

Innovation Diffusion and Adoption of Wilmar's Geographic Information Systems (GIS) in Wilmar's Intra-Organization

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ABSTRACT

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This paper is drawn upon a research about "Innovation Diffusion and Adoption of *Geographic Information System* (GIS) Wilmar in Wilmar's intra-organization." This research focuses on the communication process as an effort to diffuse information system innovation. Another objective of this research is to collect information about how the users adopt the innovation after it is being diffused by the developer and the innovator of GIS Wilmar. The innovation of Geographic Information System was suggested by a manager who is also a geographical-oil palm plantation practitioner.

This research was accomplished by using qualitative method, which involved exploring and capturing the social situation and strategy on how the innovator and the developer of GIS Wilmar communicate their information systems to the users and how the users response to that through the adoption of the innovation. The data collection needed for this research was collected using qualitative data collection method, namely Library Research and Field Research (in-depth interview and observation). The data was analyzed by going through all the data records both written and audio, and its result was shown systematically in descriptive way.

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1. MOTIVATION & BACKGROUND

There are so much information technologies innovated by the developer to improve business process, bring efficiencies into the workflow, and also decrease uncertainty between the cause and the effect involved in accomplishing a desired outcome. The information technologies which were being used in business, might not be 'accepted' by the users. In business, users who are employees in a company must obey their company's regulation, in terms of technology or information system being used for business purpose, employees must use the information technology provided by company. But in reality, users may become resistant to one information technology because in their viewpoint, the job can also be done without it, and the comfort yielded by routine activities make them more comfortable doing their job without any information technology. This can become a major problem for companies, because on one hand company surely invests their money in order to implement the information technology to boost their business, but on the other hand their employees reluctantly use it. Such condition ended up with insignificant impact on business ROI.

The innovation discussed in this paper is Wilmar's GIS. Wilmar's Geographic Information System or more commonly referred to as Wilmar GIS, is a web-based information system which was built by an idea, notion and concept of a geographic practitioner who worked daily in the field of oil palm plantations. Starting from the daily work objectives, he then developed the idea, notion and concept to build an information system which could cover the "day-to-day" work of his subordinate and also other parties whose job are related to geographic which resulted from business process of oil palm plantation under Wilmar Group Plantation.

The objectives of Wilmar's GIS are: 1) To become a major platform in communicating and sharing information about geo-spatial data between work-related departments geographic; 2) To provide results of the survey, mapping and geographical systems which were well coordinated and supported all phases of the

development cycle of oil palm plantations; 3) To provide up-to-date geographic data which was available in real time for all levels of management.

Wilmar's GIS main purposes are: 1) As an interface: providing efficiencies for geographic technicians who work for the field, in keying-in the data to the system; 2) As a reporting system: generating reports which are beneficial for the top management to take a close figure of the oil palm plantation and make decision related to land purchases, compensation, and so forth, based on those reports; and 3) As a control tool: providing the framework for the manager to easily control the execution of work-field.

Wilmar's GIS offered advantages and by those advantages the users were expected to use this information system by their own motivation and awareness that this information system could help them easily do their job. But the problem in innovation diffusion is that the resistance will always be the part of it, and having awareness and knowledge about that situation, the initiator or developer should make strategies to diffuse their innovation which in this case is Wilmar's GIS.

The formulation of the issues raised were "what is communication process like that occurs in an effort to spread the innovation and what is the user's acceptance like towards the Wilmar's GIS?"

2. RESEARCH METHOD

The research method is defined as a scientific way to get data to achieving the purpose and specific uses [4]. The research methods used to answer the issues raised in this study is qualitative methods. Analysis of the data used in qualitative research is descriptive-analytical which means interpretation of the content is created and arranged systematically [5].

The techniques applied in order to collect data were:

1. *Literature research*: by collecting books, research journals, publications, and internet resources related to the diffusion of innovation, especially with organization as the innovation target in the diffusion of innovation.
2. *Field Research*: including:
 - a) In-depth interviews, the researcher interviewed some interviewees.
 - b) Observation, by observing (seeing) and/or listening to people or events. The result must subsequently be recorded.

