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MODELING PATIENT EMPOWERMENT IN HEALTHCARE ORGANIZATION THROUGH CLOUD COMPUTING

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ABSTRACT

Healthcare organization may not necessarily invest in IT infrastructure to serving the need for e-health system by considering rent the system and resources to keep them focus in their core of business (healthcare services). Cloud computing in healthcare service can provide flexibility in term of resources adoption and quick implementation. However, adopting cloud computing for the purpose of patient empowerment is challenging task for healthcare organization. Patients are empowered in the sense of controlling the process of interaction(s) with a healthcare organization and among patients themselves. In addition, empowerment through cloud computing enables patients to have greater role in the process of participation in managing personal healthcare, sharing healthcare issues with the authorized healthcare staffs, and engaging a mobile health that emphasises on healthcare service anywhere and anytime. This paper proposes a model of patient empowerment in e-health systems through cloud computing to enhance existing theory of empowerment in healthcare business processes. A survey has also been conducted to verify and improve the initial model and to understand the responses of patients regarding empowerment in the e-health services.

Keywords: Empowerment, cloud computing, e-health, CRM 2.0.

INTRODUCTION

The idea of empowerment has been discussed from various perspectives and fields of studies but introducing cloud computing to escalate patient empowerment in e-health may need to be intensified. Empowerment is an important feature recognized as strategy for e-health services to improve health literacy and customers' satisfaction [8] [9]. A successful healthcare organization exists when it provides good quality service. However, many healthcare organizations are challenged with some inefficiencies and inequities in delivering healthcare quality and service [22]. Some of these problems are due to inefficient information management and poor service [29]. Adoption of electronic health (e-health) was aimed to improve the quality of service in healthcare information management and enhance the flow of information delivery [16] [17]. In fact, e-health has provided many advantages for healthcare organization such as cost efficiency and patient empowerment [21]. Empowerment may include healthcare organization and patient relationship, disease or illness self-management and its treatment, which leads to a boost in personal satisfaction due to the increase in responsibility of individual [13]. Patients are empowered in term of controlling the flow of interaction to their healthcare service providers and among patients themselves. Furthermore, empowerment is a result of both interactive and personal processes, where caring relationships facilitate the emergence of power [30].

Healthcare organization needs to consider empowering patients in e-health service also because it can build confidence, trust, loyalty of its patients, and quality of service [5]. Patient empowerment in healthcare service is an effort to build a good relationship between patient and healthcare organization by ensuring that channels for communications and information exchanges are in place [4]. When the channel of relationships and interactions are established then healthcare organization can expect to improve information access and flow with its patients, which in turn improve quality of service and patients' trust. Therefore, Customer Relationship Management (CRM) plays important role in delivering patient empowerment in e-health scenario.

There are many challenges associated with the complex relationships between healthcare organizations and patients in relation to patient empowerment. Patient empowerment has to ensure the quality of healthcare information and its delivery that is correct, accurate, and reliable [10] [11]. Many healthcare organizations use CRM as a tool and strategy in managing patients and improving healthcare services. In addition, the recent development of Web 2.0 and cloud computing has given the possibility of mobile based empowerment that emphasizes on mobile service anywhere and anytime. The objective of this paper is to lay the foundation for developing a modeling system of patient empowerment by accommodating Web 2.0 in CRM namely Social CRM or CRM 2.0 through cloud computing approach.

We propose that the model will promote better relationship of healthcare organization – patients, and more importantly the model offers three layers of patient empowerment in e-health system. While, cloud computing can be strategies in delivering patient empowerment more flexible in term of resources adoption and quick in implementation. The rest of the paper is organized as follows. The next section will discuss empowerment in e-health, CRM 2.0 and cloud computing. Section 3 will briefly discuss methodology. Section 4 is data analysis and discussion and Section 5 is the conclusion.

