Ethno Medicine and Medicinal Plants Research of Bali Aga Ethnic Group in Bali Province as an Indigenous Knowledge Preservation Effort

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ABSTRACT
Indonesia is rich with tropical plants. Some of the plants are used as traditional medicine. This paper is a preliminary research that aims to identify the efforts that have been made in preserving indigenous knowledge on traditional medicine of Bali Aga ethnic group in Bali. The Ethno Medicine and Medicinal Plants Research of Bali Aga Ethnic Group in Bali Province is part of The National Research on Medicinal Plants and Traditional Medicine (RISTOJA) conducted in 2012 and 2015. The method used was qualitative, which the collected and analyzed data was obtained through observation and literature review. The result of this research was a documented data of the Bali Aga indigenous knowledge in using ethno pharmacological knowledge, traditional medicine and medicinal plants. It appeared that battra (traditional healers) knowledge was still original, despite slightly affected by external knowledge. This was supported by the fact that the informants reside in rural areas with limited access and information. The fact that this indigenous knowledge only mastered by old generation, and only 3 out of 5 battras have student to pass the knowledge on. This traditional medication has been developed, practiced widely and become a lifestyle, yet not many people know it. Some activities of preservation have been done by socialization, externalization, and combination.

Keywords: indigenous knowledge; preservation; ethno medicine; medicinal plants; traditional medicine

INTRODUCTION

Indonesia is a country with the second largest tropical forest in the world, and has high plant diversity so that it is known as one of 7 (seven) "megabio-diversity" countries. Distribution of flowering plants in Indonesia's tropical forests has more than 30,000 species which means almost 12% of the total number of flowering plants in the world that amounting to 250,000 types (Ersam 2004). The huge bio-diversity stores potential nutritious plants that can be extracted and further utilized. World Conservation Monitoring Center has reported that Indonesia's territory is a region in which many

types of medicinal plants are found with the number of plants that have been utilized reached 2,518 types (Ogata 1995).

In addition, Indonesia is also rich in diverse ethnicity and culture. It has been reviewed about 554 ethnic groups in Indonesia based on the authenticity of the language and ethnic origin (Hidayah 2015). Population Census by the Statistics Indonesia (BPS) in 2010 stated that the number of ethnic groups living in the territory of Indonesia amounting to 1331 with a total population of more than 200 million people (BPS 2010).

Each ethnic group has a different cultural repertoire. In each ethnic group, there are varieties of local wisdom, including utilization plants for traditional medicine. Knowledge of the use of medicinal plants (MP) by indigenous ethnic groups is very important for the development of traditional medical treatment and modern drug development because more than 50,000 plants are used for medicinal purposes which contributes to 33% of drugs produced worldwide (Schippmann, Leaman, and Cunningham 2002).

Globalised economy can cause a loss of traditional knowledge possessed by community (United Nations Environment Programme 1999). Another thing that is also faced by the Indonesian people is cases of germplasm and cultural piracy that are increasing from year to year. The threat of sustainability is caused by damaged habitat and lack of cultivation efforts of MP, particularly for types used in small quantities and slow regeneration abilities (United Nations Environment Programme 1999)

Basic medicinal plants (MP) data in Indonesia is still very minimal, especially information about types of MP related to local wisdom, use in potions, part of which is used and how to use it. Research to get phytogeographic data, utilization based on local wisdom, phytochemicals and socio-economics of MP is very important in building a basic data. The basic data can be used as important information in the MP cultivation process for increased productivity, as well as stub for the independence of plant-based drugs.

This paper aims to record the data, constraints in the process of preservation of knowledge, steps that can be done data in order to preserve the knowledge of medicinal plants, along with ethno medicine and medicinal plants of Bali Aga ethnic group.

LITERATURE REVIEW

Preservation

Preservation is a set of activities to preserve or protect something to prevent it from being damaged and to prolong its life. Preservation specialists in libraries, archives, and museum share a commitment to protect the cultural “property” in all forms and formats, or even including building environment that houses the raw material of history and the evidence that feeds our memories (Conway 2010).

Northeast Document Conservation Center defines preservation as the protection of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content. It is explained that the main

goal of preservation is to extend the existence of cultural property. Preservation encompasses on keeping a balance between collection-level activities that prevent damage such as environmental control, disaster planning, and proper housing, which can be difficult and/or costly to manage and item-level activities such as treatment, replacement, or reformatting that address existing damage which are often more easily understood and managed (Northeast Document Conservation Center 2015).

