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<th>Knowledge management study: Traditional Chinese Medicine (TCM) Village</th>
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<tbody>
<tr>
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Knowledge Management Study: Traditional Chinese Medicine (TCM) Village

Team Member:

Chan Kin Wai, Andy
Leung Sin Ting, Cindy
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Xavier Drieux
Wan Pui Ying, Kate
Chong Kai Ling, Lois
Abstract

This paper aims to provide a knowledge management study report of a Chinese Medical Clinic, Traditional Chinese Medicine Village Group (“TCM Village”), in which to demonstrate that how knowledge management could help in such organization.

TCM Village is a professional Chinese medicine organization providing outpatient services for five branches in Hong Kong. It aims to bring together the elites of the Chinese medicine field in Hong Kong so as to promote the advantages of the Chinese medicine around the world. However, TCM Village is working in a paper based environment, therefore it has potential risks of losing the medical records of patient and difficulties on sharing clinical practice among physicians between branches.

In this paper, our team has identified the knowledge management challenges faced by the group among five branches. By applying a series of knowledge management methodologies, our group was able to determine the desired knowledge management processes as well as its infrastructure to facilitate the current situation. After retrieving the assessment result, the paper has also provided some recommendations on how to implement KM processes and technologies to achieve the desired KM processes.
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<td>45</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>46</td>
</tr>
</tbody>
</table>
INTRODUCTION

Company Background

Traditional Chinese Medicine Village Group (“TCM Village”) was founded in 2009. They consist of 5 branches including Kwun Tong, Mongkok, Tai Po, Tsim Sha Tsui and Tsuen Wan. All of these branches are with certified practitioners which are either Bachelor or Master Degree holders. [1]

Through co-operation and exchanges with different international Traditional Chinese Medicine organization and groups, TCM Village hopes to integrate cutting-edge technologies and establish a development platform, with the purpose of making Traditional Chinese Medicine technology worldwide known.

The ultimate goal of TCM village is to bring together the elites of the Chinese medicine field in Hong Kong so as to promote the advantages of the Chinese medicine to our people as well as the foreigners

Clinical Department and teams

The 5 branches of TCM Village are also known as Clinical Department. Each of these branch with 2 clinic assistants and 3 certified practitioners. Hence the team is quite small, as it only consists of totally 25 staff.

The Clinic Department of TCM Village is primarily responsible for helping patients to book their appointments, diagnosing and prescribing patients medical treatments, and maintaining the medical record. The TCM assistants’ duties include answering to the patients’ inquiries, maintaining patient records, preparing and dispensing medicinal drug as well as handling the medical payment. Certified practitioners are responsible for diagnosing health problems through discussion with patients:

a. Formulate traditional Chinese medicine treatment plan based on patient’s diagnosis
b. Advise on dietary and lifestyle choices
c. Apply other therapies such as acupuncture cupping tui na and breathing therapy.

The business objective of TCM Village is to promote and heal patients with traditional medicine and therapy for people in Hong Kong. The key objectives are:

1. Deliver quality customer services by reducing the human errors.
2. Promote and share traditional Chinese medicine knowledge.
3. Maintain a unique patient record in a system in order to share among the branches.
4. Heal patients with traditional therapy.

Assessment Background

Referring to the spokesman of group, TCM Village currently does not possess any digitalize system, neither electronic patient system nor file sharing system. They only consist of a simple website to introduce their clinical services and general medical knowledge.

The existing process has potential risk of losing patients’ record and difficulties on sharing clinical practice among physicians as well as branches. This is because every progress is in paper form. Our group is suggesting TCM Village to digitalize their existing patients’ record in order to minimize the human error, so as to enable efficient and quality assured clinical practice. As one of culture of TCM Village was to share their own experience among the practitioners via seminar or informal meeting, new system would also likely to be help on the knowledge sharing purpose.
SCOPE OF ASSESSMENT

With the constraints of time and resources, our group will focus on the knowledge management (“KM”) assessment of the clinic department. The below four steps have been used to identify the Scope of Assessment before processing the KM assessment:

1. Identify the Business Process tasks in the Clinic.
2. Identify the Challenges faced by the Clinic.
3. Identify the Project Objectives by the Clinic.
4. Use Business Process Identification check list finalizes the key business process tasks to obtain the Scope of Assessment.

Identify the Key Business Process Tasks

First, patient will either call or make an online reservation in advance, or will directly go to the clinic. Second, when a new patient arrives, a “first visit form” needs to be filled to create a patient medical record. Otherwise, the existing patient medical record will be pulled from folder in the storage cabinet. Third, certified practitioner will diagnose and prescribe the patient and write a diagnosis report including the prescription after the diagnosis process is done. Sometimes, there is only treatment after diagnose without any prescription needed. Fourth, the practitioner passes the prescription to the assistant for her to prepare the prescribed medicine. Last, patient pays and receives the drugs and some might make the next appointment for retreatment.

Based on the Clinic Department business process flow, our group has identified five key business process tasks as below [2]:

1. Appointment Reservation
2. Maintain Patient Record
3. Diagnosis
4. Prescription
5. Treatment

Identify the Challenges

After conducting the on-site observation and interviews with the Clinic team, it is identified some challenges currently encountered by TCM’s assistants and practitioners.
1. Each patient has a folder with his personal medical record in each branch. So, there is no data sharing between branches.

2. A hard copy of the patient’s diagnosis record is stored inside the folder. Therefore, a patient’s past diagnosis record has a potential risk of being lost, stolen, or breached.

3. A patient’s medical record is difficult to transfer and share among branches with different practitioners; therefore patient’s medical records are redundant and storage space is wasted.

Practitioners often require looking at the last diagnosis records; however, the handwriting in paper form sometimes is difficult to read due to the ink fading out and messiness.

**Identify the Project Objectives**

Based on the above challenges, the clinic and our team have come out with three project objectives to reach while dealing with the challenges mentioned above in order to facilitate knowledge capturing and sharing among practitioners within 5 branches to align with the TCM business objectives.

1. Implement a system to digitize patient, diagnosis, and prescription record to improve efficiency, flexibility and responsiveness of the clinic operations.

2. Facilitate knowledge sharing among different practitioners in TCM Village to provide better customer services.

3. Promote eco-friendly processes to reduce paper use and save money on avoidable costs.

After reviewing the challenges and objectives of the business and the project, our group will focus on the scope of assessment based on the following three key business process tasks: Patient Medical Record, Diagnosis, and Prescription.

<table>
<thead>
<tr>
<th>Business Objectives</th>
<th>Appointment Reservation</th>
<th>Maintain Patient Record</th>
<th>Diagnosis</th>
<th>Prescription</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Deliver customer services quality</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Promoting and sharing traditional Chinese medicine knowledge</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3. Maintaining unique patient records within branches</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4. Healing Patient with Traditional therapy</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
DESIZED KM PROCESS IDENTIFICATION

Contingency Factor Analysis

To determine appropriate knowledge management solutions, our group has adopted the methodology to analyze contingency factors. We characterize the tasks, the knowledge, the environment and the organization of TCM Village.

With a various contingency factors in help, our group outlines the following table as to determine the desired KM processes [3].

<table>
<thead>
<tr>
<th>Major Processes</th>
<th>Sub-Processes</th>
<th>Task Characteristics</th>
<th>Knowledge Characteristics</th>
<th>Desired KM Process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Uncertainty</td>
<td>Inter-dependence</td>
</tr>
<tr>
<td>Maintain Patient Record</td>
<td>New Patient</td>
<td>Low</td>
<td>Low</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Existing Patient</td>
<td>Low</td>
<td>Low</td>
<td>E</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Inspection (望)</td>
<td>High</td>
<td>High</td>
<td>T/E</td>
</tr>
<tr>
<td></td>
<td>Auscultation-Olfaction (聞)</td>
<td>High</td>
<td>High</td>
<td>T/E</td>
</tr>
<tr>
<td></td>
<td>Interrogation (問)</td>
<td>High</td>
<td>High</td>
<td>T/E</td>
</tr>
<tr>
<td></td>
<td>Palpation (切)</td>
<td>High</td>
<td>High</td>
<td>T/E</td>
</tr>
<tr>
<td>Prescription</td>
<td>Medicine</td>
<td>Low</td>
<td>High</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Dosage</td>
<td>High</td>
<td>High</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Forms of medicine</td>
<td>Low</td>
<td>Low</td>
<td>E</td>
</tr>
</tbody>
</table>

Information:
Knowledge Characteristics
E = Explicit, T = Tacit, D = Declarative, P = Procedural

The Contingency Factors are divided into four characteristics:
1. Environmental Characteristics - the Business Strategy of TCM Village
2. Organization Characteristics - the Organization Size of TCM Village
3. Task Characteristics - Uncertainty and Interdependence of the tasks
4. Knowledge Characteristics - the knowledge of the process is Tacit or Explicit and it is Declarative or Procedural.

