

Using Iterative Process to Increase Successful Rates of New Product Development Based on Cutting-Edge Technologies and Cultural Heritages – The Case of TCM Dietary

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SUBMITTED TO THE MIT SLOAN SCHOOL OF MANAGEMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN MANAGEMENT OF TECHNOLOGY
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 2018

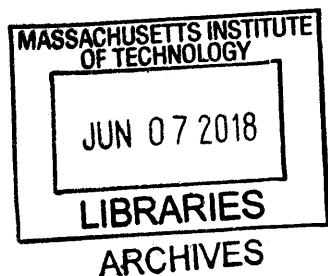
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Submitted to MIT Sloan School of Management
on May 11, 2018 in Partial Fulfillment of the
requirements for the Degree of Master of Science in Management of Technology.

ABSTRACT

As the global economy continues to fuse technologies and cultures cross borders, consumers are increasingly interested in products that apply emerging technologies to cultural heritages. For example, applying the technologies of AI, Big Data, or VR/AR to traditional Chinese culture, such as Traditional Chinese Medicine (TCM), cuisine, or fine arts, generates abundant innovative ideas with great business potential.

This thesis uses TCM food therapy as an example to explore how a marketing strategic framework helps to screen, refine and commercialize these new culture-technology-fused ideas. While cutting-edge technologies are exposing TCM to an increasing population, mass adoption of TCM food therapy faces several uncertainties. An analysis of value creation, capture and delivery will provide insights to the process of solving these uncertainties.

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I. Background and Objectives

A. TCM Dietary in General

1. What is TCM Dietary?

The practice of TCM food therapy (“TCM Dietary”) is derived from Traditional Chinese Medicine (TCM)¹. TCM teaches a comprehensive, coherent philosophical classification system (e.g., Ying Yang, the Five Elements, etc.) toward all things in the universe, including food ingredients and human bodies. TCM also provides a set of rules on how one class of things interacts with another. Depending on its classification, one thing may reinforce or weaken another thing. In applying this classification system and the interacting rules, TCM teaches in detail about how certain food ingredients may modulate certain functions of human bodies. These constitute the building blocks of TCM Dietary.

This approach is distinctively different from modern Western nutrition science. Nutrition science is based on scientific research using the foundations of molecular biology, biosynthesis, and catabolism. By contrast, TCM Dietary applies the classification system and interacting rules to seek a balance among Ying-Yang and the Five Elements within human bodies to maintain general wellness or improve certain bodily functions.

The knowledge framework of TCM and TCM Dietary has been built through thousands of years and illustrated in more than 300 classical book titles.² There is a continued effort to find TCM's link to and validation by modern medical science.

¹ See general “Your Guide to Health with Foods & Herbs: Using the Wisdom of Traditional Chinese Medicine,” April 10, 2012, by Zhang Yifang and Yao Yingzhi, Shanghai Press.

² The number is from our research survey at the on-line library for Traditional Chinese Medicine literatures, available at <http://zhongyibaodian.com/>, last visited 2018.3.30.

2. Features of TCM Dietary

The health and wellness solutions offered by TCM Dietary are completely natural. No artificial synthesis or chemical product are involved. Most ingredients used in TCM Dietary are food ingredients. A few of them may also be classified as herbs, while they are essentially vegetables or spices.

As another distinctive feature, TCM Dietary offers individualized solutions. TCM takes a holistic view toward the human body, in contrast to the reductive view of chemical/bio reactions adopted by modern medical science. As such, TCM Dietary believes that the solution to achieving one's "energy balance" is different for each person. In this regard, TCM teaches 9 different "body constitutions." One's body constitution is determined by various factors, including genes, habits, environments, ages, temperament, etc.,³ and can be determined by a "four-approaches" diagnosis system taught by TCM. The diagnosis rules are concrete and systematic. They can be programmed and trained by machine learning and improved by data mining, paving the way for a scalable business model discussed below.

3. The current state of TCM Dietary adoption

TCM Dietary is widely adopted in the communities that have a Chinese cultural connection. In many Asian countries that are influenced by ancient Chinese culture, TCM Dietary (or its variations) has been integrated into daily life. For example, during Winter Solstice, people in these regions would add ginger, sesame oil, and red dates to chicken soup to enhance blood circulation. During the Summer Solstice, they would ingest more tea oil, lotus seeds, and agarics, as these ingredients may stimulate appetite and help to keep the body hydrated.⁴

³ See "9 Body Constitutions in Chinese Medicine," by Sheng Nong, available at http://www.shen-nong.com/eng/lifestyles/nine_body_constitutions_in_chinese_medicine.html, last visited 2018.3.30.