LITERATURE REVIEW

In managing patients, a healthcare organization needs to understand how to surpass of patients' expectation. This involves the

ability to understand their expectation and eliminate the reasons for dissatisfaction. CRM is not merely tool of managing patients but also a strategy for significant improvement in services by solidifying satisfaction, loyalty and advocacy through information and communication technology (ICT). The CRM's goals are to attract and win new customers, nurture and maintain those the organization already has, and reduce the costs of marketing and customer service [6] [7]. Furthermore, the Web 2.0 is an important tool for the development of new CRM strategies. Web 2.0 technology enables patients to participate in social networks and exchange information [1] [2]. They can share information and knowledge about their diagnoses, medications, healthcare experiences, and other related information. It is often in the form of unstructured communication, which can provide new insights for people involved in the management of health status and chronic care conditions. Embedding Web 2.0 into CRM is known as Social CRM or CRM 2.0. CRM 2.0 is a philosophy and a business strategy, supported by a technology platform, business rules, processes, and social characteristics, designed to engage the patient in a collaborative conversation in order to provide mutually beneficial value in a trusted and transparent information environment. It is the organization's response to the patient's ownership of the conversation [24].

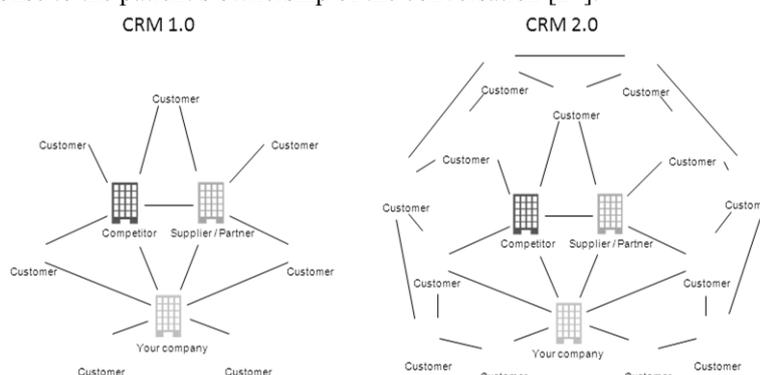


Figure 1: Comparison CRM 1.0 and CRM 2.0

Social networking in CRM 2.0 can generate a way to strengthen the relationship between healthcare organizations and their patients [3]. It can be used to encourage close and long-term relationships between organizations with its patients [12]. Figure 1 indicates the CRM transition that drives social change that affects healthcare organizations in facilitating on how patients communicating, peer-to-peer collaboration, and easy access to real time conversation. Web 2.0 can sustain the process of interactive learning [14] [15] where organization may extract information from conversation that takes place in the social networks. However, how CRM 2.0 can stimulate patient empowerment through cloud based approach. In this section discusses the literature analysis of patient empowerment, Web 2.0 and cloud computing.

Empowerment

The Internet with Web 2.0 technologies has enabled patients or patients' families are actively seeking health information and using it to make decisions about their health. As a result, patients have a better understanding of healthcare issues and more information access than before. It creates a higher expectation on healthcare organizations to fulfil as they have to make exceptional impression because poor service indicates inefficiency and lower in quality. In response, empowering patient has been offered to many patients, including patients who are not able to come physically for various reasons regardless of location. Healthcare organization through e-health can offer online healthcare services over the Internet without even physically meeting their patients.

Empowerment of patients has been discussed in the health literature over the past few decades. Many e-health discourses started with a discussion on electronic medical records (EMRs) and electronic health record (EHRs) which is transforming healthcare practice from paper-based practices to paperless business process. EMR systems are viewed as tools that allow e-health records to be stored, updated, and exchanged between various medical facilities and healthcare organizations nationwide [19]. Others define EMRs as the electronic medical data which consists reports about patients' conditions, images, physiological signals, checkups reports, medical treatment videos, and medical forms [18] [20]. On the other hand, EHR system contains the records of a patient's long term and aggregate health-related information generated by one or more encounters in any care delivery setting stemming from the interoperability of multiple providers. EHR may contain patient demographics, progress notes, problems, medications, medical history, immunizations, laboratory data, and radiology reports [35]. The functionality provided by these systems can include simple patient records, elaborate patient management, and electronic medication ordering, and billing systems [28]. EMRs and EHRs serve as building blocks for a framework of any e-health initiative [34]. According to McWilliam et al. (1997), empowerment is a result of both interactive and personal processes, where caring relationships facilitate the emergence of power [30], in this regards, CRM plays important role in ensuring empowerment [9]. The other view of patient empowerment means that the patients were able to seek health information such as the prevention of diseases, health promoting, and the availability of suitable healthcare services [25]. At the national level, the Ottawa Charter for Health Promotion in Canada has made empowerment a key issue in the theory of health promotion, which focuses on the positive health enhancement rather than only ill-health prevention, mainly through the

improvement of social conditions [27]. Australia starting from 2012 has pioneered patient empowerment through Personally Controlled Electronic Health Record (PCEHR) by allowing patients to view their medical records [32]. Allowing patients to have access from e-health systems are part of patients' empowerment, however, the scope and dimension of e-health in accommodating patient empowerment are the remaining concerns to fill the research gap especially embedding social networks through cloud computing approach.