Absorption of the innovation occurs within a specified period. As proposed by Rogers that there are four (4) main elements of diffusion of innovation and one of them is the element of time period [3]. Therefore investigators determined the criteria of users: minimal they should have been working for 2 years in the Wilmar GIS department, have been Wilmar's GIS in their daily work and have been employed for at least 2 years in the Wilmar GIS department and have been using the information systems in the span of a year 2008 up to 2011. The qualitative data to be analyzed is the result of in-depth interviews with the initiators and developers, as well as observations and interviews with the users of Wilmar's GIS.

3. RESULTS AND ANALYSIS

3.1. Research Focus

The focus of this study is a process of communication that occurs in an effort to diffuse an innovation – technological innovation – called Wilmar's GIS. In finding out the process occurred during the diffusion of innovation, both sides of communication participants were observed.

First, we observed the communicators, who communicated the innovation to communicants. Communicators of this diffusion process were the innovator and developers of Wilmar's GIS. The initiator who became the innovator of Wilmar's GIS was the Head Manager of Wilmar's GIS department, and the developers consisted of four people who put the ideas (which was still abstract) into the system that could be seen and used by the end users. We interviewed the initiator and the developers of the system to know how they communicated the system to their target innovation and what obstacles they might face in communicating their innovation.

Then we observed the communicants, who were the target of the innovation. The target innovation was the end user of Wilmar's GIS, who were the staff of GIS Department on Wilmar's Head Office. We interviewed the users to know how user adopted the innovation. The user adoption was reviewed in terms of innovation attributes namely relative advantage, compatibility, complexity, trial-ability and observability. The user adoption or acceptance was reviewed by looking at: (1) whether the users had difficulty in using the innovation or not, (2) whether the users could get the benefits of the innovation to their work or not, (3) whether the users thought the function of Wilmar's GIS was sufficient to cover their work or not, and (4) finally researchers also wanted to know whether the user was satisfied in using the Wilmar's GIS as a tool in completing their daily jobs.

3.2. Interview and Observation

Researchers interviewed the initiator (innovator) face to face on his spare time. Mr. Yau is the initiator of Wilmar's GIS, who was the Head Manager of the GIS department and the General Manager (GM) of Wilmar plantation region V. He already has experience in plantation business for over 10 years. When he was asked what lies behind the emergence of the idea to create Wilmar's GIS, Mr Yau said:

"No parties or department who took the initiative to provide a program or application that can cover the plantation business processes. When I first joined, each department has a separate data, so if management requires data relating to the maps, land compensation, and other plantation-related data, it takes a long time to the data when it needed. It was very detrimental to the company. Also there is no standard format of the data provided by each department. The data is not stored in secure data storage and not well managed. So I tried to take the initiative to make the concept of application that can provide secure data storage, centralized, easily accessible and can provide a standard reporting format. That was my initial goal and my goal even to this day."

Innovation in the form of an idea is difficult to be absorbed by the target of innovation. Rogers said there are five attributes affecting innovation targets in making decision whether to adopt the innovation being communicated to him or not [3], they were (1) relative advantages, (2) compatibility, (3) complexity, (4) trialability (could be tested) and (5) observability (could be seen). Of the five attributes, two of which were trialability (could be tested) and observability (could be seen) emphasizes that innovation which initially was innovation in the form of an idea had to be made into physical form that could be directly tested and seen or felt by the target of innovation. It would be easier for users to consider accepting the innovation when they could see and felt the immediate results of that innovation. Researchers wanted to know how the initiator finally put his idea or concept in the form of application; in which usually most people could only give an idea and concept but not or rarely bought up idea into something real. For that, the originator provided the answer:

"Because no one takes the initiation, I try to think how to make it. I'm looking for developers who can help me put my idea or concept into the form of application. When finally find the developers who can help me, we started to run development projects of Wilmar's GIS in 2007."

