic diversity require innovation that in line with the development of society itself. To government, information and communication technology aim to create greater possibilities to enhance both intergovernmental and governmental dialogues with the people in service and to create more transparent governance. Technological progress has been realized to provide economic benefits, so that many developing countries are committed to improving and developing the potential to absorb, present and implement technology.

The innovation is often interpreted as new things or renewal (Setiadi, 2008; Sudrajat, 2008). Others define innovation as an idea, practice, or object that is considered new by human beings or other adoption units. The concept of innovation diffusion theory believes that an innovation is diffused throughout society in a predictable pattern. Some groups of people will adopt an innovation as soon as they hear it, while some other community groups need a long time to adopt the innovation (Sudrajat, 2008).

Nevertheless, the availability of information and communication technologies provided by some government organizations leads to other forms of exclusivity rather than to create economic and social improvements for their communities. Where technology stuttering still exists and occurs in policy flow like manual correspondence, public service is still analogous and government's websites are not updated which in turns provide outdated and non-actual information. Organization is created to deal with routine tasks on a large scale through a rule about human relationships. The structure is needed to accommodate the results of innovation, but it can be a link between one innovations to another so that it can be interconnected which eventually will be integrated into a system (Rogers, 1995).

In Indonesia, the application of information and communication technology system within government organizations is to support the improvement of security and accelerate the development of social and economic welfare: to encounter gaps between central and regional government to improve a better system; to improve access to information and knowledge; to enhance human capacity building; to support democratic processes and bureaucratic transparency; and to sstablish information-based society.

Aceh with a vision of dignity, prosperity, justice and self-reliance based on the Aceh Government Law (UUPA) derived from Helsinki MoU has 23 districts/cities with their respective characteristics, including Lhokseumawe city which is located on the eastern part of Sumatra, the edge of the Strait of Malacca. Lhokseumawe City which has Coordinates: 5 ° 7'0 "LU 97 ° 2'0" BT, Total 181 km2 (70 mil²), Total Population 179,807, Density 950 / km2 (2,400 / sq mi) and with 68 *gampong* (villages) spreading in four sub-districts, is a governmental city that applies system of information and communication technology in support of organizational administration to be more tidy and cost-effective. Based on the observation conducted, researcher found that some *gampong* which had been supported by computer equipments and Internet did not optimally utilize and used them properly as a medium of information and communication in running governance system at *gampong* level and in building communication between *gampong* and district level government within Lhokseumawe city. Whereas the utilization of technology properly will support database repair, graphic support, modeling simulation, which will be integral to useful decision-making in planning, managing and developing. (www.bappedalhokseumawe.web.id, 2014: accessed July 10, 2017).

Ideally, the development of an organization should be in line with the development of technology in order to carry out its duties and achieve its vision and mission. Thus, the application of information and communication technology is, of course, considered as one of the media in the information and policy management to achieve its goal. In its application, there are several influencing factors that may differ from each other, including the needs and interests of the organization itself, government policy or coercion of the developed countries. Based on the above phenomenon, some problems need to be studied in order to answer the question how innovation in ICT application in the Lhokseumawe city governance system both commitment and characteristics of it in supporting the acceleration of gampong development in the region.

This study aims to find out the factors of innovation in the use of information and communication technology in Lhokseumawe. It is essential to conduct in depth study considering the availability of information and communication technology in the government organization brings no significant changes, yet creates other exclusivity instead of improving the economic and social development of society. Where technology stuttering still exists and occurs in policy flow like manual correspondence, public service is still analogous and government's websites are not updated which in turns provide outdated and non-actual information.

THEORETICAL FRAMEWORK

Generally, Information and Communication Technology (ICT) as part of science and technology is everything that deals with technological matter in collection, acquisition, analysis, storage, distribution, and presentation of information (Ministry of Research and Technology, 2006, p.6). Furthermore, the development of globalization and information and communication technology has also presented a flow of communication process in organizational and management changes both in government and business institutions. Naisbitt & Aburdene (1985) noted various changes in the paradigm of communication flow as a result of global environmental change. Meijer (2008) sees changes in the paradigm of communication flow with implications for changes in organizational and management paradigms both in structure, strategy and culture.