⁴ A Chinese year is divided into 24 Solar Terms. In each term, TCM herbal recipes have precise recommendations based on the Ying-Yang balance. See for example, "The 24 Solar Terms and Traditional Chinese Medicare," available at: <http://www.absolutechinatours.com/china-travel/The-24-Solar-Terms-and-Traditional-Chinese-Medicare.html>, last visited 2018.3.30; see also, "24 Solar Terms: 5 things you may not know about Grain Rain," by Ministry of Cultural and

Athletes in these countries have been adopting TCM Dietary for more specific objectives. For example, professional athletes in both China and Korean are reported to utilize TCM Dietary systematically to enhance their performance.^{5, 6}

The current adoption represents a sizable population and market revenue^{7, 8, 9}. However, such adoption is inherited within a cultural context under empiricism, rather than based on perception of a value validated by modern sciences or technologies. Customers who have different cultural backgrounds or get used to the Western style medicines will have limited experience with which to evaluate this solution. As such, mass adoption in wider demographics still require further support from controlled clinical studies or mainstream scientific research.

Tourism of People's Republic of China, available at:

http://www.cnta.gov.cn/English_Column/201704/t20170420_822877.shtml, last visited 2018.3.30

⁵ See "Red Ginseng and Weight Training," by Dan Howard, available at <https://healthyliving.azcentral.com/red-ginseng-weight-training-2438.html>; See general, "Investigation of the Antifatigue Effects of Korean Ginseng on Professional Athletes by Gas Chromatography-Time-of-Flight-Mass Spectrometry-Based Metabolomics," by Yan, Liu Y, Shi A, Wang Z, Aa J, Huang X, Liu Y, published on J AOAC Int. 2017.9.19, available online at US National Library of Medicine National Institutes of Health at <https://www.ncbi.nlm.nih.gov/pubmed/28927488>, last visited 2018.3.30.

⁶ See "世界冠军见证了中医的神奇", a.k.a. "World Champions Witness TCM Miracles," by Xinhua News Channel on 2017.6.30, available at http://www.xinhuanet.com/mrdx/2017-06/30/c_136406696.htm, last visited 2018.3.30; See also "东方人洪荒之力的神秘泉源", a.k.a. "The Secrete Source of Power of Asians," a special report by I-Feng Channel, available at <http://news.ifeng.com/society/special/zydkx/>, last visited 2018.8.30; See also 药食同源 - 吃出世界冠军的洪荒之力, a.k.a., "Food and Medicine Share the Same Origination – Dietary for the Power of World Champions", by Xinhua News Channel on 2017.6.30, available at http://www.xinhuanet.com/mrdx/2017-06/30/c_136406688.htm, last visited 2018.3.30 ; <http://tw.aboluowang.com/2010/1014/183387.html>

⁷ See general "浅析中医药膳与食疗的差异和相互关系及其发展", a.k.a., "Analysis on the Difference of TCM Dietary and Food Therapy and Development," by Ming Cheng on 2017.04.19, available at <http://www.mczy3016.com/yixuechuanxin/66.html>, last visited 2018.3.30.

⁸ See "The Contribution of Traditional Chinese Medicine to Sustainable Development: Keynote address at the International Conference on the Modernization of Traditional Chinese Medicine," by Dr. Margaret Chan, Director-General of the World Health Organization, 2016.10.23, available at <http://www.who.int/dg/speeches/2016/chinese-medicine-sustainable/en/>, last visited 2018.3.30

⁹ Regarding market statistics and forecasts see general "中药材报告 2017-2023 年中国中药材行业市场需求与投资规划分析报告", a.k.a. "Report on 2017-2023 TCM Ingredients Market Demand and Investment Plan Analysis," published by ZhiYan Consulting Group on 2017.6, available at <http://www.chyxx.com/research/201706/536018.html>, last visited 2018.3.30

B. Business Scope and Features

1. Recipe based on nutrition science while using TCM Dietary as supplementary

Under the market environment described above, we believe our idea has great potential. The idea is to integrate the nutrition science (dietetics) with TCM Dietary as supplementary. Rather than a complete replacement of diet based on modern nutrition science, TCM Dietary would recommend adjustments to ingredients and provide a customized meal plan to enhance the effectiveness of the modern dietary solutions. Even though we cannot predict whether mass adoption across broad demographics will eventually happen, we believe our solution will expand the adoption of this approach to larger communities.

For example, many business professionals suffer from jet lag during international travel. To overcome jet lag, nutritionists suggest a diet with a good balance of protein, complex carbohydrates, and plant-based foods.¹⁰ TCM Dietary, however, has been using Rhizoma Gastrodiae (Tianma) to calm nerves and promote sleeping (as commonly used in TCM for dizziness, insomnia, or poor memory). As such, an airplane meal recipe combining these ingredients may appeal to frequent international travelers.

As another example, during exam season, students are challenged physiologically and psychologically. Modern nutrition science advises that amino acid which is found in fish, improves perception, intuition, and reasoning. By contrast, TCM Dietary uses "polygala" to stabilize one's mind to handle stressful situations. As such, students preparing for important exams might consume both polygala and amino acid (or fish).

2. Potential business models

Our analysis focuses on one segment market and one model that appears most sensible to launch with. Our business idea, however, has potential for a variety of business models. We

¹⁰ See "How to Use Food as a Jet Lag Cure," by Amy Farley on May 27, 2014, available at <http://www.travelandleisure.com/blogs/food-as-a-jet-lag-cure>, last visited 2018.4.14.

will also touch on these in our discussion below.

