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Hardika Satria

Universitas Indonesia, hardika.satria@ui.ac.id

Naldo Naldo

*Universitas Indonesia**See next page for additional authors*Follow this and additional works at: <https://scholarhub.ui.ac.id/ajce>Part of the [Social and Behavioral Sciences Commons](#)

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Diffusing signage as visual communication in the implementation of Pico Hydro Technology in Batu Roto, Bengkulu Province, Indonesia

Hardika Satria^{a*}, Naldo^a, Arius Krypton^a, Dendy Adanta^b, Budiarto^b

^a*Communication Study Program, Vocational Education Program, Universitas Indonesia*

^b*Department of Mechanical Engineering, Faculty of Engineering, Universitas Indonesia*

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Abstract

Communication plays an important role in spreading idea. This paper describes the important role of visual communication in our community engagement activity conducted in 2017, particularly in signage and the power to diffuse information of Pico Hydro technology within Batu Roto village, Bengkulu Province, Indonesia. The community engagement itself is based on multidiscipline point of view, specifically communication and engineering. Pico Hydro is commonly used worldwide to generate electricity in rural area, and thus very useful for rural electrification. We conducted research to fulfill the needs of our plan in the community engagement and used communication development theory to support the program outcome. Communication development theory has a focus on dissemination of innovation. The method of this study is desk research such as the psychology of colour and typography. The paper argues that the application of Pico Hydro technology would have more impact on the people of Batu Roto village if it is combines with the social science method of communication development through signage. The information that lies in the signage hopefully can spread the idea of practicing pico hydro in a significant number of houses in the Batu Roto village, hence solving the lack of electricity problem in the Bengkulu Province.

Keywords: communication development; pico hydro; signage; psychology of colour; diffusion of innovations; Batu Roto; rural electrification

1. Introduction

In 2014, Bengkulu Province is one of the provinces in Sumatra still dealing with electrical energy crisis with a ratio electrification of 81.7% or 670 villages categorized as rural regions. However, Bengkulu is a province that has great potential due to its hilly topography and has many waterfalls of 3 GW, which can be used to generate electrical energy through the application of pico hydro technology. The application is very beneficial for people in rural areas with no access to electricity due to shorter life cycle cost, lower investment and operational cost, easier manufacture and larger efficiency than other source (wind turbine and solar Photo Voltaic (PV) (Ho-Yan, 2012; Williams & Simpson, 2009). This is the reason some researchers recommend pico hydro as an independent power plant to rural electrification (RE) such as Cameroon, Nepal, Laos, Rwanda and Honduras (Ho-Yan, 2012; Adhikari, 2013; Vicente et al. 2012; Pigaht et al., 2019; Thomas, 2012).

However, there are some obstacles in the implementation of pico hydro turbine: the distribution of the plant that is difficult geographical condition and low level of public awareness (Warjito et al., 2018). Development and communication are two things that are closely related. Communication in the context of development is "as an integral part of development, and communication as a set of variables of instrumental in bringing about development" (Roy in Jayaweera and Anumagama, 1987). Everett M. Rogers (2003) states that development is simply a useful change towards a social and economic system that is

*Correspondence Author: hardika.satria@ui.ac.id

decided as the will of a nation, and communication is the basis of social change. Thus, the role of communication in development must be linked to the direction of change where communication activities should be able to anticipate the movement of development.

Development communication involves three components, namely: development communicators (government/community apparatus), development messages (ideas/programs), and communicant development (wider community/villagers). Later development communication can be seen in a broad and limited sense. In a broader sense, development communication includes the role and function of communication as a reciprocal message exchange activity between the community and government, from the planning, implementation, and evaluation. While in a limited sense, development communication is all efforts, methods and techniques of delivery of ideas and development skills coming from the initiator of development and realized in targeted communities that can understand, accept, and participate in development. Thus, this program is a community engagement program in Batu Roto village in Bengkulu that means to serve the society, apply science and technology, increase the capacity of the society and empower them. This study will discuss signage implementation according to the psychology of colour in order to support the idea of rural electrification through pico hydro independent power plant. Hopefully, the applying signage of pico hydro independent power plant attracts peoples interest to come, see, and learn about pico hydro. In the end word of mouth about pico hydro will diffus around the village and the likelihood to implement the idea of pico hydro will spread within their neighborhood.