Communication has an important role in the innovation process. Hadiat (2002) reveals the function of communication in national innovation systems, where a system cannot be separated from aspects related to patterns of interaction, relationship and linkage, where communication becomes the main process instrument. Ljunberg (1982 in Mulyana, 2008), sees the role of communication and innovation as a whole in a series of innovation processes that are considered to be a complex network of communication channels linking the stages of the innovation process. Then Fischer et al. (1977; in Mulyana, 2008) states that communication as a process of the takeover (handling-over) of information packets from one party to another.

Brown and Eisenhardt (1995) also stated that structured communication is a critical prerequisite in internal and external communication for the success of an innovation process. Michael Gibbons, et al. (1994) argues there are two important elements in the communication system in the process of innovation: mobility and selectivity. In addition, Ulijn (2000) adds a third element, reflexivity, the need for attention to the competence of the actors of the communication process in the innovation, from the context of their reflection to culture.

Innovation is often defined as all new things or renewal (Setiadi, 2008; Sudrajat, 2008). Also, others contend that innovation is an idea, practice, or object that is considered new by humans or other adoption units (Sudrajat, 2008). Thompson and Eveland (cited in Plomp & Ely, 1996) define innovation as technology, which is a design used for instrumental action in order to reduce the irregularity of a causal relationship in achieving a particular goal. Thus, innovation could be viewed as an attempt to achieve a certain purpose.

The innovation of ICT in the internet itself is seen as the role of communication in general in bringing changes in society through continuously spreading of ideas and new things beyond the boundaries of place, time, and field. An innovation usually consists of two components: ideas and object. In the process of diffusion of innovation in the organizations, Rogers (1995) mentions that it has little difference in the process of diffusion of innovation at the individual level. Innovation in an organization represents a change in the classical model of innovation diffusion, which no longer focuses on individual studies, but on the organization. At the beginning of its development, the innovation focuses on the role of leader opinion in influencing attitudes and behavior of society.

The diffusion of an innovation consists of two equivalents of words: diffusion and innovation. Rogers (1995) defines diffusion as a process where an innovation is communicated through a certain channel within a certain time period among members of a social system (the process by which an innovation is communicated through certain channels over time among the members of a social system). In addition, the diffusion can also be regarded as a kind of social change that is a process of change that occurs in the structure and function of social systems. Innovation is an idea, practice, or object perceived by an individual or community group. The expression is considered new to an idea, practice or object by some people and on some others as well. It all depends on what the individual or group feels for the idea, practice or object.

From both equivalents above, the diffusion of innovation is a process of disseminating the uptake of new ideas or things in an attempt to change a society that occurs continuously from one place to another, from a period to the following time, from one field to another towards a group member of the social system. The main goal of innovation diffusion is the adoption of an innovation (science, technology, community development) by members of a particular social system. Social systems can be individuals, informal groups and organizations to the community.

There are four main elements of the innovation diffusion process: Firstly, Innovation (ideas, actions or goods) that are considered new by someone. In this case, the novelty of innovation is measured subjectively according to the view of the individual who receives it. Secondly, the communication channel, is a tool for delivering innovation messages from the source to the recipient. If communication is meant to introduce an innovation to a widespread audience, more precisely, fast and efficient communication channel is the mass media. But if communication is meant to change attitudes or behavior of the recipient personally, then the most appropriate communication channel is the interpersonal channel.

Thirdly, the time period, when the innovation decision process starts from someone who knows to decide to accept or reject it. The confirmation of the decision is closely related to the time dimension. At least the time dimension is seen in (a) the innovation decision process, (b) one's innovation (relatively earlier or slower in accepting innovation), and (c) the speed of adoption of innovation in social systems. Finally, the social system is a

collection of different units functionally and bound in cooperation to solve problems in order to achieve common goals (Rogers, 1995).

The main point of this theory is the social process that communicates information about a new idea viewed as subjective. The meaning of innovation is thus gradually developed through a social construction process. Innovations seen by recipients as innovations that have relative merit, suitability, ability to try, greater visibility, and lesser complexity are adopted faster than other innovations (Rogers, 1995).

The nature of the diffusion of innovation reflects the characteristics of innovation itself, where the characteristic of diffusion is one determines the speed of an innovation process. Rogers (1983) suggests five innovation characteristics: relative advantage, compatibility or compatibility, complexity or complexity, triability or triability (observability) and observability (observable). Based on the 5 characteristics of innovation categories proposed by Rogers (1983), this study will look at the three initial characteristics that have been carried out so far by the Lhokeumawe City government. The application of information and communication technology needs to be examined more deeply so that the innovation of information communication and technologys running can give positive impacts on all substructures under the government and the society.