For example, our business may partner with catering services for airline companies, large professional firms, schools, fitness centers, and/or professional sport teams. We may also engage in delivery of pre-portioned packs for home-cooked meals (a model similar to that of Blue Apron but with a different focus). We also contemplate franchising the recipes as intellectual property and SOPs for restaurant chains specialized in Asian cuisines.

Each variation may emphasize different value propositions. However, they share two common features inherited from TCM Dietary, i.e., the completely natural approach and customized solutions.

3. Business prospect

This business would benefit from the following changes in the general environment that would reduce the adoption barrier against TCM Dietary.

First, awareness of TCM is increasing due to globalization. The economic competition and cooperation between the United States and China are both increasing potential customers' familiarity with lifestyles or cultural heritages in China and other Asian countries.

In addition, the exemplary effect occurring in the target markets also favors this business. The adoption of acupuncture (an application of TCM) is increasing among professional athletes and the military. For example, news coverage by mainstream sports media on the swimming champion Michael Phelps about his use of TCM cupping as a "secret weapon" during the 2016 Olympia Games has sparked a wide discussion.¹¹ Word of mouth about cupping or acupuncture is also stimulating general interest in other applications of TCM.

Most importantly, emerging technologies are helping to reduce the adoption barrier. TCM

¹¹ See "What Are the Purple Dots on Michael Phelps? Cupping Has an Olympic Moment," by Gretchen Reynolds and Karen Crouse on 2016.8.8, available at <https://well.blogs.nytimes.com/2016/08/08/what-are-the-purple-dots-on-michael-phelps-cupping-has-an-olympic-moment/>, last visited 2018.4.14.

teaches a systematic framework and concrete rules. But to render a prescription still requires judgment calls. It takes more than a decade for a trainee to acquire the proficiencies necessary for diagnosis and prescribing TCM solutions. In the near future, AI, data science, and IoTs appear promising in shortening this training period, or helping TCM practitioners diagnose and prescribe treatments more effectively and accurately. Leading research institutes are investigating this topic and new findings are appearing at unprecedented speed.

12, 13

¹² For example, research projects initiated by Harvard University Medical School, led by Dr. Chung Kang Peng, on Examining Traditional Chinese Medicine principles by cutting-edge technologies, including AI and Data Mining. See <https://xresearch.co/aboutus/>, last visited 2018.3.30.

¹³ See, for example, "Unlocking the wisdom of traditional Chinese herbal medicine with artificial intelligence," published in Herbalist Review, Issue 2017 No. 1 by Roger W. Wicke, available at <http://www.rmhiherbal.org/review/2017-1.html>, last visited 2018.3.30 ; See also "An Expert System for Supporting Traditional Chinese Medicine Diagnosis and Treatment," Procedia Technology Volume 16, 2014, Pages 1487-1492, by Paulo Silva, available at <https://www.sciencedirect.com/science/article/pii/S221201731400396X>, last visited 2018.3.30; See also "Research on Entity Recognition in Traditional Chinese Medicine Diet," published in Intelligent Human-Machine Systems and Cybernetics (IHMSC), 2017 9th International Conference on 2017.8.27 by Yingying Zhao, available at <http://ieeexplore.ieee.org/document/8047631/>, last visited 2018.3.30.

II. Market and Solution

A. Segment Market and BHM

Our beachhead market (“BHM”) is the segment of professional athletes who play individual sports or certain positions in team sports. Individual sports include swimming, cycling, running, tennis, boxing, etc. Positions in team sports include, for example, a baseball hitter whose individual performance relies on fewer psychological traits and can be measured more easily. The practice of tracking detailed statistics in this sport provides a potential source for more objective measurements of an individual’s performance compared to other sports.

The users of this segment share the following traits:

First, they are facing severe competition. They seize every edge against their competitors. If their peers have an edge that they don’t have, they have strong motivation to understand and obtain the same. Such attitudes drive them to challenge their limitation and be curious about ideas that could increase their competitiveness.

To gain a competitive edge, professional athletes have a high willingness to pay to maintain a “peak state” while avoiding drugs or substances banned by professional sports. Their income level also affords them the opportunity to new ideas, as we have seen in some use cases of TCM acupuncture.¹⁴

Second, professional athletes are sensitive to their body conditions. They are more adapted to perceive the value of marginal improvement. Effects of TCM Dietary may be diluted by numerous uncontrollable factors. Sensitive users will be more likely to perceive the changes before and after the adoption of TCM Dietary.

¹⁴ An NFL player is reported to spend 350, 000 USD per year on TCM. See “This NFL Player Turns To Alternative Medicine To Stay In Shape. Here’s What You Should Steal,” by Krysten Peck on 2018.2.5, available at <https://www.mindbodygreen.com/articles/this-nfl-player-spends-350-000-a-year-on-his-wellness-routine-heres-what-you-can>, last visited 2018.3.30.