Table 1: 10 levels consumer participation in healthcare organization [21]

Level 1	Patients search for health information
Level 2	Patients exchange email with family and friends
Level 3	Patients seek guidance from online patient-helpers
Level 4	Patients participate in online support groups
Level 5	Patients join with others online service self-helpers to research their shared concerns
Level 6	Patients use online medical guidance systems
Level 7	Patients interact with volunteer online health professionals
Level 8	Patients use the paid services of online medical advisors & consultants
Level 9	Patients engage in electronic conversations with their local clinicians
Level 10	Patients receive one way electronic messages from their clinicians

Table 1 describes 10 levels in which consumers take part in the access and use of health care information [21]. The framework in Table 1 has not clearly expressed distinction on how patient who engage in social networks and patient as individual be included into comprehensive empowerment perspective through cloud computing. In many cases, when patients encountered a serious medical concern, they do not just accept whatever treatment received from their medical staffs. They seek information on the Internet learning about their condition, communicating with other patients and healthcare staffs who share their interests, and trying to find on the best treatments. Furthermore, some important outcomes of patient empowerment are self-management of disease and treatment, perceived control over the disease, satisfaction regarding the treatment, self-determination of health and treatment and increase the level of health literacy [13]. Based on the discussion above, we argue that patient empowerment in e-health can be categorized into three dimensions; personal, medical, and social. Then, each dimension was examined through survey in analysis's section.

Cloud Computing

Providing friendly e-health systems yet cost efficient and effective without reducing core functionalities are unavoidable for any healthcare organizations. The concept of cloud computing emerges with new workflow paradigms attributable to the arrival of Web 2.0 or Web as a platform [38]. Cloud computing eliminates the need to install and run the application on the users' own computer. As a matter of fact, many users already familiar and use many of the cloud services in their daily life.

There are three types of cloud computing; Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software-as-a-Service (SaaS) [33]. In national level, government or organizations with large IT infrastructure can act as cloud service provider by providing resources to any healthcare organizations within the country based on subscription models. Cloud computing can help healthcare organizations to avoid over investing IT infrastructure and training staffs by considering rent the system and resources to keep them focus in their core of healthcare services. Therefore, healthcare organizations can take advantage of using a cloud when the ICT capacity needs extensibility, customizability and scalability [37]. It is lessens the internal IT staffs' burden of maintenance, monitoring operation, and support for any incident may happen.

However, the main advantage is cost effectiveness for the implementation of the hardware and software and cloud computing can improve quality of current e-health system at an affordable cost [23]. Furthermore, cloud computing offers to healthcare organization focuses in their core business process on healthcare services and delivery activities rather than managing complex IT configuration, maintenance, and software systems through a quick deployment [36]. The proposed model reveals cloud computing has brought a possibility to extend the e-health by enabling patients empowerment and active participation in the healthcare process.

METHODOLOGY

To develop a model, this study is built upon recent literature reviews of patient empowerment in e-health, CRM in healthcare organizations, and cloud computing. The relevant journal search was conducted using keywords e-health AND patient empowerment, Web 2.0 AND CRM, and cloud computing. We chose only English-language articles published in peer-reviewed journals. After removing duplicates and articles beyond the scope of this study, the researcher selected 20 articles for the review. These articles were reviewed to extract the issues of patient empowerment at e-health setting. The researcher employed a thematic analysis of definitions, that is, the most important linked papers and articles (e-health, social networks, empowerment and healthcare, cloud computing, Web 2.0, CRM 2.0, EMRs, EHRs, etc). Then, based on the literature analysis found research gap about the scope and dimensions of patient empowerment in e-health system with embedding the concept of CRM 2.0 and cloud computing. The population sample for this study were intentionally selected from patients, patient's family, or medical staffs of hospitals, clinics, and homecare center across the country in Indonesia

(2012) and Taiwan (2014). This survey was important to reveal vital statistics and to gather users requirements derived from proposed model. Then, the model was verified and improved from the survey results.