2. Methods

The conveyance of ideas and information in forms that can be seen describing visual communication. It relies in part or whole on vision. Visual communication has a broad spectrum including signs, typography, drawing, graphic design, illustration, industrial design, advertising, animation, color and electronic resources. Fahmy, Bock & Wanta (2014) argues in "Visual Communication Theory and Research. A Mass Communication Perspective" the importance of methodical rigor in visual communication research and notes this research has borrowed liberally from the traditional theoretical approaches to mass communication – in particular, framing, agenda setting, cultivation, and semiotic.

The study on visual communication is currently blooming. David Machin (2014) observes that the nature of visual communication has been debated for centuries, the proliferation of academic journals and publications targeting the visual is a relatively recent but timely development. He suggests that the "discovery" of the visual within various fields of study runs the risk of reinventing the wheel, for instance, by importing field-specific theories and renaming established concepts, which may have been carefully redefined over decades within other fields of study. Visual communication is thus not new, it can be traced from prehistoric cave drawings to complex computerized renderings. It has the power to transcend the written word to eye visual perception. Edward Tufte (1997) linked visual display of information to thought: "When principles of design replicate principles of thought, the act of arranging information becomes an act of insight" (p.9). Visual communication is thus simultaneously informative and artistic.

Signage is one kind of visual communication form, it is created to display information to audience with visual graphic content. The term 'signage' appears to have come into use in the 20th century as a collective noun used to describe a class of signs, especially advertising

and promotional signs which came to prominence in the first decades of the twentieth century. Signage helps viewer to digest information and at the same time engage with the viewer. Engagement in this matter is the idea that not only do the audience notice a message, they become involved in it as well. Engaging signage draws viewers in, capturing their interest on a deeper level that ideally results in emotional involvement. Signage is the design or use of signs and symbols to communicate a message to a specific group, usually for marketing or a kind of advocacy. A signage also means signs collectively or being considered as a group. At its best, messages that directly engage consumers invite and encourage them to participate in the ongoing community engagement program of pico hydro in Batu Roto.

Calori (2007) describes the roles of signs as follows: (1) Information-provision, i.e. signs conveying information about services and facilities, such as maps, directories, instructional signs or interpretive signage used in museums, galleries, zoos, parks and gardens, exhibitions, tourist and cultural attractions that enhance the customer's experience; (2) Persuasion, i.e. promotional signage designed to persuade users of the relative merits of a company, product or brand; (3) Direction/ Navigation, i.e. signs showing the location of services, facilities, functional spaces and key areas, such as sign posts or directional arrows; (4) Identification, i.e. signs indicating services and facilities, such as room names and numbers, restroom signs, or floor designations; (5) Safety and Regulatory, i.e. signs giving warning or safety instructions, such as warning signs, traffic signs, exit signs, signs indicating what to do in an emergency or natural disaster or signs conveying rules and regulations; (6) Navigation – may be exterior or interior (e.g. with interactive screens in the floor as with "informational footsteps" found in some tourist attractions, museums, and the like or with other means of ".



Fig. 1 Signage Shape

Source: US Department of Transportation Federal Highway Administration (2013)

One of the most important aspect in signage is the use of colors. Colors have great impact on the viewer and attract attention. Attention is captured subconsciously before people can consciously attend to something. Solomon (1999) argues that people will react first to that which is most visible, and color plays a central role in allowing us to detect objects quickly. Colors play important role for society and can evoke various emotions such as excitement, energy and calmness (Ou et al, 2003). Colors are a component of nonverbal signs which are studied as one of the important phenomena (Kotler and Keller, 2006). In this program we use psychology of color as a theoretical approach in doing community engagement program of pico hydro in Batu Roto, Bengkulu Province. We strongly believe that contrast color can produce high visibility signage, thus viewer can recognize it from distance, become attracted to come and visit pico hydro to learn more about it and later spread the words to the others. With these systematical approaches, the process of diffusing technology idea of pico hydro in Batu Roto village can be delivered smoothly and accepted by the people.

This community engagement program used secondary data to develop answer for the existing problem in Batu Roto. The technique we use for this methodology is desk research. Desk research technique involves collecting data from existing resources and is considered a low-cost technique compared to field research. We gathered data and information mainly from the web, thus it is considered as online desk research. We use this method due to the financial limitation of the program. The cost for set up pico hydro in Batu Roto is expensive even though we have collaborator from Faculty of Mechanical Engineering, Universitas Bengkulu. Nevertheless, the remaining budget is still insufficient for us to conduct field research.