In the above characteristics for the processes, our group found that Environment Characteristics and Organizational Characteristics are the same. The external environment factors of the clinic department TCM Village are relatively uncertain. However they mainly focus on patient and the sharing class for the Chinese medicine knowledge, therefore the external environment is stable (low uncertain) as they would not have some big change in their business. Currently, there are 25 employees working in the clinic department of the TCM Village in 5 branches, thus the
organization size is small in terms of staff. The clinics are running a differentiation strategy because of the assistants and the practitioners seeking for new knowledge as there are many new diseases nowadays.

As for the task and knowledge characteristics, there are some differences in different sub-process:

**Task Characteristics**
Task characteristics would specify for the task only. It analyzes each sub-process of maintain patient record, diagnosis and prescription:

a. The patient record is the knowledge of low uncertainly.
b. The sub-processes of diagnosis are high uncertainty, as diagnosis has to combine the 4 of the sub-processes and results are different every time, they are Inspection, Auscultation-Olfaction, Auscultation-Olfaction and Palpation.
c. In the prescription process, dosage is high uncertainty, because it has to depend on the practitioner’s experience and the patient’s need. For the medicine and the forms of medicine, as the clinic only has powder form of the medicine, the uncertainty is low.

**Knowledge Characteristics**
Tacit knowledge which is difficult to express and share like individual experiences, thus the 4 sub-process of diagnosis are all Tacit knowledge. Beside they are Tacit, some of the basic knowledge of the Chinese medicine are from old books, so the diagnosis can be Explicit or Tacit. Dosage of the prescription is based on the experience of the practitioner as well, so it is a tacit knowledge.

The declarative knowledge stated in a form of facts, which includes of the patient records and the prescriptions. In the process of diagnosis, that consists of various steps or actions and which is a procedural knowledge

**Prioritize KM Process**
After identifying the KM processes based on each contingency factor, our group has prioritized the needed KM processes as shown in following table:

<table>
<thead>
<tr>
<th>Contingency Factors</th>
<th>KM Processes</th>
<th>Task Uncertainty = High</th>
<th>Task Inter-dependence = High</th>
<th>Tacit Knowledge</th>
<th>Procedural Knowledge</th>
<th>Org. Size = Small</th>
<th>Bus. Strategy = Diff</th>
<th>Env. Uncertainty = Low</th>
<th># of Yes</th>
<th># of OK</th>
<th># of No</th>
<th>Cumulative Priority Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination</td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>OK</td>
<td>OK</td>
<td>Yes</td>
<td>No</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Socialization for Knowledge Discovery</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>No</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>Socialization for Knowledge Sharing</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>OK</td>
<td>Yes</td>
<td>OK</td>
<td>Yes</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Exchange</td>
<td></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>OK</td>
<td>No</td>
<td>OK</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Externalization</td>
<td></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Internalization</td>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>Yes</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>Direction</td>
<td></td>
<td>Yes</td>
<td>OK</td>
<td>OK</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Routines</td>
<td></td>
<td>No</td>
<td>OK</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
According to the analysis, the desired KM processes are prioritized as follows:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socialization for Knowledge Sharing</td>
<td>6.0</td>
</tr>
<tr>
<td>Externalization</td>
<td>5.0</td>
</tr>
<tr>
<td>Socialization for Knowledge Discovery</td>
<td>4.5</td>
</tr>
<tr>
<td>Direction</td>
<td>4.0</td>
</tr>
<tr>
<td>Combination</td>
<td>3.0</td>
</tr>
<tr>
<td>Exchange</td>
<td>3.0</td>
</tr>
<tr>
<td>Internalization</td>
<td>2.5</td>
</tr>
<tr>
<td>Routines</td>
<td>2.0</td>
</tr>
</tbody>
</table>

In conclusion, Socialization for Knowledge Sharing and Externalization are desired knowledge management process to be adopted.
ASSESSMENT METHODOLOGY

Assessment Criteria
To identify and understand the current situation of TCM Village, some measurements are taken to assess the strengths and weaknesses of the clinics.

Quality of Services
- Percentage of customer complaints and appreciation on services
- Average time required for patient making appointment reservation

Knowledge Discovery
The frequency of meetings and the frequency of getting new ideas on maintaining records, diagnosis and prescription can be used to measure the performance of Knowledge Discovery.

Knowledge Capture
The total number of employees attending the TCM public seminar and the frequency of acquiring the medicine, treatment and other operation knowledge from books, journals, colleagues and the Internet can be assessed from the questionnaire below.

Knowledge Sharing
From the questionnaire and the interview, our group has asked the willingness of sharing, mostly-used sharing channel and the frequency of sharing the knowledge with other colleagues via these channels.

Knowledge Application
To assess the knowledge application, our group used the frequency of applying new or improved suggestions and methods on maintaining records, diagnosis and prescription.

Assessment Method
In order to assess the current knowledge management activities of TCM Village, our group has adopted the following three methods:

Conduct a questionnaire
The questionnaire is a quantitative assessment to evaluate the current processes. Our group has designed a questionnaire (Appendix A) to ask 15 certified practitioners and 10 clinic assistants from different branches of the company. The result is available in the Appendix B.

Conduct interviews
The interviews are a qualitative assessment. Our group has formally interviewed 3 people (an operation manager and two certified practitioners) and informally chatted with 2 clinic assistants. From this, our group has gathered their detailed opinion about the current situation and the current challenges encountered in their daily work. Interview questions are attached in the Appendix C.

Make on-site observation
Beside the interviews and questionnaires, observation can provide us with more objective solutions. It puts the answers in perspective with the real situation and
details of clinic operation. Our team went to Mong Kok and Tsuen Wan branches for observation.

Result Analysis

Staffs of TCM Village are willing to share the knowledge (Q2) with their colleagues. However, majority of staffs (Q3) think existing clinic does not have good sharing environment and sufficient facilities to share knowledge (Q5). They hope the company can provide a good knowledge sharing environment (Q4).

Under the current situation, 32% (Q6) of employees usually chat with other colleagues and share some new ideas or medical knowledge. For clinic assistants, more than half (Q7, Q8) find it is difficult to search for patient records and locate the medicines during drug preparation. 40% of them said (Q9) the handwriting patient description is very difficult to read, so this will decrease the work efficiency (Q10). In addition, they cannot find the patient records and their prescriptions because these records are often in other branches (Q11).
For certified practitioners, nearly two-third of them (Q12) require to retrieve 4 to 10 times medicine resources a day for research purpose. Among these medicine resources, more than 70% (Q13) feel that these medicine materials are outdated for reference. Finally, more than half (Q14) of the staff likes to retrieve the clinic and medicine information from the portal in the future.

After conducting interviews and on-site observation, our group gathered more information about the current situation. The summarized result is that patients require waiting around 4 to 5 minutes to make appointment reservation.

In between 2013 and 2014, about 8% customer complaints are received, and staff gets 5.3% appreciation mainly from incentive cares.
ASSESSMENT RESULT

Current KM Process

In order to assess the different current KM sub-processes implemented by TCM Village, our group has identified the ones that were required for each key business process during the KM process identification. Then observing which KM sub-processes were implemented, assessed their validity and compared them to the ones should be used.

For each KM process currently implemented, our group has identified which KM sub-process was currently in place.