Third, this market has a growing TCM adoption and WOM.¹⁵ The number of star players who have adopted TCM acupuncture has been increasing. This trend is likely to expose more users to other TCM applications, such as TCM Dietary.

Most importantly, it is easier to objectively measure the performance of the athletes in our BHM than in other market segments. In individual sports, the athletes' performance does not rely on team coordination or the performance of the other team players. In addition, their performance involves less psychological traits and is less affected by the strategy of play. For example, swimmers' performance is basically measured by the speed of their repeated muscular actions.

Based on the same idea, our BMH also includes athletes playing certain positions in team sports, for example, baseball hitters, as their batting rate is mainly determined by individual performance of repeated swing actions. The rate is objectively measurable and important in this game.

B. New Solutions

Our solution is creating consulting services that provide TCM Dietary recipes for improvement of athletes' performance.

The services consist of diagnosis and recommendation for meal plans. Also, on an as-need basis, we may also provide know-hows of best practice in cooking such meals, so as to maximize the effect TCM Dietary.

According to the nature of each sport and conditions of individual athletes, the goals of

¹⁵ See for example, "NFL Players Using Chinese Herbs for Performance Enhancement," by Dylan Jawahir, 2011.1.20, available at <http://augustpoint.com/nfl-players-using-chinese-herbs-for-performance-enhancement/>, last visited 2018.3.30; See also "Super Bowl Fans: Which of Your Favorite NFL Players Uses Acupuncture?" by Jade River on 2015.1.30, available at <http://jaderiverpdx.com/2015/01/super-bowl-fans-which-of-your-favorite-nfl-players-uses-acupuncture/>, last visited 2018.3.30; See also "Baseball Players Use Acupuncture Too!," available at <http://tcm007.com/baseball-players-use-acupuncture-too/>, last visited 2018.3.30

improvement in performance may be set to be general or specific ones.

For example, an MLB hitter needs to maintain excellent hand-eye co-ordination. In this regard, TCM Dietary teaches that using Matrimony Vine will maintain eyesight. After diagnosis of the hitter to determine his body constitutions, we provide meal recipes containing Matrimony Vine, and other supplemental ingredients capable of maximizing the effect of Matrimony Vine according to his body condition. The body constitution will determine the respective quantities for Matrimony Vine and each of supplemental ingredients, to ensure a “balanced solution” as taught by TCM.

Another example applies to sport teams that frequently play away games. Travel and time difference may disturb athletes’ sleep, and thus affect their performance. TCM teaches several natural ingredients to ease the nerve and facilitate sleep. They could be built into the athletes’ recipe as in the process described above.

Additionally, our solution may be aimed to improve the athlete’s performance in general. For example, muscular endurance is desirable in almost every sport. In this regard, TCM teaches using Ginseng to improve endurance. The practice is widely adopted in the Korean athletic community. Ginseng could be adopted into meals or a variety of soups. It can be used to form a meal plan that will enhance an athlete’s performance over the long term.

The above is our core services in principle. In facilitating adoption, we anticipate certain variation. We may also advise on sourcing, as relying on less familiar ingredients could hamper or dissuade users from adopting TCM Dietary. The core services are designed to deliver a minimum viable product (“MVP”) and gain an advantage position for pivoting as needed to secure this beachhead market.

The delivery of this solution needs participation from dietitians. We will discuss this aspect in detail below.

C. Go To Market Strategies

1. The customers' decision-making units

Our beachhead market includes the following three major decision-making units:

The first unit is the end users, i.e., athletes. They understand that food affects their performance, but individuals' habits or knowledge may prohibit them from adopting appropriate diets. As such they or their sport teams usually hire dietitians to advise them or help formulate meal plans.¹⁶

As such, the dietitian has the role of influencer as the second decision-making unit. They can advise the sport team's central kitchen or catering services on the meal plans. They may also explain to the athletes the ideas of TCM Dietary, observe the effect closely, and discuss with the athletes to obtain first-hand use experiences.

Some teams or star players may engage medical doctors specialized in nutrition science for this advisory role. In this case, these influencers may further help to resolve a regulatory concern in marketing the services. As TCM Dietary is derived from TCM, depending on specific use cases, providing TCM Dietary services may need to satisfy regulations. In the introduction of value propositions, over-emphasis on TCM Dietary's functionality (or "treatment effectiveness") may cross FDA red lines; but under-emphasis may decrease the perceived value. Licensed professionals have better discretion or room to maneuver in these grey areas.

The economic buyers may be someone else other than the athletes themselves, e.g., the team management who has control over the budget and the expenses of team meals. But

¹⁶ See "Career Path on How to become a Sports Nutritionist," available at <https://www.nutritioned.org/sports-nutritionist.html>, last visited 2018.3.30. The job description often includes: (1) administering nutrition counseling for individuals (2) engaging in menu development plans (3) creating nutrition-rich food service initiatives (4) spearheading nutrition education for teams, groups or wellness programs (5) using nutrition to facilitate professional development.

upon the entry of our BHM, we will prioritize athletes who are also economic buyers, so that we can shorten the decision process for adoption.