RESEARCH METHODOLOGY

Present study employs a qualitative descriptive approach. According to Creswel (1994), qualitative descriptive is trying to describe the symptoms or relationship of symptoms encountered during the field observation. The use of this method is intended to obtain an overview regarding the empowerment of information and communication technology in Lhokseumawe city. Primary data were collected based on observation and structured interviews from informants that were taken based on the purposive sampling technique. In addition, secondary data were collected from books, papers, research journals, and other written materials related to the 3 of 5 characteristics in the diffusion of innovation provided by Rogers (1983). Furthermore, this study uses interactive models data analysis techniques which consists of three main points: data reduction, data presentation, and conclusion (Miles & Huberman in Idrus, 2009).

RESULT

a. Characteristics of Informants

This study was conducted by interviewing informants from government officials, communities and key elements from *gampong* within Lhokseumawe.

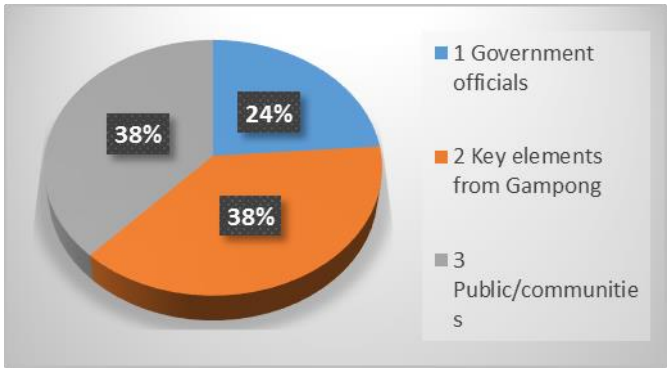

Figure 1: Informants data.

Figure 1 shows the groups of informant coming from 3 areas consisting of total 21 persons as the ICT facilities users in Lhokseumawe city: 5 informants from the district government (24%), 8 informants from *gampong* elements (38%) and 8 informants from the community (38%). This classification of informants' characteristics is determined based on the consideration that this study focuses more on how the innovation model proposed by Lhokseumawe city administration in designing a development plan to all areas within the district, especially the use of ICT in correlation to *gampong* governance system. As this is the initial study of the first year, the data shown in the graph are only 24%.

b. Innovation Characteristics and Commitment in ICT system Implementation

The development of communication and technology has an important role in human life, this is in line with the development of an increasingly modern era. If we look at five or ten years ago, the users of technology were still very little. In digital age todays, however, people from all elements can enjoy all forms of convenience offered by the media without any limitations. One of the innovations in the field of communication and technology is the presence of the internet and its usage is increasing every year. In Indonesia, the use of the internet continued to increase drastically in the past 3 years (Smart Innovation, 2015; Internet Development in Indonesia 2006-2015). This trend, of course, continues to grow rapidly in the last 3 years until early 2017.

The development of ICT in Indonesia should, ideally, bring positive impact of local development of all regions in Indonesia, including Lhokseumawe city, Aceh. The city which consists of only 4 sub-districts with not-too large coverage areas was originally well known by industrial zone where some companies such as gas and oil, fertilizer and others operated. Their operation has certainly brought about technological developments that gave impacts on community life. This predominantly Muslim region also began to live in the digital world. The widespread of WiFi availability for public access is a phenomenon as the internet access can be easily found in coffee shops, cafeteria and is also provided by cellular providers has changed the lives of the community by bringing together several devices to be integrated in one internet network. The main feature of the ICT development is the integration of several types of media and technology, which then produce new forms that have multiple capabilities and create a variety of complete and unique communication services, even unimaginable before.

This phenomenon, of course, became part of the current study with the extended focus of services and information provision by government and private institutions in Lhokseumawe. The mandate of Law Number 14 Year 2008 on Transparency of Public Information plays an important role for local government in information management. In Lhokseumawe, this management was initially under the responsibility of Information and Documentation Management Office (PPID). Nevertheless, along the implementation of *Qanun* (local law) Kota Lhokseumawe number 9 year 2016 on the Establishment and Composition of Regional Devices of Lhokseumawe City, the management of information becomes the responsibility of the Regional Information and Communications Service (DISKOMINFO). The transfer of these tasks became an obstacle in the improvement of online-based services in the city. In 2016, the establishment of a new DISKOMINFO office in Lhokseumawe indicated some problems in starting innovation of ICT in Lhokseumawe: whether it is internal government or external.