We seek information mainly from the internet, particularly the concept of color and the psychology of color. These concept supports the idea of innovation diffusion where idea can spread through signage. Given the culture of Malay exist in Bengkulu, we found that yellow is the dominant color of Malay culture, so we embed it into the signage. The creative process of designing signage is through brainstorming session within social sciences member of this community engagement program.

After the brainstorming session, some ideas to be put in the signage were generated. As the last step before the finalization of signage, we conducted a phone interview through with one of the key persons in Batu Roto to confirm the idea and the contrast color approach we used based on cultural perspective. These insights are very useful in the process of making the idea of innovation diffusion happen since we believe in community-based perspective. Murphy (2014) breaks the community-based perspective from the traditional view of social existence and organizational life, and instead compares it with the outlook of critical community practice that emphasizes solidarity and social inclusion. He also argues that persons who participate in this creation are responsible for giving the community and its needs meaning.

To put in detail all works are done in collaboration between two institutions, Universitas Indonesia and Universitas Bengkulu. Firstly, the program was set after the meeting of representatives from both universities in Depok. Secondly, the team was split into two groups, engineering and social science, wherein engineering team focuses on developing model of pico hydro and social science focuses on how to disseminate the idea or message of pico hydro itself. Lastly, we also asked the local community and government to participate in building and maintaining pico hydro in Batu Roto.

3. Result and Discussion

The function of signage in mass communication especially in the form of visual communication is important to diffuse the idea through information within the people of Batu Roto. Fruitful discussion between view point of mechanical engineering and social sciences haggling during the process of pre-assessment to implementation. During the discussion we strongly advocate the use of signage in the diffusing process of the innovation diffusion technology of pico hydro in Batu Roto. We argue that signage is a relatively cheap investment for a visual communication tool and it can also become a point of interest for the pedestrian since the location of pico hydro is nearby the street.

The combination between engineering and social sciences creates a comprehensive solution to tackle the problems in Batu Roto especially the electricity problem. Those two different perspectives are advantageous in creating an integrated solution within the community engagement program. From the point of view engineering it can be seen that

Batu Roto has a potential water resource that can serve as a source of electricity. The abundance water flowing through the village is deemed enough to produce electricity with the help of pico hydro turbine. The turbine generates electricity from the water flow in the waterways near residents' houses on a small-scale electricity i.e. 5 kW.



Fig. 2 Engineering team measure water discharge in Batu Roto's waterways
Source: Dendy Adanta (2017)

On the other hand, the point of view from social science manage to support the idea of pico hydro and its implementation. We try to put the idea into reality by creating signage with the intention to attract more viewers to come, see, and learn more about the pico hydro technology, which is a brand-new technology for the people of Batu Roto village in Bengkulu. The enthusiasm from the people is high, particularly during the installation phase where a lot of people join to help the process. This can be seen as an engagement process in the community and the transfer of knowledge to them. The relationship between university and the community is thus positive and it is in line with the purpose of our community engagement program, namely the transfer of knowledge from university to community, community empowerment, and in the end is disengagement.



Fig. 3 Community takes part during installation process of pico hydro
Source: Dendy Adanta (2017)

In designing signage, we follow the rule of color combination coined by the Outdoor Advertising Association of America (OAAA). It is suggested to follow the color combination to create high visibility effect since the signage was intended to be put nearby the road where people of the village pass by. Like sound waves, light rays have varying wave lengths or frequencies; the lighter the color, the higher the frequency. These wave lengths determine how people perceive color. Some pigments absorb certain light frequencies and reflect others and we see the reflected frequencies as color. Complementary colors such as red and green are not readily legible because they have similar black and white value, so their wave lengths set up a vibration. Any combination of colors of similar value even without vibrating will have low visibility. Although yellow and purple are complementary colors, they have strong contrast in value and therefore little vibration, so they provide maximum visibility.



Fig. 4 Color frequencies and contrast
Source: United States Outdoor Advertising Association of America (2016)

The aim of communication is to encourage the public to attract a wide audience. In addition to visual, structural features and its aesthetics pay attention to the expressive properties of human reactions, which can also be based on the following color analysis: (1) Red creates reaction of excitement and energy of the doubly effective, lively, and dramatic;

(2) Yellow evokes people to more accurately sense and represents the development; (3) Blue symbolizes the stability in the lives of human beings, constant, gentle, cool, and reliable; (4) Green represents natural, refreshing, and relieving; (5) Orange depicts friendly, charming energy, jolly, and happy; (6) White creates sense of contradiction, purity, and simplicity; (7) Black symbolizes powerful, mysterious, beautiful and classic, and magnitude; (8) Brown is completely rural and positive expression, rich, healthy, safe, and durable. Thus, we can choose the best choice for the signage and it goes to high visibility as the color contrast approach in creating and designing signage.