Adoption should not increase the meal expenses significantly. Because the essence of TCM Dietary is to find the right match between food and respective athletes, the solution does not require new or fancier ingredients, except for certain herbals, which are usually used in low quantity in the recipes.

On the other hand, the expenses on the consulting fees (i.e., source of our revenue) will affect the decision of the economic buyers. If the solution brings measurable value, the economic buyer will have a high willingness to pay, because athletes' performance is hugely important in this market.

2. Life cycle of the use cases

We will engage the dietitians and the end users through the sales process discussed below. Once engaged, the delivery flow would be like this:

First, we will need to work with dietitians to set the goals. In this process, we expect dietitians to communicate to us the desired performance in the sport. For example, teams from MLB or NBA will look at different set of physiological traits in their players, depending on the applicable game rules. Likewise, in the same sport, e.g., NFL, players at different positions would have different emphasis on their speed or strength.

The dietitians shall also facilitate the communication with the individual athletes to understand their priority in performance improvement as well as life style or habits that may affect their performance. Most importantly, we will need to determine their respective "body constitutions," through the TCM diagnosis process to be facilitated by the dietitians.

Once the goal is set, we start to formulate the meal plans. We will apply the TCM framework and interacting rules described above to determine the details of the meal plan, including the kinds and quantities of the relevant ingredients and application courses.

In the initial stage of our business, experienced TCM practitioners will be retained to execute the diagnosis and meal plan formulation. In the medium term, we will further integrate AI into the operation. The data generated by TCM practitioners in the service process will be used for machine learning and algorithm perfection. When the business scales up, AI is expected to take over these processes.

Once the meal plan is decided, the dietitians then start to implement the plan. We expect dietitians to oversee the adoption in athletes' meal preparation by central kitchen or catering services. The dietitians should assist with auditing and verifying the implementation process. If the existing meal suppliers are less familiar with sourcing or best practice knowhow in cooking with TCM Dietary ingredients, we may provide value-added services to facilitate the adoption.

After the course of meal plan, athletes' performance (to be discussed in detail below) will be verified against the set goals. Positive feedback from athletes will help to continue the engagement of our services for another course, and to spread the experience to a larger group through word of mouth (WOM). In addition, satisfied end users will in turn become influencers to other decision-making units, i.e., their dietitians or the team management.

3. Sales process for customer acquisition

As indicated above, dietitians play a crucial role in the use cycle. At the beginning, the sales process will be designed around the dietitians, and then will be adjusted in the short term, medium term and longer term, according to our interaction with dietitians and other decision-making units at different stages.

In the short term, we will approach dietitians through field sales. It is not cost effective; but it appears the most sensible approach at this stage. TCM Dietary will be a new concept to most dietitians. Even though they may understand the concept, face-to-face communication is required to catch their subtle but important reactions and respond to their queries. At this stage, end users' satisfaction is the key. We will need to work closely with experienced TCM

practitioners to assure the value of the TCM Dietary is recognized.

At this stage, dietitians' behaviors pose a great uncertainty to this business. We will analyze the causes, solutions and validation process in chapters below.

In the medium term, WOM is expected to kick in. In addition to the field sales, other approaches will be used to create demand, including increase of brand awareness through marketing campaigns, direct access to more users in "watering holes" where the targeted users usually meet or exchange ideas, and information and experience sharing in seminars, conferences, or social media.

In addition, we will also leverage triggers that may bring in sales opportunities. They may include important playoffs, tournaments, and other nationwide or international sport events. Triggers other than sport events may also be used if they expose Chinese cuisine or TCM to the potential adopters. As mentioned above, such opportunities appear more frequently than before, as the U.S. is increasing its interactions with China.

In the long term, we will reduce the efforts in field sales with the dietitian but increase resource allocation into a centralized platform to create demand in dietitians and athletes. However, we may start using field sales to reach academics or professional schools that train dietitians. We shall continue the efforts in marketing, seminars, conferences and social medias. Depending on the development of the AI (discussed in detail below), we should adjust the sales process to obtain a strategic position for entering the ancillary segment markets.

III. Justification of the Solution

A. Value Creation (and Perception)

1. What is the value created?

Value is usually reflected in the increase of end-user experience or operational efficiency. Our solution focuses on the former, as it is expected to increase athletes' performance. The key issues here are two-folds: How much value we can create? Can the users recognize the value?

We consider the value to be significant, if TCM Dietary brings the anticipated effect. The improvement to physiological performance (e.g., reaction time, speed of move, strength of muscle) may be marginal, as most professional athletes are already at their peak status. But under the severe competition at this segment market, any marginal improvement could make a great difference. For example, a 0.01 second improvement in the 100-meter dash may help the runner to win the race.

Rules of most sports game are not as simple as 100-meter dash. Because the outcomes of games are influenced by various factors, improvement of a player may not produce an objectively perceivable value. For example, an MLB pitcher may increase his speed, but the first baseman may bobble, resulting in a run. This fact has significant implication in the choice of our BHM, which we analyze in more detail in the chapters below.