To obtain user awareness and understanding of the innovation, innovation must be communicated to the user. Effective communication with users was perhaps one of the most important aspects of any development process towards the ultimate success of any system. On this, the researcher asked how the initiator attempted to introduce Wilmar's GIS, He then explained how his views on efforts to introduce the innovation:

"For now, we have not been too focused to introducing this system, we are still focused on strengthening existing business processes internally. This information system has about 13 modules consisting of major modules and additional modules. We already introduced the main modules such as Job Submission module (Reporting Services), modules GRIT (Indemnification Growing Plant), and the Inventory module, but for the additional modules such as Downloads, Helpdesk and other additional modules, there is no special effort to introduce it to the user, because we do not concern about it. Introduction of the main module is done by the developers that directly introduce and provide guidance how to use the modules. Of each module there is one selected a designated user called champion to get a direct introduction of the developer, and then for the next communication process, champion will have to spread or introduce the module to other user."

In the communication process there were things that hinder mutual understanding about the messages conveyed by the communicator to communicant. Similarly, in an effort to communicate the innovation of Wilmar's GIS, surely there were barriers or obstacles. Then to close the interview with the initiator, researcher asked what might be the constraints or obstacles that he faced when trying to deploy and communicate his innovation. He explained:

"In addition to time constraints that was more directed to consolidate existing systems and develop new modules, we also face constraints in Human Resources to conduct user training. We lack of people to perform specific socialization to the user, so what we can do is choose a champion for each major module and let the champion socialize the module to other users."

At the end of the interview, the initiator suggested that there was a dilemma faced when developing and communicating the Information Systems. He said that in addition to the constraints in Human Resources (human resource), there were several other constraints, and the biggest obstacle was people perspective of the system. He further explained that people still assume Geographic Information Systems as a system that only provided survey data and mapping only, while in fact Wilmar's GIS was meant to be an enterprise solution for the whole business process of the company. Those kinds of perspectives made some bosses thought that

this system was not an urgent and important system for the company, and so the struggle was to seek every opportunity to show and open awareness of the relevant parties that this Wilmar's GIS is not just an information system that provided data map or survey data, but an integrated information system that was able to provide solutions for business process plantation companies. That was why the focuss on developing and strengthening internal systems was more important to him rather than trying to introduce it. He asserted that the attempt to introduce or communicate Wilmar's GIS was an important thing to do and he was also very aware that the dissemination process to the user needed to be done correctly. But the complexity on the existing corporate organization and business processes made the efforts to introduce or communicating the system not as easy as expected.

The developers of Wilmar's GIS, as mentioned earlier, also participated in introducing their applications to users. The four developers, three of them were the pioneer developers who followed the development process of Wilmar's GIS. Researchers wanted to know the developers involvement in introducing or communicating the information systems. The four developers replied that they were indeed involved in communicating the innovation, but not specifically, no provision of time devoted to introduce the Information Systems. Communication between developers and users occurred when users experienced problems and obstacles in using the information system. For example when there was an error or lack of understanding in using the information system, as stated by one of the developers, Ika, whom has joined and became the developer of Wilmar's GIS for approximately over 2 years said, "Yes we communicate with users, but merely if there was a function error in the system, then we give solution and explain it to users." That sounded similar to Ria who said "Yes, but only for the modules used in the field. So if the user hit the error, the users directly ask us to resolve the error and we explain how to handle it." The developers suggested the existence of a special team to conduct training to users and communicate these innovations.

To find out how users accepted and used that information systems, researchers asked users 'opinions about the quality of the image of the information system and whether the system acceptable or could be received by a user or not, then about how the users' opinions about the content are available in the information system, whether it was accurate or not, whether the delivery of information in the form of a report or error messages was delivered with clearly or not.

About the image quality of the information system users believed that the picture quality was not too stable and still needed to be improved and developed further. "Sometimes it was good, sometimes the menus disappear", so was the opinion of Susandi about image quality information system. While Yudo Tamtomo said "In my opinion, there was no problem with the picture quality of Information Systems, it well received."