According to observation results, it can be noted that there was not a good grand design for the development of information and communication technology in the city government even though DISKOMINFO planned to provide a representative data center that can reach all government systems and services in Lhokseumawe. Moreover, government Websites itself in Lhokseumawe is still unwell managed and it is often found out to date. The master and domain are still managed by the private sector who become partners of the government in the field of information and technology.

The website becomes important tools in order to support the implementation of Lhokseumawe internet-based services program. Although socialization has been done to all City Government Working Units (SKPK) in Lhokseumawe, it will be useless if similar socialization is not delivered to the community as a whole since the main goal of this program is to ensure that people can easily access all their needs.

The results of collection conducted by DISKOMINFO on applications and servers used by the 33 SKPKs in Lhokseumawe, as the effort to create an integration of information and communication system of the city, there were only 17 applications from 14 (42.4%) SKPKs available until 14 August 2017, while the other 19 (57.6%) SKPKs were waited until the end of September 2017. The data can be seen in the graphs below:

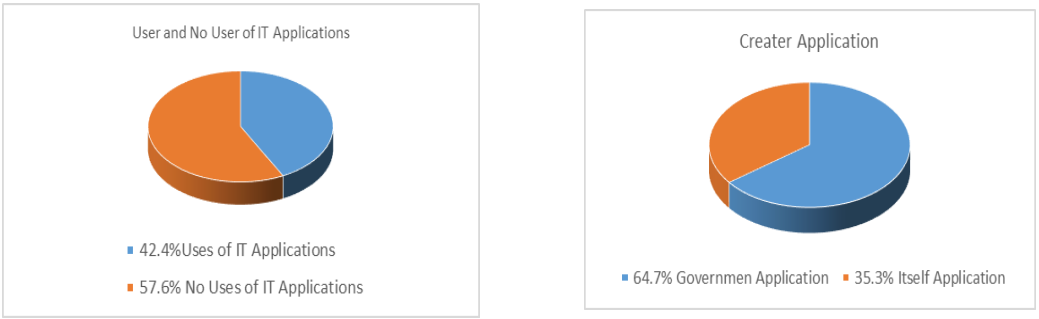

Figure 2: User of applications and creater data.

In this case, the government should determine a standard for the implementation of information and communication technology facilities for each SKPK in the process of information dissemination in an integrated and interconnected manner which includes the implementation of information by local governments at city level: Standards in facilitating the development of partnerships with private media, the feasibility standards of provision of information technology facilities are consolidated and integrated standards, information technology service feasibility standards, policy utilization standards, confidentiality, electronic transaction security and information security, policy guidance standards for public information systems and documentation, guidance standards for information system and application development methods, quality guidelines for access to information communication and outreach, and publish any standard operational procedures for the use of public services that use the information technology system at public service venues which can be viewed visually and easy-understood language either in terms of web applications or email used by all SKPK later. From data application reported by 14 SKPK in Lhokseumawe to DISKOMINFO, it was found 14 (82.4%) automatic operating applications that can be integrated, while other 3 (17.6%) applications were operated manually.

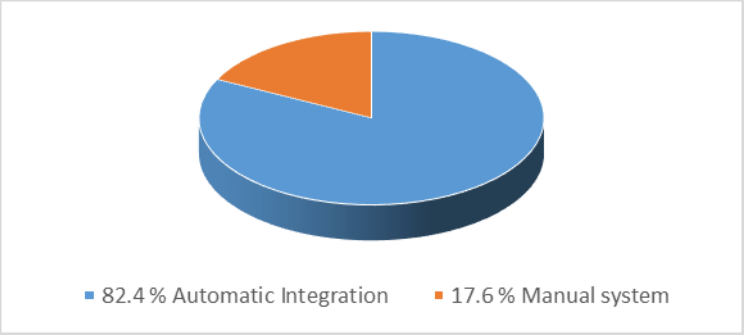

Figure 3: Integrated system format.

Among 17 applications reported by 14 SKPK in the city, there were 11 (64.7%) closed applications and could not be accessed by the public, but accessible for internal only and 6 (35.3%) applications were open to public.