In some other scenarios, the value may be perceived, but cannot be quantified. For example, in the same scenario, the pitcher's adoption of TCM dietary helps him to recover more quickly for the next game. (Faster recovery is the key reason why TCM acupuncture adoption is increasing in this segment.) The pitcher could perceive the value. But there may be no concrete benchmark to measure "how well" or "how fast" he has recovered. He just feels it personally.

Overall, while TCM Dietary has a potential to create significant value for professional athletes, there is uncertainty as to whether it will be recognized as the source of the improvement.

2. How do the customers search?

What criteria do athletes use when searching for dietary supplements or foods? Presumably, their search will be dominated by personal taste and previous habits. But when performance becomes a concern, athletes often rely on dietitians for advice.

Dietitians are experts in nutrition. Some dietitians in the segments (the U.S. market) may search for solutions within their current knowledge domain. But most of them are unlikely to extend the search to include TCM Dietary, because the idea of using TCM Dietary to enhance body function is novel to most Western dietitians. They may not even be aware of this possibility. This is the lesson of the Aqualisa case,¹⁷ in which Aqualisa launched a new product in the U.K. to increase water pressure for a better shower experience. However, many users in U.K. do not know the pressure of shower water could have been higher. As the U.K. users were unaware of this possibility, they were not motivated to find the new products, even though great value has been created by new products.

Assuming the athletes and dietitians are motivated to search in the TCM domain, are the criteria of our product or service searchable?

The answer seems unlikely. The criteria of the TCM Dietary are inherent to the users of the segment market. Experienced users may become aware of the effect of the TCM Dietary based on the description of ingredients. They have the knowledge and experience to infer the value that TCM Dietary may bring to them. Without such background, potential users would then need to spend extra effort in searching for opinions or discussions in the public domain or through personal networks. While such information may be available, a large

¹⁷ See "Aqualisa Quartz: Simply a Better Shower," by Youngme Moon, Harvard Business School, 9-502-030 REV: July 10, 2006, pages 1-3.

portion is not translated into the language of the target markets. In other words, consumer search would be very time consuming and ineffective for them to determine the value before adoption.

This search behavior has implications for our sales process and go-to-market strategies. As the criteria of our services are not searchable, authority, brand and WOM¹⁸ are more likely to create the demand. In addition, the key decision-making unit, i.e., dietitians, will not search to find our solution. As such in the short term we will rely on field sales targeting dietitians. Because of dietitians' crucial role, their behaviors become a source of uncertainty and require careful validation as discussed in the following chapters below.

B. Value Capture

In analyzing whether we may capture the value we create, we will first analyze which resources may bring us strategic advantages, and then we apply them against each potential competitor in this segment market to determine if we could compete.

1. Potential strategic resources

First, we consider if we control any resources that may provide sustainable and differentiable services to satisfy customers. From this perspective we will analyze 5 potential strategic resources below.

(1) Knowledge

To operate this business requires three kinds of knowledge.

The first kind is knowledge of the TCM framework, including the classification system and its interacting rules. This knowledge is in the public domain. It takes some time to acquire

¹⁸ For example, usage of deer antler for performance enhancement is likely to be adopted by WOM. "NFL Players Using Chinese Herbs for Performance Enhancement," by Dylan Jawahir, 2011.1.20, available at <http://augustpoint.com/nfl-players-using-chinese-herbs-for-performance-enhancement/>, last visited 2018.3.30

such knowledge, but everyone has access to it. One may leverage experienced TCM practitioners to accelerate the acquisition process. As such, this resource may only serve as a strategic resource in the short-to-medium term.

The second kind is knowledge about TCM's application scenarios in dietary, proven-use cases, and the market potential. Such knowledge is acquired through observation in the market where adoption has taken place. However, such knowledge is becoming increasingly available in our segment market. For example, Amazon lists more than 5,000 English book titles on the subject of "Chinese cuisine," 300 on "Chinese Food Therapy," and 30 on "TCM Food Therapy."

Through the public resource, competitors could acquire such knowledge. In addition, once we launch the services in the segment market, the application and use case will become known to the public. As such, the advantage of this knowledge may last only in a short-to-medium term.

The third kind of knowledge is about sourcing relevant ingredients used in TCM Dietary.¹⁹ As mentioned above, most of the food ingredients used in our solution are available in the market. However, certain ingredients may be less familiar to the current suppliers. In addition, the trading volume and supply channel may also be limited in the U.S. market. It will take some time for existing procurement departments, catering services or meal providers to build up knowledge for sourcing.

In connection with sourcing, one may need to find alternative ingredients to achieve the same goal. This situation happens in two scenarios. First, a small portion of the ingredients may need to be imported or obtained through contractual farming. If these options are not available, one will need to exercise the first kind of knowledge to find the best alternative. Second, several alternative ingredients may have a similar TCM effect,

¹⁹ Dealer or sales network could be a kind of strategic resource. See general "Barco Projection Systems (A): Worldwide Niche Marketing," by Rowland T. Moriarty, Harvard Business School, 9-591-133 REV: May 9, 2002.

while they provide different flavor or tastes that appeal to individual users. Making such choice would require experience in applying the three kinds of knowledge together.