Indigenous Knowledge

Indigenous knowledge related to specific environmental knowledge, and rooted in particular places. Indigenous knowledge is fundamentally tacit and embedded in practice and experience and exchanged in the community through oral communication and demonstrations. Indigenous knowledge is referred to local wisdom which is exposed to all tangible cultural heritages or intangible.

Boven and Morashi (2002) suggested that indigenous knowledge refers to a complete body of knowledge, knowing and maintaining the history of interaction with the natural environment. A collection of understandings, interpretations and meanings are part of the cultural complexities that include language, naming and classification systems, practices for using resources, ritual, spirituality and worldview. Consequently, it provides the basis for local level decision-making about many fundamental aspects of day-to-day life to adapt to environmental or social changes.

Another concept about indigenous knowledge is essentially empirical knowledge, based on the experience of people who are directly involved with the natural world. Many terms are used to describe to IK; local knowledge, folk biology, folk knowledge, ethno ecology and traditional environmental knowledge (Morris 2010).

Knowledge Transfer

Knowledge transfer is defined as an activity that connects professionally across functions, platforms, and geographical distances. This connection helps in building a knowledge-sharing network formation that allows people to build relationships to share knowledge (Desouza 2011).

Knowledge transfer includes a variety of interactions between individuals and groups; within, between, and across groups (Paulin and Suneson 2012). The transfer of knowledge often adopts an analysis model which includes the existence of a source and a receiver, where knowledge is transferred from one party to another (Machado and Paulo Davim 2014).

There are four types of knowledge transformation based on Nonaka's SECI Model; socialization, externalization, internalization and combination.

	Tacit Knowledge To	Explicit Knowledge
Tacit Knowledge From	Socialization	Externalization
Explicit Knowledge	Internalization	Combination

Figure 1: The Nonaka's SECI Model

1. **Socialization** :conversion of tacit knowledge to tacit knowledge (individual/team)
2. **Externalization** :conversion of tacit to explicit knowledge (individual)
3. **Internalization** :conversion of explicit knowledge to tacit knowledge (organization)
4. **Combination** :conversion of explicit knowledge to explicit knowledge (organization)

The first model is socialization, when a tacit knowledge is transformed into new tacit knowledge. Socialization aims at transferring tacit knowledge face-to-face through interactions, imitation and practice. When an experience is shared with the individual, through this experience will create new tacit knowledge for the individual itself. The second is externalization means when tacit knowledge is codified and turns into explicit knowledge so that knowledge can be shared with others, involving the personalization of a mental model into a concrete concept. A person who possesses tacit knowledge, then interprets that knowledge into a documented knowledge so that it can be shared and understood by others. Frequently, the stage of externalization is difficult to do, due to tacit knowledge is difficult to convert and codify.

The third stage is combination. In this stage newly explicit knowledge becomes widely disseminated, discussed, redesigned and modified. It is argued that the combination mode of knowledge conversion embodies the aggregation of explicit knowledge in meetings or conferences. Here, individuals or a group categorize and combine it in order to merge and then shape a new and enhanced conception. Such reconfiguration helps create new ideas (IAEA, 2011). The final stage is internalization, which means explicit knowledge is transferred to develop new tacit knowledge.

Knowledge Preservation

Knowledge preservation is a process of maintaining knowledge systems and organizational capabilities that protect and store perceptions, actions and experiences from time to time and allows recalling for the future use. Knowledge preservation is a constant struggle against the advance of time and the focus on the present and future, preservation of knowledge includes the processes necessary to capture, understand,

archive, retrieve and protect explicit and tacit knowledge and to maintain its accessibility and readability in order to remain useful (IAEA 2011).

In the IAEA it is mentioned that knowledge preservation is critical precursor to knowledge transfer, the risk may come when not preserving the knowledge is the loss of tacit knowledge possessed by a competent person. Knowledge preservation efforts go through a cycle of: identification, capture, processing and organization, storage and retention, search, retrieval and representation, transfer and exchange, and maintenance and updating. The stage of knowledge preservation is storing the knowledge identified, captured and processed in robust and reliable devices to make it available for a long period of time, another stage of knowledge preservation is handling the maintenance and updating of knowledge base systems. Knowledge preservation requires information be stored in a format in which it is easily accessible and can be reused for future undertakings or decision making requirements.