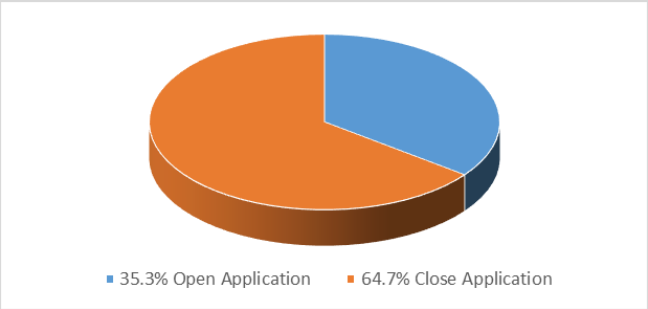

Figure 4: Public acceses of technology.

Innovation of information and communication technology is essential and beneficial to an organization. Based on the data, it is found that the users of information and communication technology facilities are classified based on services functions, such as administration and management functions within the government office in Lhokseumawe: for instance some SKPKs, sub-districts offices and g*ampong* management that have developed some technological innovations in separately to support staffing system and services.

The information and communication technology system not only concerns on the network infrastructure as a means of data communication and information accessibility, but also focus on the infrastructure concerning the data structure and information system process as the foundation for the application of government information system. Innovation in this field has also been implemented by the city government but more to online applications that were provided by the central government such as procurement system: application of Electronic Procurement Auction (LPSE).

The quality of human resources within the government of Lhokseumawe are considered good as a big number of young people hold strategic positions in government offices. However, internet technology management is still weak either in installing the network, operating and maintaining available facilities. Some reasons found that this situation is due to mutation and promotion regulation where some personnels who received ICT training and are good at ICT were replaced and promoted to another position in the institution.

Several SKPKs in Lhokseumawe begins to implement various computer and internet based applications in order to make their work easier and provide better service for community. Resource shortage becomes one of the hindering factors for government officers in implementing and managing information and communication technology in Lhokseumawe city. This is evident from the number of ICT officers who ideally receive ICT related education and training provided by the office management, but they tend to make learning and performing their duties in an autodidact manner.

In 2007, Lhokseumawe officials conducted a competition on technology innovation model for all participants from the websites management team of government offices. The sustainability of this program, however, was not taken into consideration as the government did pay attention to the result of the competition such as providing expertise training to the innovative winner and utilizing the model resulted from the championship. As a result, there are many ICT persons within government office who are lack of capacity in ICT matters.

In terms of budgeting, the development of information and communication technology is also an issue. In this sense, existing available budget is allocated focusignly on other priority development programs like the sector of transportation, education and health. The geographical condition of Lhokseumawe that near to the Malacca Strait and the city consisting of four sub-districts with unsimilar development progress makes government difficult to allocate the budget towards a larger technology. Therefore, the budget allocation is more to the distribution of development in 4 sub-districts, especially in transportation and other supporting facilities.

Looking into the harmony and settlement of complexity in the innovation of the use of information and communication technology in Lhokseumawe city government, of course, we must carefully look at the characteristics of information technology implementation and communication within the internal government. Some of the characteristics presented in the application of information and communication technology in Lhokseumawe city are: firstly the availability of information in the internal government of Lhokseumawe city continues to grow and improve. Although it is not integrated into one system, but each section and SKPK are trying to provide information both internally within the institution and the community. In technological improvements, several SKPKs have used computer technology in all fields. Although they are still limited in the development, they are already online so that they can make their work easy and can provide wider access to both internal and communities.

Tabel 1: General characteristics are emerging in the application of information and communication technology in the current city administration of Lhokseumawe.

No.		**Characteristics**	**Hardware Availability**	**Software dan Brainware Availability**
1	Relative Advantages	Able to provide information	Availability of computer with good software. But the absence of a large and good server	Software applications used are still from the central government (Jakarta) through their respective ministries, which are coordinated to the SKPK level in Lhokseumawe City.The new city administration presents "city.co.id" which is managed by a third party.