(2) AI algorithm and Big Data

The more data and use cases we accumulate along the time, the more advantage we may have against competitors.

As mentioned above, during the medium term we will start to collect the data for the purpose of machine learning. At this stage, we still work with experienced TCM practitioners to deliver the service. Their participation is important to ensure the quality of services. At the same time, we will use their opinions and prescriptions for machine learning and improve the AI algorithm.

It takes time and big data to build an AI system that matches experienced TCM practitioners. As the first one to offer this solution, we enjoy lead time in perfecting the AI algorithm and data collection in this segment.

This head start creates a gap between us and new entrants who may compete with us. The gap will continue to widen with time at an accelerated rate. As illustrated in the success of Merge Healthcare, which has accumulated 30 billion medical images, this strategic resource provides a tremendous competitive advantage in scaling up its business when adopting AI solutions.

(3) Distribution network

An argument against the above analysis on the first mover advantage is the "second mover advantage." Our competitors could reverse engineer our solution to save on their experimental costs. This may be true from the point of the AI technology alone. However, our first mover advantage stands beyond the AI and Big Data.

The delivery of the TCM Dietary also requires a network among several collaborative

parties, including central kitchens, catering services or the members in the supply networks of food ingredients. It takes time to gain an efficient operation among them.

Competitors may use a different business model to deliver a similar service to circumvent such collaboration. However, it is unlikely to have another viable model at least in our planning horizon because of the uniqueness in end-user behavior and the relationship among the decision-making units at this segment market.

If our competitors use a similar model, they will face a higher cost of operation than ours at the beginning. As long as the users' behavior and value perception in TCM Dietary remain largely the same, operational efficiency should be a competitive advantage.

(4) Switching cost

Two kinds of switching costs continue to increase, forming our strategic resource that becomes even stronger over time.

The first kind of switching cost is associated with the AI system and database. Throughout the use life of our products/services, a user will generate data about his/her body constitution, detailed ingredients of the meal plan, changes in performance, and most important of all, the interrelation of those variables. Like in other AI applications, the accumulated big data may know these users better than they know themselves. A user who switches the services will need to start over to accumulate data on the other's platform. It takes time to reach a similar level of effectiveness that TCM Dietary could possibly provide to them.

The second kind of switching cost is associated with the cost of the distribution. As mentioned above, other competitors may provide a similar solution, but they are unlikely to offer the service with the same cost as ours. In other words, a user switching to another service will entail higher fees for fewer services.

In comparison, the first kind of switching cost appears more dominant.

As switching costs will become our strategic resource, it poses a question: Would the users or partners (i.e., dietitians) refrain from adoption of our solution when perceiving this switching cost? We analyze this question from both the end user level and the partners' level.

At the end users' level, as mentioned above, most professional athletes would rely on dietitians' recommendations. The demographics of this beachhead market does not suggest that the end users are sophisticated planners who would think several steps ahead. More likely, they would consider the initial adoption just an experiment that may increase their performance.

At the dietitians' level, their reaction poses certain uncertainty to our business. It needs further analysis and validation as detailed below. In short, we believe they would adopt our solution despite switching costs for two reasons. First, they have limited options to differentiate their services; second, we are able to provide sufficient incentives to resolve this tension as further analyzed in sections below.

(5) Control on certain ingredients

In the U.S., ownership and control of certain TCM ingredients may be strategic resources for our business.

As mentioned above, most of the ingredients of TCM Dietary are simply food ingredients already available in the markets. But there may be limited supplies. For some ingredients, producers or importers are adapted for low volume of supply due to limited demand in the market. For some others, it takes several years before a harvest, even though producers hope to increase the supply. As such, certain suppliers may not be able to meet the demand if it suddenly increases.

A good example is Camellia Oil. It is like olive oil's counterpart in Chinese cuisine and an essential ingredient in numerous TCM Dietary recipes. The Camellia is cultivatable in

North America, but it takes years to grow. Control or ownership through contractual farming for such ingredients could be a strategic resource at least in the short-to-medium term.

Certain ingredients may not be cultivatable naturally outside of greenhouses in North America. They are less used in TCM Dietary. Their second-best alternatives may be available in the market. However, serious and premium users may be willing to pay for that marginal difference. The production would entail greenhouses or importation. The resource and time to obtain the supply or the required license are significant. As such the control and ownership in the supply could be a strategic resource at least in the short-to-medium term.