The application of color psychology in the signage creates resonance in visual communication within the intended information. The concept of resonance in visual communication is credited with enriching a reader's experience of a visual text by amplifying intended meaning and urging an interpretive effort (McQuarrie and Mick, 1992; Meggs, 1989; Salen, 1993). The resonance in the concept of signage is described as reinforcement that comes from the color and its information words. Resonance itself therefore emphasizes the participation and experience of readers in communication activity. In other words, a viewer or reader of a signage is immersed in the intertextuality of communication in everyday life as a dynamic intersection of texts, in which meaning is mediated socially, culturally and historically and through which resonance is generated.

Signage is timeless and a highly functional piece of design thought. It demonstrates design with high level of functionality provided via objects that look simply. For this reason, we make everything functional starting from the color to the shape. Sign shape communicates certain meaning information to the readers in a universal way no matter the culture or language of the place where the signage is. Shape of the signage has meaning and quickly determines the nature of the message it transforms, such as warning, regulation, information, etc. Being able to get the message communicated by a signage, people are informed and can act appropriately according to this information. In this community program, we choose square or rectangle shape for the signage because it gives direction or information. We choose blue color as the background of the signage as it is used for information sign and we combine with yellow for the letters to get contrasting color and generate high visibility. This combination of design may resonate the message or information effectively even from the distance.



Fig. 5 Pico hydro signage
Source: Author's collection (2017)

As the Malay proverb goes "you can't love what you don't know", the signage is needed to raise awareness that there is a new source of energy technology and can be utilized by the community toward an independent energy village. The shape of the signage is rectangular in size large enough to inform that there is a picohydro technology in the village of Baturoto. Yellow, in addition to representing a strong Malay culture in Bengkulu can give the impression of cheerful, happy, energetic, and an optimistic feeling. Yellow combined with blue can give high visibility effect. The selection of arial letters that are part of the sans serif typography form can give a firm and straightforward impression in conveying information.

The combination of blue and yellow is intentional to adapt with local color of Malay people in Bengkulu. Hasan (2004) states that yellow is a symbolic color in the current Malay community that symbolizes the majesty and status of the wearer with special intentions. In addition, Jamal (1992) has mentioned color plays an important role in Malay culture, they use color expression in various symbols and aesthetics. Being fond of bright colors, Malay people see yellow as an important royal color and one of the most popular colors. Thus, it does not only create a high visibility signage but also pay attention to the distinctive color of Bengkulu people. In a community outreach program, we need to focus not only on disseminating the knowledge to the community but also on actively seeking community participation during the program. One of the answers to that problem is to create communication between the researcher and the community through mass media communication channel like signage. We argue that the existence of signage in the community increases the people's awareness of the pico hydro technology in their area.

4. Conclusion

Pico hydro technology is a brand new to the people of Batu Roto village in Bengkulu Province. They rely the need for electricity by the distribution of the state electricity company and it is considered unreliable since there were many blackouts during day and night. Moreover, furthermore electricity network in Bengkulu is not yet covered the whole province, let alone Batu Roto village considered in a hilly remote area location. To tackle

this problem, we make a community engagement program involving two approaches specifically engineering and social sciences. The main aim is to introduce the pico hydro technology as a cheap reliable alternative way to generate electricity that can covered the needs of electricity in a household with approximately maximum generated power is 5Kw. On the other side we would like to see this program continue and people of Batu Roto become familiar with the technology and later adopted it. Thus, we create an approach to deal with it and for the first stage to make this technology familiar to them is by creating a signage. The signage is not only just a signage, but we put information and we applied theory of color psychology to make it appealing to them and attract them visually. The colors combination is based on contrast color with intended purpose to grab viewers' attention, make them interest and create desire to have one and later it becomes action by installing pico hydro in their house. Signage in a simple way is a diffuse tool for the theory of innovation diffusion as a theoretical background we used in this community engagement program. Our hope is that one day people of Batu Roto village will take pico hydro as a solution to the electricity need and its adopted throughout the village.

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