				Furthermore, local financial applications (SIMDA) and SIM PAYMENTS for local government to process salary payments are only connected between agencies only.
2		User Friendly, properly designed to facilitate access to information for users.	The computer has supported by lcd screen, high processor. Also have started procuring laptops and wifi in a government agency. Wifi and smartphone modems.	Application Socialization is very rare, resulting in many applications perceived very difficult in accessing information. Even many SKPKs in the city of Lhokseumawe still send letters manually (Paper Print)
3		Has minimal response time	Processes that have been running are still internal agencies such as the use of LAN or internal WAN. For other supporting facilities is still very little	The perceived benefits are very good from some government agencies that use the app and get a quick response from the public. On the other hand, still lack of experts and operators in data input
4	Compatibility	Reliable	Some of domains are still in the third party (vendor) and the use of wifi transmitter equipment is still very limited only a few SKPK only.	internet applications from the central government is good but the application itself still less because it still pivate owner
5		A fast cycle of innovation	The facilitation of computers and supporting facilities in the application of information and communication technology is still budget shells and more for other projects	Self applications have been attempted to be inventoried and will be innovated in systems that are integrated by the Office of Communications and Information Technology and still lack expertise and need the preparation of permanent staff placement team of operators.
6	Complexity	The Technology is diverse and stable	Planning of server procurement in the office KOMINFO and a strategic place of building to reach all areas of the city of Lhokseumawe. While some SKPKs	Existing applications over connectivity from Central Government derived apps such as village financial report applications (SIMADES) in the DPMG Service, e-Planning Application at BAPPEDA, INLISLITE in Library and

		still use server with small capacity for independent purposes. With a variety of brands Like CISCO and HUAWEI in the Social Service, Hewlett Packard (HP) at the Library and Filing Service,	Filing Service, SIAK, Benroll, Bcardmanagement at the Population and Notes Department CIVILS, WEB SITE in Education and Culture Department. still constrained in the division of tasks and budgets for experts and operators in input data
7	Desentralization / Individualism	Lenovo at the Department of Population and Civil Registry, Dell at DPMG.	Various web-based applications such as Licensing Management Information System, "lhokseumawekota.go.id", INLISLITE, SIAK, BENROLL, BCARD Management, and PADATI (a network from the central government) network, while some of the applications used by other SKPKs still run only input system data administration only and not yet significant to be accessed by public.

Regarding the policy regulating the implementation of information and communication technology in Lhokseumawe City, in the preliminary interview, the researcher had not found the qanun of municipal government that specifically regulates the policy of application of Information and Communication Technology in planning, developing, implementing process, and monitoring and evaluation of an activity both internally and externally in the city of Lhokseumawe. However, the spirit to run services quickly, reliably and provide access to the public is strongly supported.

To this extent, it can be clearly observed the leadership commitment in supporting the changes to the computerized reporting system in order to facilitate and accelerate reporting system and data sharing at the regional level. With the system, all information will be open, moreover, as the system is integrated and interconnected in the implementation of local government system. This system will affects the performance of the apparatus and improves mobility as well as the acceleration of information sharing which in turns will support the rapid development of *gampong* effectively and efficiently. Furthermore, it also supports the rights of the community on information disclosure as well as the process of public decision making. Finally, regulations such as *Qanun* as local regulations are indispensable in the application and development of information and communication technology, because of the regulation the city administration of Lhokseumawe will have a clear direction towards the application and development of information and communication technology to be more advanced and better in serving the community.

CONCLUSION

The characteristics of information and communication technology application in Lhokseumawe government are still very weak (not so reliable). Amongst SKPKs, only few have open access to information and still few that is "friendly" with the community although it began to merge with the operator. Some innovations are still in the upgrading process and mostly the issue is on the integration: for instance unintegrated information system, unintegrated E-Office between SKPKs, SIPPD / e-Planning application was just started and not integrated yet with e-Musrenbang, unintegrated Employment Application, and some data inputs are still completing in hardcopy document. Furthermore, there are several systems with the same function as SIMBADA and SIMDA for asset data recording, and SIMDA and SIM GAJI. Also, there are some applications that hosted by the Third Party such as *Lhokseumawekota.go.id* website and not all SKPKs own and use official e-mail as expected by DISKOMINFO and as directed in the Official Letter from Ministry of Administrative and Bureaucracy Reform (KEMENPAN-RB) No. 06 years 2013.

Commitments from government is crucial in succeeding any activity or program within government office itself. The role of the Government in the implementation of policy or program becomes the main actor in the success of the policy. In this regards, the commitment of Lhokseumawe city government is strong to support the application of information and communication technology, especially from the community empowerment sector at *gampong* level. The use of technology system has facilitated decision making and supervision process in *gampong* development through computer-based application, SIMAKDES which regularly reports about the administration and financial system at *gampong* within Lhokseumawe city. Nevertheless, strong commitment of Lhokseumawe city government to the application of information and communication technology does not supported by the policy of regional or provincial level, particularly at its grand design. In fact, on the other hand, local government has tried to allocate the budget for the construction of data centers (server) which will be managed by DISKOMINFO Lhokseumawe.

BIODATA

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