Good information systems should provide clear and accurate information to be used by the users, since in addition to the effectiveness of work, clear and accurate information were exactly the relative advantages expected by the users of an information system. Users found that the information provided by the information system was fairly accurate, and the presentation of the report was quite clear, but it might be needed to have more detailed report in the future. For error messages given by the information system, users agreed that the errors messages given was still not understandable by the users as error messages that appeared in the form of programming code, such as described by end user "the error messages still not clear because they are still in codes like program which only the developers who know how to interpret them."

Overall the three users interviewed said that they had felt quite satisfied with the modules and functions provided by the information system. All three agreed that by the existence of such information systems, they felt their work was more controlled, more efficient and effective because of the interaction between employees, for example with the forum as one of the modules that allowed easiness of employees to coordinate and communicate. In addition, data could be stored in a safe place and if there was a need to find a job that has been done previously, that information could be searched more quickly through the Wilmar's GIS. Susandi provided an explanation for why he felt quite satisfied with the information system by saying:

"There are so many benefits that I get. All functions of the application of GIS cover a lot of my work. With this information system all work activities are recorded and easier to retrieve. Overall I'm satisfied with this application. The work is now much more organized with the existence of Wilmar's GIS."

Successful development and implementation of an information system was influenced by several factors, such as the support of executive management, end-user involvement, clarity of the use of information systems according to the needs and maturity of the company's plans and feasible expectations. On observations made by the researcher for one month, researchers found that the users of Wilmar's GIS played an active roles in the improvement and development of the information systems in which the users directly provided input in the form of advice or give constructive criticisms to the initiator and developers. Users also actively used the media via Helpdesk module which was provided in the Wilmar's GIS to accommodate input

(feedback) from the users. Users provided input in accordance with what they experienced when using the information system, for example they would directly inform the developers if they found that there was a function that need enhancement.

3.3. Discussion

Diffusion is the process by which an innovation was communicated through certain channels over time among the members of a social system. It was a special type of communication, in that the messages were concerned with new ideas [3]. In the process of diffusion of innovation, there are 4 (four) main elements, namely [2]: (1) the innovation, (2) was communicated through certain channels, (3) within a period of time, (4) among the members of a social system.

In accepting an innovation, usually the innovation target would through a number of phases, so-called the decision-making stages of innovation or innovation-decision process, they were [1]:

1. Knowledge, the stage where individual was first exposed to an innovation but lacks information about the innovation. During this stage of the process the individual had not been inspired to find more information about the innovation.
2. Persuasion, the stage where individual was interested in the innovation and actively seeks information/detail about the innovation.
3. Decisions, the stage where individual took the concept of the changes and weighted the advantages/disadvantages of using the innovation and decided whether to adopt or reject the innovation. Due to the individualistic nature of this stage Rogers noted that it was the most difficult stage to acquire empirical evidence.
4. Implementation, the stage where individual employed the innovation to a varying degree depending on the situation. During this stage the individual determines the usefulness of the innovation and might search for further information about it.
5. Confirmation, the stage where individual finalized his/her decision to continue using the innovation. This stage was both intrapersonal (might cause cognitive dissonance) and interpersonal, confirmation the group had made the right decision.

In diffusing an innovation in organization, the process occurred was as below [3]:

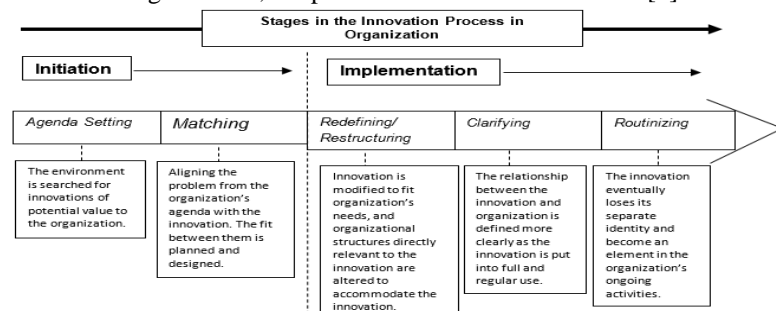


Figure 1. Innovation Process in Organization

The survey data, map data and the data of land compensation were an important data needed by the plantation management to adopt strategies and decisions related to the Wilmar's plantation. But at the time prior to this innovation, the data was not well-managed and there was no standard on the format of data reporting required by the plantation management.