1. Knowledge Discovery and Knowledge Sharing
   For both Knowledge Discovery and Sharing, it found out that TCM Village mostly used Socialization through informal discussions with colleagues or more formally during seminars organized around one specific topic.

2. Knowledge Capture
   As Knowledge Capture is concerned, Internalization is mostly used by TCM Village, by learning academic knowledge in medical books.

Comparison between Current & Desired KM Process

As summarized in the chart below, our group has assessed the validity of implementing such sub-processes. Our group found out that Socialization for Knowledge Discovery was unessential but that according to our research, both Internalization for Knowledge Capture and Socialization for Knowledge Sharing were valid.

<table>
<thead>
<tr>
<th>KM Process</th>
<th>Current KM Processes</th>
<th>Desired KM Processes</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Discovery</td>
<td>Combination ✓</td>
<td>✓</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Socialization ✓</td>
<td></td>
<td>Non-Essential</td>
</tr>
<tr>
<td>Knowledge Capture</td>
<td>Externalization ✓</td>
<td>✓</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Internalization ✓</td>
<td>✓</td>
<td>Yes</td>
</tr>
<tr>
<td>Knowledge Sharing</td>
<td>Exchange OK</td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Socialization ✓</td>
<td>✓</td>
<td>Yes</td>
</tr>
<tr>
<td>Knowledge Application</td>
<td>Direction OK</td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Routine OK</td>
<td></td>
<td>OK</td>
</tr>
</tbody>
</table>

According to our KM process identification, the following KM sub-processes should be implemented:
1. Knowledge Discovery
For Knowledge Discovery, instead of Socialization which turns out to be unessential, Combination should be used. For instance, certified practitioners should take advantage of their experience and the availability of multiple data and information sources (explicit knowledge) to try to discover new knowledge for treatment.

2. Knowledge Capture
For Knowledge Capture, while Internalization is important, it is also found out that Externalization should be added in the form of medical information conversion into documents that would be stored in the shared system.

3. Knowledge Sharing
For Knowledge Sharing, our group agree that Socialization is the solution to be applied, but it must be done in a more extensive way, not only through informal talks and medical seminars. Using the shared system, patients’ records and medical information would be automatically integrated to that system so that every employee of TCM Village could benefit from it.

All in all, our group has assessed that every desired KM sub-process was not satisfactorily implemented by TCM Village, thus the need to strengthen them.

Current KM Solution & Infrastructure Assessment
In this section, our group shall discuss the current KM solution & its infrastructure of TCM Village. The table below is to show the overview on its KM Process Assessment result in terms of KM system, KM mechanisms as well as KM technologies:

<table>
<thead>
<tr>
<th>Major Process</th>
<th>Sub-processes</th>
<th>Desired KM Processes</th>
<th>Actual KM in Place</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KMS</td>
<td>KMS Infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>IT / Paper Based</td>
<td>Culture</td>
<td>Structure</td>
</tr>
<tr>
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<td>New Patient Externalization</td>
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<td>Paper</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Existing Patient Externalization</td>
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<td>Paper</td>
<td>N/A</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Inspection Soc. for KS</td>
<td>X</td>
<td>X</td>
<td>Encourage discussion of patient’s case and experience</td>
</tr>
<tr>
<td></td>
<td>Auscultation-Olfaction Soc. for KS</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td></td>
<td>Interrogation Soc. for KS Face-to-face meeting</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Palpation Soc. for KS</td>
<td></td>
<td></td>
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<tr>
<td>Prescription</td>
<td>Medicine Combination Face-to-face meeting</td>
<td>Paper</td>
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<td></td>
<td>Forms of medicine Internalization</td>
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<td>X</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Overall TCM Village does not provide any computer-based technologies for their employee, but there are a few practitioners who would use their own laptop with word processor to maintain their own notes. Practically the clinic works with paper copies of documents.

Chinese is not only their mother tongue, but also their recording languages for the patient record and diagnosis as well as prescription. About half of staff can even speak moderate mandarin and English.

Although the practitioners are all certified professional individuals, they are encouraged to discuss and share on the patient’s case and experience, mainly focusing on diagnosis and prescription. Refers to the questionnaire results, there are 68% of the employees declared that they are willing to share their knowledge among the colleagues. But most of the employees do not have the awareness of the need of a capturing system to capture valuable knowledge; the knowledge sharing among them would stop at the discussion level and remain tacit. In addition, except the routine meeting, they do not have much opportunity for interaction to create knowledge.

Based on the interviews and on-site observation, our group has also found their existing KM Solution and Infrastructure according to the business process:

**Maintain Patient Record**

TCM Village owned a public website to distribute Chinese medicine related knowledge and company information as well as allowing patient to make online appointment. However such online appointment system only simply sends a notification email to the clinic, so actually the clinical assistant is marking the appointment in a big notepad. Aside from online booking, patient would also make the reservation via phone calls.

There are a few big shelves at the reception to store patient records, each patient owns a folder of personal medical record. However, TCM Village currently operates independently among the 5 branches, hence one patient may consist 5 different medical folders.

Both new patient and existing patient could make appointment. However the progresses are slightly different when they arrive at the reception. New patient would need to first fill in a “first visit form” in order to create a new patient folder. As for existing patient, the clinic assistant will direct retrieve the folder of the patient from the big shelves.

**Diagnosis**

Each practitioner has its own consultation room for diagnosis. Each room consists of a clinic bed for immediate inspection. When doing patient consultation, the practitioner goes thru 4 sub-processes: Inspection, Auscultation-Olfaction, Interrogation and Palpation.

The practitioners work independently on patients’ diagnoses and the clinic assistant will assist the practitioner during the process. In these 4 sub-processes, the practitioners and assistants may communicate with specific terms for illness, human organs and name of pharmaceutical substances. For practitioners, they
share similar or same level of knowledge of Chinese Medicine and traditional therapy as they are all certified. For example the skill set to assess illnesses.

During Inspection and Auscultation-Olfaction, based on the observation on patient, there is no real social element involved. However as for Interrogation and Palpation, practitioner will do face-to-face meeting, ask the patient about his / her condition, medical history, fell the pulse by hand or press the abdomen to examine if there are abnormalities.

After the diagnosis, the practitioner will write the result on a diagnosis form which is in paper base and placed it back to the patient medical folder.

**Prescription**

Besides the result of diagnosis, the prescription in terms of herb and Dosage is also written on the diagnosis form. Each type of herb initially in powder form stored in plastic container and well labelled. There is a small room for these plastic containers storage which has temperature and humidity control keeping it in a dry and cool condition.

The use of Medicine and its Dosage is based on the Pharmacology and experience of practitioner. The clinic assistant may not be equipped with such basic knowledge. However it is not necessary for them to recognize all the names of different herbs.

After the clinic assistant receives the prescription from the practitioner, they will go to the medicine storage room to get the herbal powder, and then they will put all types of herb written on the prescription into the medicine powder mixer to mix them well. The mixture of the herb powder with the appropriate dosage is known as Medicine. Since the type of medicine has already been standardized in the powder form, there is no need to mention it on the diagnosis form.

**Assess Current KM Solution and Infrastructure facilitate Desired KM Processes**

This section describes the satisfactory level and possible improvements of current KM solution and infrastructure in facilitating the desired KM processes those are Socialization for Knowledge Sharing and Externalization.

**KM Solution**

**Knowledge Discovery**

TCM Village currently would conduct routine meetings within a branch to review specific patient case selected by each participated practitioner and bring up discussion in the meeting for exchanging purpose. Moreover, practitioner would make phone conversations for quick chat when needed.

The effectiveness of KM mechanism for knowledge discovery is suitable for the clinic. The clinic could arrange assistance, namely time, to encourage practitioner to collaboratively create document about specific topic. The company should provide KM technology as having an extra platform for more choices of
communication methods like email to leverage better socialization. In addition to have a tool for easier analyze any captured information.

Knowledge Capture
As currently the practitioner would learn by reading the paper-based patient record, It is extremely insufficient support, both KM mechanism and KM technology, provided for externalization. There is no way except hand writing to document data which makes it difficult for information recording and retrieval. The mechanism for the internalization process is suitable for the clinic and the related technology could be not necessary.