ANALYSIS

There are many important questions associated with the complex relationships between healthcare organizations and patients in relation to patient empowerment. The survey indicated that more people either patients or healthcare staffs are prone to Internet connection in daily activities. In other words, the demands for e-health and mobile services are increasing in the future. Providing empowerment to patients in e-health condition is a challenging task. Patient empowerment must be supported with a reliable system because it encourages patients to take responsibility for their own health and make decisions about their healthcare. Empowerment in an e-health system can be used to provide effective self-service as well as to help healthcare organization to reduce costs in handling an increasing number of transactions effectively. Therefore, we designed survey that accommodates broad spectrum of patient empowerment. We distinguished questionnaire of patient empowerment into three categories of personal, social, and medical. Each category can be empowered to patients with different scope and complexities. Below is the comparison of survey results on three dimensions of empowerment in Indonesia and Taiwan.

Table 2: Survey of Patient Empowerment (Indonesia and Taiwan)

Empowerment Domain	Indonesia	Taiwan
Medical		
• View & update EMRs	69 %	79%
• Consultation online	83%	69%
• Stand by online health educators 24/7	92%	77%
Social Network		
• Discuss health service in social networks	72 %	71%
• Supporting group in social network	93%	78%
• Discuss with patients same condition	80%	69%
Personal		
• Paying service online	39%	26%
• Emotional & spiritual affect physical	100%	97%
• Record health activities online	75%	69%

Because no research has been published on the subject of e-health and three layer of patient empowerment, this paper is prepared to fill that gap. Table 2 summarizes survey results that directly correlated with the empowerments in Indonesia and Taiwan. There are three sections clustering questions for empowerments. For example, type of question that we have asked to the participant for medical empowerment, do you agree that you able to view your own electronic medical records (EMRs) anywhere, anytime? Almost 70% - 80% respondents agreed if they have accessed to their EMRs. Details of the agreement are shown in the percentage Table 2. Figure 2 shows the trends of high demands for patient empowerment in both countries Indonesia and Taiwan. In fact, the majority of respondents show their agreement of empowerment features in e-health systems except for paying service online. It is reasonable because most of Indonesian and Taiwanese enjoy the facilities of medical insurance in the country.

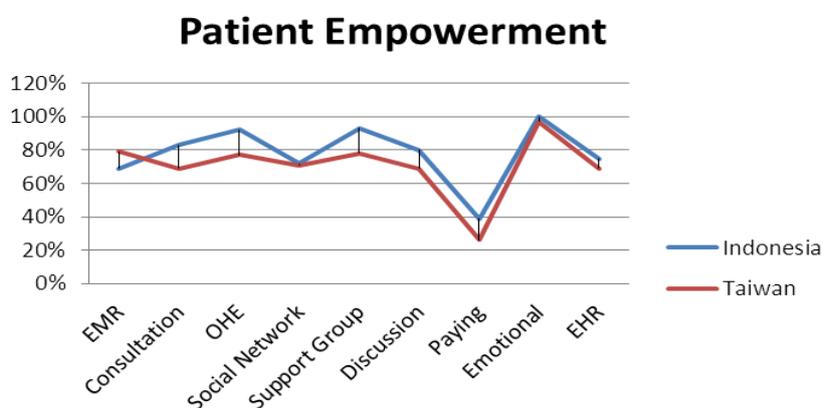


Figure 2: Patient Empowerment' Perception Indonesia & Taiwan

DISCUSSION

Patient empowerment is characterized by the manner in which patients share healthcare activities and responsibilities in healthcare processes that can pose challenges. The challenges can be privacy and security issues [26] [31]. In some cases like

in Indonesia where there is no centralized and standardized system, patient empowerment may face challenges of high cost of implementation and maintenance, standardization, and interoperability issues. Figure 3 show simplified business model of patient empowerment without cloud computing approach. Traditionally, patient empowerment in Figure 3 represents the concept of patient empowerment as shown from Table 1. In fact, many healthcare organizations consistently hold the paradigm that they are by defaulted control and manage EMRs as well as EHRs of their patients. In this scenario, patient empowerment is limited to the patient own effort to seek healthcare information from external sources like Internet with lack supervision from healthcare staffs and organization. In fact, they cannot ensure the reliability of health information gathered from those sources. In many cases, patients are prevented to view or access their EMRs that affects them in difficulties to seek second opinion from other healthcare organizations. Therefore, the model in Figure 3 confirmed the survey results in Table 2 that they demand more empowerment' capabilities especially to involve them in the healthcare process.