RESEARCH DESIGN

The method used in this study is qualitative, where the collected and analyzed data was obtained through observation and literature review. The data collected for this study comes from articles and research report on ethno medicine and medicinal plants. Then this study was conducted to identify the efforts of preserving ethno medicine and medicinal plants of Bali Aga Ethnic using the SECI Model.

RESULTS

The main ethnic group in Bali is the Bali Aga ethnic group. Ethnic Bali Aga in the Province of Bali today still maintains tradition with utilizing the surrounding plants for treatment or health care. The ethnic community of Bali Aga is an ethnic community that identifies itself as a native of Bali (not a migrant). The Bali Aga community is administratively located in several districts, such as Gianyar, Bangli, and Karangasem. Danandjaja in Koentjaraningrat and Emmerson (1982) states that the Bali Aga ethnic group or also known as Bali Mula ethnicity (specifically Trunyan area) have the characteristics of living in the mountainous region.

The Bali Aga ethnic community generally makes a living as farmers. The plants planted are onions, cabbage, oranges, and so on. Koentjaraningrat (1971) argues that the Bali Aga community has not experienced significant influence from existence since Hindu-Majapahit ancient times although the religion is embraced by the majority of the people is Hinduism at present. The marriage system that is considered ideal is the marriage system of endogamy. Each region in the Bali Aga ethnic group has a "belief system" and different center of orientations, for example the people of the Trunyan Village believe Betara Beturuk as an orientation center and the people of Tenganan Village believe Betara Indra as their orientation center in conducting traditional ceremonies. Danandjaja in Koentjaraningrat and Emmerson (1982) states that the Trunyan belief system does not know "Leak" or creatures because they believe that gods are very hate such aggressive science. These two are locations where people still maintain the

authenticity of values and traditions that are considered as heritage. The two regions are often considered as the icon of the Bali Aga community. They also still maintain the form of traditional houses and art systems, such as dance, masks, woven handicrafts.
This is different from 3 other villages, such as Desa Pengotan, Jehem Village, and Puhu Village which have been influenced by Hindu-Javanese culture. Some of the areas targeted by RISTOJA 2015 were Trunyan Village (Kintamani District, Bangli District), Pengotan Village (Bangli District, Regency Bangli), Jehem Village (Tembuku Subdistrict, Bangli District), Puhu Village (District Payangan, Gianyar Regency), and Tenganan Village (Manggis District, Regency Karangasem). Some of these areas were selected because the people in the area are indigenous people of Bali Aga who still maintain the values and traditions of their ancestors, including wisdom local in treatment.

The battra (traditional healers) in each village are selected as informants according to certain criteria, which is having the ability and experience of treatment with medicinal plant as the main medium of treatment. “Battra” or also called “Jro Balian” is a person who is believed by the local community as a capable person treating ill people medically or non-medically. At present, Bali Aga ethnic community is trying to treat diseases by visiting doctors, hospitals, health centers and also use alternative medicine by visiting battra. The region is fertile and surrounded by tropical forests enriched with many plants, including medicinal plants, which are flourishing the region so that many herbs can be used, both by battra and society.

Battra Demography

According to the literature review it was found that the mapping of traditional Balinese Aga healers in the Bali region had found more than 50 battras, and 5 of them who successfully interviewed as informants were the most famous battra, had the most patient and considered as the most powerful used medicinal plants as media of treatment. The characteristics of the informants is shown in Table 1. While the distribution of "work" area from each informant is shown in Table 2.

Table 1: Characteristics of Informants

Characteristic	Proportion
Age	
<40 years old	0%
41-60 years old	20%
Education	
Uneducated	60%
Did not graduate from elementary school	20%
Graduated from university	20%
Number of patients	
0-5 patients	40%
6-15 patients	20%
15-30 patients	0%
>31 patients	40%

Table 2: Distribution of Work Area

Code	Name of Battra	Coverage Area of Practice	Number of Students
Battra 1	Men Minting	Banjar Mukus, Desa Trunyan, Kecamatan Kintamani, Kabupaten Bangli	0
Battra 2	Nang Seri	Banjar Dajan Umah, Desa Pengootan, Kecamatan Bangli, Kabupaten Bangli	1
Battra 3	I Nengah Darsana	Banjar Jehem Kaja, Desa Jehem, Kecamatan Tembuku, Kabupaten Bangli	0
Battra 4	I Made Perih	Banjar Carik, Desa Puhu, Kecamatan Payangan, Kabupaten Gianyar	1
Battra 5	Nengah Tanggi	Desa Tenganan, Kecamatan Manggis, Kabupaten Bangli	1

Herbal Potion

In this research all information relating to the use of plants in medication was collected, which included ingredients / composition, plants information and their uses, and the following identification and manufacture of herbaria. Potions that were successfully recorded amounted to 63, symptoms / diseases that can be treated by the battra related to illness and care for children (battra 1), specialized in cough pain (battra 2), cancer specialization (battra 3), bones and jaundice injury specialization (battra 4), and specialized in malaria (battra 5). The plants used in medicine amount to 86 plants, of which 85 were successfully identified and consisted of 85 species and 37 families.