Knowledge Sharing
It is similar to the mechanism of knowledge discovery, the KM mechanism for knowledge sharing is adequate, but the clinic should provide KM technology to enhance the degree of management of knowledge. For example a web portal for document sharing or email system for knowledge sharing.

Knowledge Application
There a little of both direction and routine is involved. As most of the employees are certified professionals no intensive KM mechanism is required. For KM technology, implementing a knowledge application system could further improve the service quality of a practitioner as the system could provide critical summary information to assist prescription and also could reduce the time spent on reviewing the patient record to ensure drug allergy history.

KM Infrastructure
Organizational Culture
Although the employees agree that they are willing to share, they mostly are sharing passively in needed basis. And they do not have much awareness for knowledge management and do not recognize the value that could bring in the long term. Overall, the clinic has a good atmosphere that could potentially lead to a good environment to implement knowledge management and to support the desired KM processes.

Organization Structure
The organization structure for TCM Village is simple as there are only 2 levels in the hierarchy, practitioners at the top and the clinic assistants at the bottom. This simple organizational structure could facilitate socialization for knowledge sharing, but as the small amount of employees with heavy amount of appointment serves the patient for a work day, it would not be easy for the employee to do the externalization process. There should be a tool to provide an easy and convenient way to minimize the required time for externalization.

IT Infrastructure
There isn't any computer device that could not leverage the desired externalization process. IT infrastructure should be improved to provide a beneficial tool to eliminate the time spent with hand writing rather than typing while eliminating the time spent on identifying terrible hand writing.
In addition, IT infrastructure could also play a role to facilitate communication to support socialization. For example, practitioners could communicate easily through email so that they do not always have to set up a time for telephone or face-to-face discussion.

Common Knowledge
Common Knowledge is good overall. But there isn’t much support for new clinic assistance that could cause a long training period as the assistance are not certified professional for Chinese medicine.

Physical Environment
Physical environment is acceptable. It is acceptable to hold short meetings at any of the practitioner office, but a bigger meeting room could allow cross-branches meeting for knowledge sharing. In addition, set up a pantry or a rest room could encourage better informal communication to enhance socialization for knowledge sharing.

Summary
In conclusion for assessment result, our group believe that to the best way to improve the current KM infrastructure is to implement KM tools.

In the coming sections, our group will be acting as a consultant as to provide several KM solutions for both IT and non-IT sector to meet the mentioned objectives in the previous chapters. A feasible action plan in both short-term and long-term has also proposed. Our group expected that in the long run the use of these KM tools should be perfected in order to reduce the percentage of medical errors.
KNOWLEDGE MANAGEMENT STUDY: TRADITIONAL CHINESE MEDICINE (TCM) VILLAGE

KNOWLEDGE MANAGEMENT TOOLS

Referring to the assessment results, our group found out that several improvements could be done in order to provide TCM Village with a better knowledge sharing.

In this section, our group will give an overview of both IT based and non-IT based recommended solutions as well as their evaluation. After the evaluation, the best solution is suggested for implementation in order to achieve the desired KM Process (socialization and externalization) and to meet the KM project objectives that are aligned with the business objectives of TCM Village.

**IT Based Solution**

Our assessment has shown that TCM Village worked in a paper based environment and they used to have discussion in a very small consultant room. Therefore the proposal of the IT based solution is the following:

<table>
<thead>
<tr>
<th></th>
<th>Document Sharing System</th>
<th>Video Conferencing</th>
<th>CMIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socialization</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Externalization</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Quality Customer Service</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Facilitate Knowledge Sharing</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Effective Clinic Operation</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Solution Recommendation**

**Building a Document Sharing System**

In each branch everything is processed with paper files, the clinics do not even equipped with the computers or Internet networks. Building a Document Sharing System as well as a small office network would be the minimum action to implement a better sharing environment for any KM tools and it would enable the staff of TCM Village to share documents such as Chinese Medicine Article from magazine.

**Setting up Video Conferencing**

Currently when the practitioners try to discuss a case of a patient and make a decision about a therapy, they need to hold a meeting in one of the consultation room of practitioners. However the size of the room being limited, maximum 5 people can sit in the room at the same time only and it is very crowd and uncomfortable. Therefore our group suggests that a Video Conferencing system [4] might help to solve the problem. This solution does not only solve the issues related to the size of the room but also provides the following advantages:

a. Flexible timeslot and place

   Once practitioners are free, they can meet anywhere or anytime if they want. Meetings are not limited by office hours and consultation rooms
b. Meeting with practitioners in other branches

Currently practitioners only meet other colleagues among their own branches. If Video Conferencing is set up, they can invite practitioners from other branches to join in order to have a wider experience sharing.

Set Up phase by phase Chinese Medicine Information System (CMIS)

There are several Traditional Chinese Medicine Information System (CMIS) used by the government [5] [6] or other medical groups [7]. Our group is suggesting TCM Village to use one of these systems. The benefits of the system could help with the following issue:

a. Electronic Patient Medical Record

Referring to the assessment results, patient records are currently kept in a paper format that entails a potential risk of losing them and difficulties to read them, in addition each patient needs to have separate records in each branch. Implementing electronic patient medical records would help to share the medical record of a patient. Practitioners could understand the medical history easier in order to provide the correct therapy.

b. Systematize the knowledge base of Chinese Medicine

Chinese Medicine includes acupuncture, herbal medicine and dietary modification etc. Those are important information that could be shared among practitioners to enrich their professional knowledge. It is important to systematize it or even help to create a standard practice from the system. For example the system would help to provide Chinese Medicine in traditional herbal form and concentrated granules. In addition, it could help to monitor the quality and risks of the products.

c. Record the Chinese Medicine Practice

With the help of the system to record the diagnosis, practitioners may review it from time to time as part of a clinical research, to empirically find out the best practices.

Evaluating Solution Recommendation

These IT based solutions were evaluated according to the five criteria listed below. Each solution has been given a score in order to rank them and determine the most feasible solution.

1. Cost

Cost measured in terms of money, the total amount for the IT solution including how much TCM Village would invest in the solution and the maintenance fees.

TCM Village is a small business and there are limited sponsors for the IT projects. Cost is one of the important elements to evaluate the IT investment. Therefore a high cost is most likely to bring about a low score for a project. CMIS requires the highest cost among the solutions in terms of labor and system cost, followed by Video Conferencing, as it will be quite costly to implement a secured conference network.

2. Efficiency

It is an estimation of the additional productivity of the end users, the clinic assistants and the practitioners, after implementing the IT tools.
Our group thinks that if any of these IT projects were carried out, it would improve the efficiency of the work of staff as they are working on paper files currently. CMIS ranks the highest as it provides an all-in-one solution, from patient records to the Chinese Medicine knowledge. Documents sharing would help but it is not as efficient as the Video Conferencing system. Since Video Conferencing enables immediate discussions between the practitioners in different branches, they do not need to gather in small consultation room. In addition, the meeting time and place would be more flexible.

3. Effectiveness
This criterion is an estimation of the performance of the users after implementing the tools, an evaluation of the knowledge gain permitted by the solution and the extent to which it is applicable for the daily work of users.

CMIS may significantly help in this section. As the herbal data would also be entered in the system, practitioners and clinic assistants could learn from there. In addition, a patient record sharing system among branches would help making better diagnoses and recommending the most suitable therapies. Video Conferencing could only have an impact on discussions and knowledge sharing but could not really improve the effectiveness of daily work. Document sharing has the same issue, as it enables the sharing of academic articles that is a knowledge source for the practitioners but has not got any material impact on their everyday workload.

4. Feasibility
It is the degree to which a given solution can realistically be implemented by taking the practices, infrastructures and environment of TCM Village into account.

As it is less costly, takes less time and is easier to implement, Video Conferencing is ranked first before the CMIS in terms of feasibility.

5. User Preference
It measures the degree to which the IT solution would be more satisfying for and appreciated by employees.