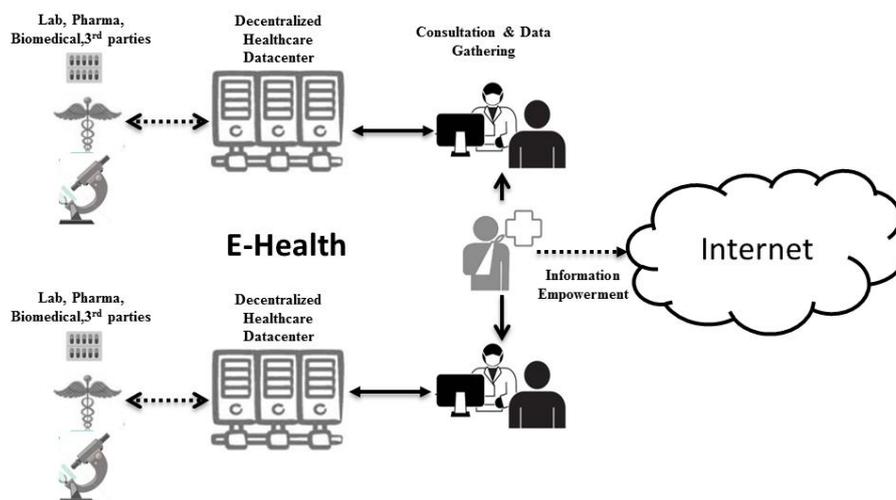


Figure 3: Traditional Model of Patient Empowerment in E-Health

Healthcare organizations may vary in implementing empowerment to their patients. Patient may visit different healthcare organization (institution 1 or institution 2) simultaneously because decentralizing healthcare systems. In this case, patient faces discontinuity of EMRs that is scattered to many healthcare organizations. For instance, patients in Indonesia are suffer from solidity and continuity of their EMRs across the country. The only patient empowerment is the ability to seek healthcare information from Internet and from social networks. Seeking healthcare information from Internet and social networks has a problem of information integrity and reliability. Even, if healthcare organization empowers patients to have access over information on their EMRs like PCEHR system in Australia, yet there is inefficiency when healthcare organizations have to deploy, manage, maintain, or upgrade the e-health systems using an internal or on-site hosting model. This required a significant amount of resources from IT personnel. Therefore, the e-health system needs to shift from two consideration are inflexible systems and less patient empowerment where patients are solely considered as recipients of care. In the next section, we propose alternative model of patient empowerment that accommodates e-health system flexibility through cloud computing.

The Model

Learning from previous model and survey results, there are two considerations for healthcare organization in deploying new paradigm of e-health system. Firstly, healthcare organization should consider more active role of patients' empowerment into their e-health systems (Figure 4). In this model we propose three dimensions of patients empowerment as personal empowerment, medical empowerment, and social network empowerment. Secondly, the model proposes three level of patients empowerment can be adopted through CRM 2.0 with cloud computing approach. Cloud computing is able to bypass and significantly reduce the amount of time, money, and resources required from the IT department. The use of cloud based e-health can have significant impacts on healthcare organization and its business process as shown in Figure 4. Cloud computing saves the significant resources, and related benefits take time to develop adopt flexible and customizable technology solutions will enable healthcare organization to support their strategic business objectives at a lower cost, and help to enhance quality and productivity. Cloud based application encourages patients to share their experiences and related information to achieve better health outcomes. Web 2.0 may affect healthcare business processes, especially those relating to interactions between patients, which offer a new way in engaging, managing, and maintaining relationships.