Wilmar's GIS could be used as media convergence of map data, survey data and land compensation and other data relating to the plantation business, could provide both daily and monthly reports, could speed up data retrieval and could certainly provide data integrity and data security. The meaning of data integrity here was that the data stored in the database system was accurate and reflected actual data and consistency, so that the resulting report was a report that reliable and attempted to keep up-to-date. While the data security was the existence of a database that stored data centrally, all map data, survey results and other data relating to the plantation business were centrally organized and secure from data loss. The system was also granting access rights to users, so that users can only access data related to their daily work: this was done to avoid the misuse of the data from those who were not responsible.

Based on the interview which occurred in the communication process of innovation diffusion the Wilmar's GIS was pictured as follows:

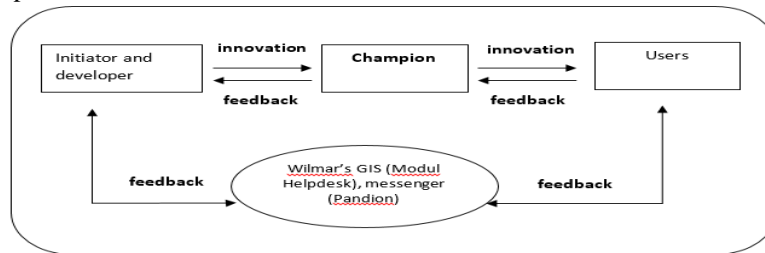


Figure 2. The Communication Process in Wilmar's GIS Diffusion

4. CONCLUSION

Based on the analysis of interviews and observations conducted in the department of GIS as a social system chosen in this study, we could conclude some of the following:

1. To spread the innovation, the initiator and developers try to communicate their system to users by using some strategies: choosing a champion of each module, making manual for user self-guidance, creating helpdesk module, and using internal messenger to actively answer user problems. With some constraints faced by the initiator and developer, those strategies came out with good result in a way communicating the innovation.
2. Users acceptance of Wilmar's GIS innovation in terms of how they accessed and used the information system on a daily basis, was good, in the sense that users used this information system with the awareness that this was a medium or tool which was built and developed to assist and facilitate their work. Users could get benefit from the information and automation provided by the system for them to complete their daily work. Users also felt the need for some sorts of special training to the users so that users know more about the functions provided by the information system in detail and could use this information system optimally to support their work.

The practical implication of this research was to successfully diffuse an innovation, the communicator had to know the strategies in communicating the innovation to the target. Mostly technological innovation failed merely because it was not delivered well by the developer. Choosing the champion among the users was one good and efficient strategy to communicate an innovation. The champion who had passion on the innovation and willing to learn more about it, would also be willing to introduce and communicate the innovation to other users.

REFERENCES

- [1] Diffusion of Innovations, http://en.wikipedia.org/wiki/Diffusion_of_innovations
- [2] N. Zulkarimen, *Komunikasi Pembangunan: Pengenalan Teori dan Penerapannya*. Jakarta: Raja Grafindo Persada. 2007.
- [3] Rogers, Everett M. 2003. *Diffusion of Innovations*. New York: Free Press
- [4] Sugiyono. 2008. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D)*. Bandung: Penerbit Alfabeta
- [5] N. Zuriah, *Metodologi Penelitian Sosial dan Pendidikan, Teori –Aplikasi*. Jakarta: Bumi Aksara. 2007.

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