Given the problems engendered by the paper based files and forms (repetitive tasks, bad writing, files deterioration, potential losses) practitioners and clinic assistants praise the CMIS as the solution they want to be applied. Video Conferencing scored second as practitioners agree that meeting rooms does not meet the requirements to hold proper discussions with their colleagues among the different branches. Video Conferencing solves the issues incurred by the size of the rooms and the distance between the branches.

The evaluation results are summarized in the following table and it appears CMIS ranks first as the IT solution to be implemented.
## Non-IT Based Solution

Our group believed that not only IT solution would help improving the knowledge sharing, and that regardless of time and location it could be achieved through simple conversation too. Therefore our group would like to propose the Non-IT based solutions which are summarized in the table below:

<table>
<thead>
<tr>
<th></th>
<th>Pantry with Refreshment</th>
<th>Community of Practice</th>
<th>Best Practice</th>
<th>Incentive Reward Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socialization</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Externalization</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Quality Customer Services</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate Knowledge Sharing</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Effective Clinic Operation</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

### Solution Recommendation

**Pantry with Refreshment**

Physical environment is one of the factors that influence the KM processes. By providing free beverages and a pantry as well as possible desk(s) and chairs, informal communication will be facilitated. Employees usually go to pantry a couple of times a day for drink, lunch, or during breaks. Especially, employees will stop at pantry when they encounter any issues or bottlenecks that need refresh air or coffee/tea break. TCM Village should provide a pantry with refreshment such as coffee or tea to attract practitioners to go and interact with each other and therefore enhance socialization for tacit knowledge sharing since people tend to feel more comfortable and share their experiences, opinions, or suggestions in an informal atmosphere.
Community of Practice
A Community of Practice (“CoP”) is a group of individuals with common interests in a particular domain or area getting together and sharing what they know while engaging in an informal interaction [8]. Through informal communications, practitioners can improve their own knowledge such as diagnosis or prescription by learning from others. Moreover, the new ideas sometimes were developed through tacit knowledge sharing and learning process. CoP is the well-known application of socialization for mutual interest with an emphasis on the fact that the group members are willing to share and learn from each other. TCM Village can periodically host employee engagement activities with practitioners from five branches to create more opportunities to build trust and also promote employees’ socialization for knowledge sharing and exchange.

Best Practice
Best Practice is a methodology that is used as the benchmark to follow in order to achieve consistent results as it has been previously approved by experience and researches [9]. By setting different rules and document templates, Best Practice can help the clinic teams in the knowledge externalization process by converting tacit knowledge into explicit forms more efficiently in a consistent way. TCM Village can setup the proper standards for documents management and implement the proper controls to make sure that employees are following them accordingly. For example, the document naming convention, access rights, and the different pre-defined templates for different knowledge capturing purpose. With Best Practice as blueprint, practitioners and clinic assistants can work according to the same guidelines and rules to achieve a high quality in their work by increasing efficiency and reducing inconsistency due to human errors.

Incentive Reward Scheme
Incentive Reward Schemes are designed to motivate the behaviors or actions of the employees to align with the goals of company either through monetary or recognition method [10]. TCM Village can use an Incentive Reward Scheme to promote organizational culture for knowledge sharing among employees and to motivate creation and exchange of knowledge as the norm of clinic. The reward can be individual recognition like posting the best of knowledge sharing practitioner per quarter in TCM Village or monetary reward with supermarket coupons or special bonus. In Hong Kong, the monetary reward would be more effective than the recognition scheme.

Evaluating Solution Recommendation
Our group has identified five criteria to evaluate the non-IT based KM tools. Each factor has a different weight in the evaluation. As TCM Village is a small business in Hong Kong, Cost and Usefulness play important factors in deciding which KM project to choose by using limited budget to improve the clinic operation efficiency and solve the existing challenges. Besides, Feasibility and User Preference are also the other two factors that have a high impact to the overall score.
1. **Cost**  
Cost is measured in terms of how much TCM Village has to pay for KM non-IT based tool including reward benefit, beverages, personnel, or facilities costs etc.  
All non-IT tools are costly, however the Incentive Reward Scheme for employee is the most expensive, followed by Pantry with Refreshment. Therefore, launching CoP and Best Practice would require less spending compared to the other two methods.

2. **Usefulness**  
This factor explained how non-IT based KM tools will effectively facilitate the desired KM processes and overcome the current challenges of clinic team in order to meet business objectives of TCM Village.

Pantry with Refreshment, CoP, and Incentive Reward Scheme facilitate Knowledge Sharing and Best Practice helps Knowledge Externalization. Contribution on Pantry with Refreshment to knowledge sharing will be limited due to 5 to 15 minutes break time constraint. Moreover, CoP also helps increasing the quality of customer services and Best Practice will improve the clinic operations’ effectiveness. Additionally, Incentive Reward Scheme will act as stimulator to motivate the staff of TCM Village.

3. **Lead Time**  
It is the total time spent from the initiation of the KM project to the actual implementation of non-IT based KM tool.

It is easier to form groups of practitioners with mutual needs and interests to launch CoP. This CoP does not require much time to be implemented since TCM Village currently organizes seminars regularly. On the other hand, it will take time to adapt the company policies or rules to implement Best Practice. Elaborating a suitable Incentive Reward Scheme for the employees will also be time consuming.

4. **Feasibility**  
It is the degree to which a given non-IT based KM tool can realistically be implemented by taking the practices, infrastructures and environment of TCM Village into account.

Taking the current situation TCM Village of into account, CoP is the easiest solution to implement with the existing staff and facilities. The Incentive Reward Scheme requires collaborating with human resource personnel to develop this reward with the consent of top management. In addition, Best Practice will require experienced employees and/or IT infrastructure to be implemented this solution.

5. **User Preference**  
It refers to the degree to which a non-IT based KM tool would be more satisfying for and preferred by the users.
For the user preference, our group thinks that the Incentive Reward Scheme would be the most appreciated solution by the employees, followed by the CoP since practitioners with same area of expertise would gather, socialize and potentially gain knowledge through interactions. On the other hand, Best Practice has the lowest score since it will incur an extra workload to employees and they might not be willing to do it.

The table below shows the evaluation results of non-IT based KM tools. Community of Practice has the highest score and is retained as the non-IT based KM tool to be implemented.

<table>
<thead>
<tr>
<th></th>
<th>Pantry with Refreshment</th>
<th>Community of Practice</th>
<th>Best Practice</th>
<th>Incentive Reward Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>30</td>
<td>15</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Usefulness</td>
<td>30</td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Lead Time</td>
<td>10</td>
<td>5</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Feasibility</td>
<td>15</td>
<td>8</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>User Preference</td>
<td>15</td>
<td>8</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Total Score</td>
<td>100</td>
<td>46</td>
<td>78</td>
<td>53</td>
</tr>
</tbody>
</table>
ACTION PLAN

After introducing the KM tools, our group has prepared an action plan to guide TCM Village through the completion of the project. Since there is no KM system in TCM Village, the project is divided between the short-term and long-term implementation.

Short-term implementation includes brief CMIS and CoP, which will be running during the first year. Long-term implementation adds more features and improvements for CMIS. This action plan mainly focuses on the short-term implementation. If TCM Village is agreed with the following schedule and the suggested tools, a very detailed process and system plans as well as its technical requirement shall be provided later.

Short-Term Implementation

Work Breakdown Structure (WBS)

The WBS decomposes the whole project into smaller components to guide TCM Village to develop and control the project. The WBS for the first year project plan for CMIS is presented below:

1. Project initiation
   1.1 Form project team and identify key stakeholders
       TCM Village should select suitable staff to form a project team and identify the relationship manager and sponsor as project key stakeholders. Chaser also takes part in this project acting as the project manager of the whole project.

   1.2 Develop Project Charter
       A project charter notifies the key stakeholders with the project aims, requirements, scope as well as the starting date in order to authorize the project manager to run this project.

   1.3 Hold Kickoff meeting
       Kickoff meeting describes the project goals, key features, project teams and their responsibilities.

2. Project planning
   2.1 Prepare the Project Baseline
       The Project Baseline is an estimated measurement point to control and manage the project run.