DISCUSSION

Traditional medicine has developed widely in many countries and increasingly popular. In various countries, traditional medicine has even been used in health services, especially in the first strata health services. Developed countries, whose health care systems are dominated by conventional medicine, nowadays also accept the existence of traditional medicine, even though they call it complementary and alternative medicine, for example the United States and European countries. Traditional medicine is also widely practiced in various countries in Asia, such as China, Korea, India, Japan, including Indonesia (Siswanto 2012).

Indonesia has been blessed with abundance of biodiversity and among of them have drug effect. Herbal medicine has been used for generations to treat and maintain health. The knowledge of ethno medicine and medicinal plants are generally only known by older generations. It is important to preserve the knowledge of each ethnicity and their knowledge.

Externalization is when tacit knowledge is codified and turns into explicit knowledge, interprets that knowledge into a documented knowledge so that it can be shared and understood by others. The externalization activities undertaken in efforts to preserve the knowledge of ethno medicine of Bali Aga ethnic are by doing RISTOJA which resulted into research reports and established Museum of Jamu in Tawangmangu to display the map of jamu (herbal potions) raw material distribution and collection.

From the data, it is found that some battra are able to have at least one student. This is as the attempt to pass on the knowledge as the principal of socialization. Socialization is when tacit knowledge is transformed into new tacit knowledge, creating new tacit to other individuals. The Ministry of Health of Republic of Indonesia (MoH RI) also built Clinic of Scientification of Jamu "Hortus Medicus". This clinic carries out pre-post clinical research and synergizes to formal health care service. The clinic is supported by medical doctors, pharmacist, pharmacist assistants, laboratory technician, nurses and medical record person to learn how to diagnose a patient and give them a traditional herbal as the treatment. The socialization is also conducted by holding Annual Conference on Traditional Medicine and the program of Scientific Health Tourism, a blended program of education and recreation to encourage public interest on using safe and efficacious jamu as well as to conserve medicinal plant display, collecting sub-tropic and aromatic garden, herbarium collection, medicinal plant seed collection, integrated laboratory and scientification jamu clinic. The tour is supported by several facilities such as medicinal plant garden and traditional medicine training, library, and gift shop.

MoH RI also forming National Scientific Jamu Committee in order to preserve the ethno medicine knowledge, and to make herbal medicine become widely accepted by modern society as treatment that is scientifically proven. In the meantime, MoH RI also planning to build a virtual museum which combines the documentation of the research reports, Museum of Jamu, and Scientific Health Tourism as a media of promotion in order to enable people getting knowledge of this traditional medication using plants.

CONCLUSION

Ethno medicine and medicinal plant as traditional knowledge of Bali Aga Ethnicity is an activity of medical treatment by using herbal potions. It is just mastered by the old generation, although many young and modern generations know about the trend and have accepted it as their lifestyle. However, not many people know the variety of the plants, the ingredients, how to make the potions, and use it in scientific way.

Research on ethno medicine and medicinal plants at the Bali Aga ethnic is only one of the example since there are abundant numbers of ethnic which exist in Indonesia. The indigenous knowledge preservation activities of local wisdom have been conducted in various ways by socialization, externalization, and forming committee National Scientific Jamu Committee. Socialization preservation is done by passing it on from battra to the students, building Clinic of Scientification of Jamu "Hortus Medicus", having Scientific Health Tourism, and holding annual converence. While, preservation by externalization has been done by holding RISTOJA and establishing Museum of Jamu in Tawangmangu. As the combination, MoH of RI also in the process of building a virtual museum to collect

all the explicit knowledge into new explicit knowledge that can accessed world widely through a homepage.

From the results of this study it is hoped that herbal medicine are known widely, can be accepted and developed scientifically. In addition, it is suggested that by getting the knowledge of the varieties of the plants, people will be eager to cultivate their own plants collection and help to preserve it from distinction.

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