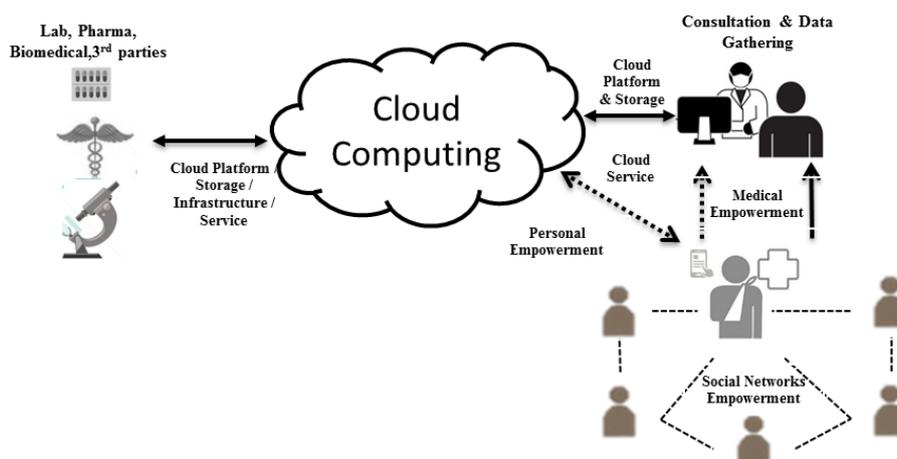


Figure 4: 3 Layers Patients Empowerment in Cloud Computing

Personal empowerment is the ability of a patient as individual to have access towards their personal healthcare records (EHRs). In term of EHRs, patients can have facility to record, update, and maintain their own personal health records such as (basic habit; eating, sleeping, exercise, emotional, spiritual, etc). As a matter of fact, the survey revealed that patients want to empower in this category. While, EMRs are mostly generated when patient consults with the medical staffs or after medical examination. From the perspective of the proposed personal empowerment, patients are able to have view and access their medical records anywhere anytime.

The model also proposes social networks empowerment. The social networks can be easily adopted and embedded into e-health system through cloud computing. CRM 2.0 plays important role in supporting better partnerships between patients with their healthcare staffs for mutual benefits. Patients have an ability to make interactive conversation between them. For example, a patient with chronic diseases will be motivated to share their experiences and other who have similar problem. Patient-patient interaction is a form of social empowerment where patients participating in social networks can share information about their healthcare experiences and other beneficial information.

Finally, medical empowerment empowers patients not only to view or access electronic records but also they can view and generate health and medical records under supervision of authorized healthcare staffs. Patient-healthcare provider interaction is a form of medical empowerment where they are able to interact with medical staffs through e-health as they interact physically. The activities in this interaction are online consultation, e-prescription, e-appointment, etc.

The three layers of patient empowerment can be deployed in cloud computing. Those benefits range from providing healthcare resource storage and databases, modules applications and tools for patients and healthcare staffs involving in e-health program such as social network Apps for chronic diseases, Apps and Web for personal empowerment, and medical Apps' to view his / her medical records. In summary, cloud computing in e-health can be solutions for the countrywide healthcare system where they have not yet implemented standardize e-health system like in Indonesia, at the same time cloud computing initiative will be best solution for any healthcare organizations to escalate patient empowerment in reliable, secure, and scalable manners. Through cloud computing, patient empowerment can be deployed in any level of healthcare organization.

CONCLUSION

The model provides alternative and direction for any healthcare organization in empowering their patients, and the survey results have supported that patient empowerment can be extended into personal, medical, and social through e-health. Then, the model accommodates those three layers of empowerment into integrative interactions through CRM 2.0 and cloud computing approach. CRM 2.0 has brought a possibility to extend the service of healthcare organizations by enabling patients, patients' families, and the community at large to participate more actively in the process of health promotion and education through the social networks. The model can help healthcare organizations in defining which scope of empowerment that they will implement into the organization. In addition, cloud computing based can be the best solution for any healthcare organization to keep the technological trends in order to empowering patient in their services. Healthcare organizations can save on repair and maintenance, system and licensing, and physical space. In addition, healthcare organizations are increasingly driven to cloud computing will increase functionality, lower cost, and enhance convenience of patients empowerment by making the services and resources available anywhere anytime.

ACKNOWLEDGEMENT

The author thanks to the supports from The Taiwan Fellowship Program of MOFA Taiwan during data collection at Taiwan.

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