   2.2 Prepare Schedule Management Plan
   2.3 Prepare Cost Management Plan
   2.4 Prepare Quality Management Plan
   2.5 Prepare Risk Management Plan
   2.6 Prepare Human Resource Management Plan
   2.7 Prepare Procurement Management Plan
   2.8 Prepare Change Management Plan
       The team should create different constraints including schedule (time), cost, quality, etc. management plan on foreseeing project outcomes and how to react if the project fails to meet the estimated points.
2.9 Select system vendors
Select the vendor to procure system hardware, networking and implement system software.

3. System design
3.1 Define system architecture
3.2 Collect patient and medicine information
3.3 Create patient record system and database
   It is the process of defining the system architecture, collecting patient and medicine information to create the related database.
3.4 Create medicine information system and database
   To use the above components, data and modules to develop the final product – patient record system and medicine information system.

4. Testing
4.1 Create system test and User Acceptance Test (UAT) plan and manuals
   Before testing, vendor should help TCM Village preparing system test and UAT plan and manuals.

4.2 Conduct System Unit test and Integration test
   System unit test runs each program modules. System integration test integrates the different system modules and data to ensure that the whole system runs flawlessly.

4.3 Conduct UAT in all branches
   UAT is to apply the system to the real-life scenarios. End Users will try to use the system in all branches at this stage.

4.4 Review testing results
   After the test, vendor should ask TCM Village for the project acceptance. Project manager is assumed to review all testing results.

5. Procurement and installation
5.1 Purchase servers and client PCs
   TCM Village should procure servers and PCs for the deployment use.

5.2 Install and set up systems on hardware and networking
   Vendor will install and configure systems on these procured hardware and networking.

6. Training
6.1 Prepare system manual and user guide
   If system test and UAT are passed, vendor will prepare system manual and user guide to responsible staff.

6.2 Provide user training
   Vendor should also provide user training to teach how to use the new system in details.

7. Deployment
7.1 Notify users and key stakeholders
7.2 System deployment
When system is completely tested and all key staff members know how to use this, it is the time to notify the system deployment date to all related staff and key stakeholders.

8. Project Wrap Up
8.1 Collect feedback from users and stakeholders
Vendor and TCM Village can collect feedback from users and stakeholders after 2 months of use.

8.2 Monitor and review project plans and financial report
Within feedback collection period, project manager and financial staff monitor and review project plans and financial report, to match against the expected results.

8.3 Project completed
If the top management and stakeholders approve the reports, the project is completed.

Project Schedule
The short-term implementation plan will last nearly one year, starting from January 2\textsuperscript{nd}, 2015 to December 8\textsuperscript{th}, 2015.

Detailed schedule of all sub tasks stating with the starting date, ending date and duration are presented in Appendix D. Simplified schedule in Gantt chart format of the major project tasks for CMIS implementation is shown as follows:

<table>
<thead>
<tr>
<th>Ph</th>
<th>Major project task</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project initiation</td>
<td>1 2</td>
</tr>
<tr>
<td>2</td>
<td>Project planning</td>
<td>3 4</td>
</tr>
<tr>
<td>3</td>
<td>System design</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Testing</td>
<td>6 7 8</td>
</tr>
<tr>
<td>5</td>
<td>Procurement &amp; installation</td>
<td>9 10</td>
</tr>
<tr>
<td>6</td>
<td>Training</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
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<td>12</td>
</tr>
<tr>
<td>8</td>
<td>Project Wrap Up</td>
<td></td>
</tr>
</tbody>
</table>

Besides CMIS, CoP is another KM tool suggested for TCM Village. Since employees often communicate informally, it is easier to encourage them to use and promote socialization culture among employees. Our group suggests that TCM Village could plan a 6-month trial period implementing CoPs. If the trial is successful, TCM Village is encouraged to extend the CoP and improve it.
Project Budget
As CMIS is the most costly part of the project, the budget plan will be focusing on CMIS only. The estimated budget for CMIS is about HKD700,000 (see pie chart below). The budget items are referenced from the CMIS developed by HKSAR Hospital Authority [11].

![Pie chart showing budget allocation]  

Budget: HKD700,000

The project cost falls under five main areas. They are:

1. Human Resources
   Human Resources area refers to Chaser providing the KM assessment, KM solutions proposal and planning, managing and coordinating the implementation of the KM solutions.

2. Software
   Software area refers to the cost of hiring two working teams from software vendor to deliver the required software system. In addition, as TCM Village is not equipped with any computer, the cost for licensed computer software that will need to be installed is also taken into account.

3. Hardware
   Hardware area refers to the equipment procurement and the cost to hire a specialized team to set up the necessary infrastructure. The high proportion for hardware is due to the purchase of a personal computer for every employee of TCM Village as currently there is nearly none. Beside personal computer, the cost also includes the printers and barcode devices. Last but not least, to build up a small office network within the clinic, network devices and implementation are also considered.

4. Ongoing support
   Ongoing support area refers to the maintenance cost of hardware and software or any necessary improvement which would add values to the KM solutions. Our group has also taken the fee for Data Center & the Internet network into the account.
5. **Others (Miscellaneous)**

   Others area refers to reserve cost. It is reserved for contingency plan in case that any delay on the schedule occurs and that there are requirements for extra budget, it could be allocated immediately without requesting extra amount from the sponsors.

   Detailed budget plan could be referenced in Appendix E.

**Project Team**

This section shall provide the major stakeholders of this project; the team structure is defined as follows:

- Chaser will take the role as the project steering committee to oversee the project.
- Staff selected from TCM Village to form a project monitoring team, they are also act as the project sponsor and responsible to provide the required knowledge to assist Chaser in the project.
- Software Development Team A is responsible to deliver the patient record system.
- Software Development Team B is responsible to deliver the medicine information system.
- Infrastructure Team will be responsible to the necessary procurement and installation for the hardware.
## Roles and Responsibilities

<table>
<thead>
<tr>
<th>Team</th>
<th>Position in team</th>
<th>Project Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaser</td>
<td>Project Manager</td>
<td>Project Manager</td>
<td>Coordinates the entire project including project planning; manages the project execution; responsible for client interfacing; supervises the progress of various vendor team; monitor and control the project budget, tasks, deliverables and results.</td>
</tr>
<tr>
<td>VP of IT Dept.</td>
<td>Consultant</td>
<td></td>
<td>Provides insight on knowledge management for TCM Village and input to the KM solution, KM assessment and all other related works.</td>
</tr>
<tr>
<td>Project team of TCM Village</td>
<td>Project Manager</td>
<td>- Project Sponsor Project Coordinator between TCM Village &amp; Chaser.</td>
<td>Works closely with Chaser to provide necessary knowledge on their field of providing Chinese Medicine treatments and services and also the knowledge of business processes and model of TCM Village. In additional, plays the role of representative to provide comments and any specific or customized requirement as input for the project.</td>
</tr>
<tr>
<td>Software Development Team A</td>
<td>Team Leader</td>
<td>Senior Programmer</td>
<td>Supervises the development team to deliver quality software solution and works closely with the Chaser Consultant Team to ensure the requirements are realized correctly, report development progress to the project manager and manage the deployment details.</td>
</tr>
<tr>
<td>System Analyst</td>
<td>Senior Programmer</td>
<td></td>
<td>Development team member that mainly carries out system analysis, benchmarking the solution design, manage technical issues of the solutions. Reports to the Team Leader.</td>
</tr>
<tr>
<td>Analyst Programmer</td>
<td>Senior Programmer</td>
<td></td>
<td>Development team member that monitors the coding quality, assist the development, problem solving for technical issues. Reports to the Team Leader.</td>
</tr>
<tr>
<td>Programmer</td>
<td>Senior Programmer</td>
<td></td>
<td>Development team member that is responsible for development, unit testing, debug. Reports to the Analyst Programmer.</td>
</tr>
<tr>
<td>Team</td>
<td>Position in team</td>
<td>Project Role</td>
<td>Responsibilities</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Infrastructure Team</strong></td>
<td>Team Lead</td>
<td>Senior System Engineer</td>
<td>Infrastructure designs, carries out the detailed hardware installation planning, budgeting, does product selection, manages the procurement processes and supervises the team to carry out the installation. Works closely with Chaser Consultant Team for rollout scheduling and quality control.</td>
</tr>
<tr>
<td><strong>Operator</strong></td>
<td>Quality Assurance Officer</td>
<td></td>
<td>Infrastructure team member who are the working unit for the infrastructure installation. Report to the Team Leader.</td>
</tr>
</tbody>
</table>
Long-Term Implementation
Our group has estimated a pilot version of CMIS could be rolled out after a year. As mentioned before, this system will be implemented phase by phase. Therefore our group assumed the project could be a long-term implementation. In addition, some KM tools that were recommended could also start implementing afterwards.

IT based
The first stage of the CMIS would be operational to enable the digitalization of patient records including diagnosis reports and prescriptions. Second stage of the system aims at building the Chinese Medicine Database, for example the herbal images, its source, origins, description as well as its taste and clinical indications. Moreover, this system could also be improved to work more efficiently by implementing an artificial intelligent case-based medical system that could help practitioners to diagnose patient precisely based on the patient situation and medical record.

With sufficient budget, our group recommends Video Conferencing, the second best IT tool, can also be worth implementing in this stage. It can help to communicate between different branches and save the traffic time.

Non-IT based
Incentive Reward Scheme can take place every year in the form of small amount of presents that will result in the promotion of knowledge sharing cultures and grant recognition to the awardees.
EXPECTED OUTCOMES
KM solution will help us to tackle the three challenges has encountered in Clinic Department: (1) no patient record sharing among branches, (2) hard-copy of diagnosis records of patient with a potential risk of being lost, stolen, or breached, and (3) redundant patient records and waste of storage space. After the KM plan implementation, our group can foresee that the time, cost and quality of service performance will be improved.

Expected improvement

CMIS
“CMIS” provided a platform for clinic assistants and practitioners to access to the patient record including his/her diagnosis report and perception record. In addition, this new system will promote eco-friendly measures in reducing the use of paper.

Patient Record
It will improve the patient records readability and security by digitizing them. In addition, the system will centralize all the records which will enable all the branches to access the system easily to look for the patient records. By providing patient records, it could also help to record the Chinese Medicine Practice, acting as a clinical research means to empirically find to the best practices. Therefore if there is a patient with similar body constitution and same disease, practitioners could have access to past treatments recommended in similar cases.

Diagnosis & Prescription Record
As mentioned before the problem of the readability of the results of diagnoses and prescriptions will be dealt with. Human mistakes will be reduced and in that way since there will not be any mistakes triggered by a misunderstanding of the prescription. Our group also expects that with the digitalization of the records, a standard practice will be developed.

CoP
As CoP focuses on community relationship, employees of TCM Village will be working more closely and will be more willing to share their experience than they used to. By sharing their experience, it could help encouraging knowledge and skill development. In addition, valuable information and best practices could be transferred during the employees’ interactions. Furthermore, during these interaction employees will share the solutions they have come up with when they were faced with a specific issue. This will decrease employee turnover rate, increase employee job satisfaction, and deliver the better customer services.
Future Improvements

The patient, diagnoses, and prescription records will be enhanced with the CMIS database, which will have a positive impact on more processes in future expansion of TCM Village.

Reservation

For the reservation, the existing patients will be able to just enter their telephone number in the enhanced online reservation system which will be linked with CMIS database. The clinic assistant will check the reservation schedule easily in the reservation part of the CMIS system. A better control of the numbers of patients within a given time slot will reduce the waiting time, as well as the cross-infection rate between patients.

New patients will input their information in the CMIS system by scanning their ID card with the scanner and the keypad on the reservation kiosk.

Payment

The payment procedure can be improved as well, as CMIS can be enhanced to be able to calculate the cost for the herbs and other treatments. After that the CMIS system will be print out the total amount with the receipt. The accuracy of the cost and the calculation time will be improved, as well as the workload of the clinic assistant. Recording the payment record of the patient as well as the unit stock price of the each herbal would also help TCM Village to learn the price trend on the medicines as to determine the adjustment required for consultation fee in the future.
CONCLUSION

TCM Village is suggested to implement tools facilitating the socialization for knowledge sharing and the externalization processes in order to deal with their main challenges: no data sharing among clinics, only hard copies of the records were kept, and practitioners had not any effective means available to share their knowledge.

Our group has come up with two best solutions for both IT and non-IT sector to meet these mentioned objectives, they are Chinese Medical Information System (CMIS) and Communities of Practice (CoP). The proposed plan is assumed taking place around a year, estimated budget with HKD700,000. It is expected that CMIS will enable the digitalization of the patient, diagnosis and prescription records as well as the creation of a knowledge base of Chinese Medicine while CoP is built around common medical interests helping to improve employee job satisfaction.

In long term, our group wishes that Reservation and Payment process would also implement into CMIS which could help in providing customer services as well as learning the price trend of the medicines as to determine the adjustment required for consultant fee.
**APPENDIX A – QUESTIONNAIRE**

1. What is your position in the clinic?
   A. Certified Practitioner
   B. Clinic Assistant

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

2. Are you willing to share your knowledge with your colleagues?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

3. Do you think your clinic has a good knowledge sharing environment?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

4. Do you think the clinic needs to have a good knowledge sharing environment?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>5</td>
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</tbody>
</table>

5. Do you think the clinic provides sufficient facilities to share knowledge?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>3</td>
<td>4</td>
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<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

6. When you get some new ideas or medical knowledge, which channel do you use mostly to share?
   A. Do not likely to share
   B. Informal chatting
   C. Formal meeting
   D. Send email or via social media (WhatsApp, WeChat, Facebook, etc.)
   E. Print out hard copy and share to colleagues

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
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<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

7. Do you think it is difficult to search patient records or medicine information?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

8. Do you think it is difficult to locate the medicines during drug preparation?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

9. Do you think it is hard to read the handwriting patient prescription?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>
10. Do you think the time to find patient records and/or patient prescriptions decrease the work efficiency?

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th></th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>N/A</td>
</tr>
</tbody>
</table>

11. If existing patient records and/or patient prescriptions are difficult to find, why is it happened?
   A. These records are in other branches
   B. These records are in somewhere within the same clinic
   C. Lost/Stolen
   D. N/A, Feel easy to find

12. Please rate the frequency to retrieve medicine resource for analysis/research purpose for a day?
   A. None
   B. 1-3 times
   C. 4-6 times
   D. 7-10 times
   E. More than 10 times
   F. N/A

13. Do you know your medicine resources are updated enough for analysis and prescriptions?
   A. Yes
   B. No
   C. N/A

14. How would you like to retrieve the clinic information in the future?
   A. Print out as a paper and store in the storage cabinet
   B. Search and open each record on multiple MS Office documents
   C. Get a portal and type patient ID to search the record in few clicks

---- Thank You ----
APPENDIX B – QUESTIONNAIRE RESULT

No of Respondents: 25

1. What is your position in the clinic?

   - Certified Practitioner, 60%
   - Clinic Assistant, 10, 40%

2. Are you willing to share your knowledge with your colleagues?

   - Strongly Agree, 17, 68%
   - Agree, 3, 12%
   - Neutral, 4, 16%
   - Disagree, 2, 8%
   - Strongly Disagree, 0, 0%

3. Do you think your clinic has a good knowledge sharing environment?

   - Strongly Agree, 2, 8%
   - Agree, 2, 8%
   - Neutral, 4, 16%
   - Strongly Disagree, 7, 28%
   - Disagree, 10, 40%
4. Do you think the clinic need to have a good knowledge sharing environment?

- Strongly Disagree, 1, 4%
- Disagree, 2, 8%
- Strongly Agree, 7, 28%
- Agree, 9, 36%
- Neutral, 6, 24%

5. Do you think the clinic provide sufficient facilities to share knowledge?

- Strongly Agree, 2, 7%
- Agree, 3, 10%
- Neutral, 5, 17%
- Disagree, 10, 35%
- Strongly Disagree, 9, 31%

6. When you get some new ideas or medical knowledge, which channel does you use mostly to share?

- Not Share, 2, 8%
- Chatting, 8, 32%
- Meeting, 6, 24%
- via Social Media, 4, 16%
- via Hardcopy, 5, 20%
7. Do you think it is difficult to search patient records or medicine information?

8. Do you think it is difficult to locate the medicines during drug preparation?

9. Do you think it is hard to read the handwriting patient prescription?
10. Do you think the time to find patient records and/or patient prescriptions decrease the work efficiency?

- Strongly Agree, 3, 30%
- Agree, 3, 30%
- Neutral, 1, 10%
- Disagree, 1, 10%
- Strongly Disagree, 2, 20%
- N/A, 0, 0%

11. If existing patient records and/or patient prescriptions are difficult to find, why is it happened?

- In other branches, 5, 20%
- Somewhere in clinic, 2, 8%
- Lost/Stolen, 1, 4%
- Easy to Find, 2, 8%
- N/A, 15, 60%

12. Please rate the frequency to retrieve medicine resource for analysis/research purpose for a day?

- None, 2, 8%
- N/A, 10, 40%
- 1-3 times, 3, 12%
- 4-6 times, 5, 20%
- 7-10 times, 5, 20%
13. Do you know your medicine resources are updated enough for analysis and prescriptions?

- Yes, 4, 16%
- N/A, 10, 40%
- No, 11, 44%

14. How would you like to retrieve the clinic / medicine information in the future?

- From portal, 13, 52%
- From storage cabinet, 5, 20%
- From MS Office Document, 7, 28%
APPENDIX C – INTERVIEW QUESTIONS

1. What is your company structure?

________________________________________________________________________
________________________________________________________________________

2. What is the company mission and its strategy?

________________________________________________________________________
________________________________________________________________________

3. What are the key business processes and business objectives?

________________________________________________________________________
________________________________________________________________________

4. Can you describe the steps on these business processes operation?

________________________________________________________________________
________________________________________________________________________

5. Can you describe the company culture on knowledge sharing?

________________________________________________________________________
________________________________________________________________________

6. Which facilities do the company provided to ease the knowledge sharing?

________________________________________________________________________
________________________________________________________________________

7. Knowledge Management (KM) focuses on organizing and making available important knowledge (e.g. medical information) wherever and whenever it is needed. Do your clinics have any related KM systems?

________________________________________________________________________
________________________________________________________________________
8. Can you evaluate the current challenges on maintaining patient records, prescriptions and using medical information?


9. What are the expected results would you like after KM is implemented?


---- End of Questions ----
## APPENDIX D – DETAILED PROJECT SCHEDULE

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Period (Year 2015)</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Project initiation</td>
<td>2-Jan to 20-Jan</td>
<td>13 days</td>
</tr>
<tr>
<td>1.1 Form project team and identify key stakeholders</td>
<td>2-Jan to 8-Jan</td>
<td>5 days</td>
</tr>
<tr>
<td>1.2 Develop Project Charter</td>
<td>9-Jan to 14-Jan</td>
<td>4 days</td>
</tr>
<tr>
<td>1.3 Hold Kickoff meeting</td>
<td>15-Jan to 20-Jan</td>
<td>4 days</td>
</tr>
<tr>
<td>2.0 Project planning</td>
<td>21-Jan to 3-Mar</td>
<td>27 days</td>
</tr>
<tr>
<td>2.1 Prepare Project Baseline</td>
<td>21-Jan to 27-Jan</td>
<td>5 days</td>
</tr>
<tr>
<td>2.2 Prepare Schedule Management Plan</td>
<td>27-Jan to 30-Jan</td>
<td>4 days</td>
</tr>
<tr>
<td>2.3 Prepare Cost Management Plan</td>
<td>2-Feb to 5-Feb</td>
<td>4 days</td>
</tr>
<tr>
<td>2.4 Prepare Quality Management Plan</td>
<td>2-Feb to 5-Feb</td>
<td>4 days</td>
</tr>
<tr>
<td>2.5 Prepare Risk Management Plan</td>
<td>2-Feb to 6-Feb</td>
<td>5 days</td>
</tr>
<tr>
<td>2.6 Prepare Human Resource Management Plan</td>
<td>6-Feb to 13-Feb</td>
<td>7 days</td>
</tr>
<tr>
<td>2.7 Prepare Procurement Management Plan</td>
<td>6-Feb to 16-Feb</td>
<td>7 days</td>
</tr>
<tr>
<td>2.8 Prepare Change Management Plan</td>
<td>17-Feb to 3-Mar</td>
<td>9 days</td>
</tr>
<tr>
<td>2.9 Select system vendors</td>
<td>17-Feb to 28-Feb</td>
<td>2 weeks</td>
</tr>
<tr>
<td>3.0 System design</td>
<td>4-Mar to 27-Apr</td>
<td>35 days</td>
</tr>
<tr>
<td>3.1 Define system architecture</td>
<td>4-Mar to 13-Mar</td>
<td>8 days</td>
</tr>
<tr>
<td>3.2 Collect patient and medicine information</td>
<td>4-Mar to 25-Mar</td>
<td>3 weeks</td>
</tr>
<tr>
<td>3.3 Create patient record system and database</td>
<td>26-Mar to 27-Apr</td>
<td>1 month</td>
</tr>
<tr>
<td>3.4 Create medicine information system and database</td>
<td>26-Mar to 27-Apr</td>
<td>1 month</td>
</tr>
<tr>
<td>4.0 Testing</td>
<td>28-Apr to 25-Jun</td>
<td>40 days</td>
</tr>
<tr>
<td>4.1 Create system test and UAT plan and manuals</td>
<td>28-Apr to 4-May</td>
<td>4 days</td>
</tr>
<tr>
<td>4.2 Conduct system unit test and integration test</td>
<td>5-May to 26-May</td>
<td>3 weeks</td>
</tr>
<tr>
<td>4.3 Conduct UAT in all branches</td>
<td>27-May to 17-Jun</td>
<td>3 weeks</td>
</tr>
<tr>
<td>4.4 Review testing results</td>
<td>18-Jun to 25-Jun</td>
<td>6 days</td>
</tr>
<tr>
<td>5.0 Procurement and installation</td>
<td>26-Jun to 21-Jul</td>
<td>17 days</td>
</tr>
<tr>
<td>5.1 Purchase servers and client PCs</td>
<td>26-Jun to 13-Jul</td>
<td>10 days</td>
</tr>
<tr>
<td>5.2 Install and configure systems on hardware and networking</td>
<td>14-Jul to 21-Jul</td>
<td>1 week</td>
</tr>
<tr>
<td>6.0 Training</td>
<td>22-Jul to 24-Aug</td>
<td>24 days</td>
</tr>
<tr>
<td>6.1 Prepare system manual and user guide</td>
<td>22-Jul to 31-Jul</td>
<td>7 days</td>
</tr>
<tr>
<td>6.2 Provide user training</td>
<td>3-Aug to 24-Aug</td>
<td>3 weeks</td>
</tr>
<tr>
<td>7.0 Deployment</td>
<td>25-Aug to 8-Sep</td>
<td>11 days</td>
</tr>
<tr>
<td>7.1 Notify users and key stakeholders</td>
<td>25-Aug to 1-Sep</td>
<td>1 week</td>
</tr>
<tr>
<td>7.2 System deployment</td>
<td>8-Sep</td>
<td>N/A</td>
</tr>
<tr>
<td>8.0 Project Wrap Up (After 2 months)</td>
<td>9-Nov to 8-Dec</td>
<td>21 days</td>
</tr>
<tr>
<td>8.1 Collect feedback from users and stakeholders</td>
<td>9-Nov to 23-Nov</td>
<td>2 weeks</td>
</tr>
<tr>
<td>8.2 Monitor and review project plans and financial report</td>
<td>24-Nov to 8-Dec</td>
<td>2 weeks</td>
</tr>
<tr>
<td>8.3 Project completed</td>
<td>8-Dec</td>
<td>N/A</td>
</tr>
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</table>
## APPENDIX E – DETAILED PROJECT BUDGET

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>HKD</th>
<th>HKD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Human Resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaser Consultant Team</td>
<td></td>
<td>100,000.00</td>
<td></td>
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REFERENCES