Table 1 – TCM Ingredients with Potential Become Strategic Resources

Features of the Category	Examples	<u>Strategy Implications if Deficiency in Supply</u>
Cultivable But Not Main Produces (contractual farming)	Portulaca Oleracea L.; Mugwort; Houttuynia Cordata; Desmodium, etc.	<ul style="list-style-type: none"> • Decrease variety of flavors; harder to satisfy the personal tastes. (see Insight 5 – Body Constitutions) • Functionality may be partially impacted.
Cultivable But to Harvest Takes A Long Time	Camellia Oil Ginseng - wild pick requires governmental license	<ul style="list-style-type: none"> • Essential ingredients in numerous TCM Dietary recipes. (Camellia Oil, is olive oil’s counterpart in Chinese cuisine, has a distinctive flavor.) • Takes 3-5 years to harvest.
Non-Cultivable in the natural environment (greenhouses or plant factories required)	Ganodorma Lucidum Taiwan fungus Camphorates	<ul style="list-style-type: none"> • Precious, high-end ingredients with significant function in TCM food therapy. • Functional values can be perceived by sensible or savvy customers.

2. Analysis of the competitors

Below we analyze these potential strategic resources against specific competitors in our

segment market.

(1) Existing food suppliers

Existing food suppliers includes central kitchens, catering services or those who participate in sourcing, preparing and supplying the meals to athletes. As mentioned above, TCM Dietary is meant to find a better match between foods and individual athletes. As such our service is not to replace these other services. In fact, in the short-to-medium term, we will need to utilize their existing platform in delivering TCM Dietary solutions. They may experience certain changes in their operations, as they need to source food ingredients, new recipes, or cooking methods for TCM Dietary.

They are unlikely to capture value in our solution. They are not equipped with the three kinds of the knowledge required to prepare TCM Dietary recipes. They are unable to build up that resource quickly either. They are not adapted to AI and Big Data to provide customized TCM Dietary meal plans.

At least in short term, they will act like OEM manufacturing. They do not have much bargaining power and may be replaced by other service providers. Accordingly, we could compete with them with our business model.

On the other hand, the existing food suppliers are potential partners. As discussed above, certain ingredients used for TCM Dietary may have limited supplies. In addition, the supply channel is less known to those service providers who have no experiences in sourcing these ingredients. Our knowledge or established network could help them to deliver their services.

(2) TCM practitioners or clinics – can compete

Most TCM practitioners provide their services under a traditional model. In the U.S. they usually operate stand-alone clinics. Such a model is not adapted to operate in our market segment. In addition, the stand-alone practice tends to limit their resource and

networking. As such they are not equipped to commend domain knowledge on a wide range of sports to customize their solution for individual players in different sports. In the short term, we could compete with them.

In the medium-to-long term, dietitians may reach out to TCM practitioners to form alliances that compete with us. However, at that stage, we will be moving into AI and Big Data Mining for scaling up the operation. Such alliances would not be able to compete with us in scale and efficiency.

(3) New entrants

As analyzed above, we will have five kinds of advantages over competitors that follow us: (1) knowledge of TCM Dietary (2) better AI algorithm and larger data base (3) efficiency in distribution network (4) switching costs (5) control of certain ingredients.

The first advantage may only benefit us in the short-to-medium term. The other edges should continue to grow, widening the gap between us and those that follow.

(4) Dietitians

Dietitians are crucial to our operation. They have two roles to play. They could compete with us to extract value; they could also collaborate with us to deliver more value. Because of this uncertainty, we will need to consider how to resolve the uncertainty and validate the solutions. Here we just highlight the relevant issues. The answer to these issues will determine if we may compete.

- In most cases, dietitians own the customers. At least in the short term, we need dietitians more than they need us. Under our business model, what incentives would be sufficient to keep them as a partner rather than drive them to be competitors?
- Will dietitians worry about their loss of control on athletes after adoption of our service? Some star athletes are reported to demand their sport team hire acupuncture therapists. But that appears unusual. IBM Watson may be a better analogy here. IBM

Watson collaborates with medical doctors in diagnoses to enhance their performance and efficiency. Doctors do not worry about losing patients to IBM. Similarly, one may argue that dietitians could improve their services to athletes by adopting our services. They have personal relationships built up from their daily interaction with athletes. The consultation practice goes beyond what an AI system may deliver.

- Once the adoption begins to increase, dietitians may seek to form alliances with TCM practitioners and compete with us to extract more value. We have analyzed this issue above. But the uncertainty is whether AI could eventually replace TCM practitioners under our business model?
- Switching costs could also influence dietitians' behavior. Will these costs be high enough to keep dietitians as partners rather than competitors?
- If our solution delivers perceived value to the athletes, dietitians may leverage our partnership to build up their own brand. This will change the balance in our collaborative relationship. How could this change affect our value extraction?

C. Value Delivery

We need to collaborate with dietitians to create value, as well as to compete with them to capture value.

1. Collaborate to create value

As mentioned above, the value created by TCM Dietary is to increase performance of athletes. Dietitians could share with us their domain knowledge in a specific sport or experience in working with individual athletes. For example, we will get information about which traits, such as strength and duration, are most valued in that sport or by the individual players.

At the initial engagement, we will need dietitians to act as champions, advocating to the athletes for the value of TCM Dietary. They have a key role in advising the meal plan, dietary supplements, and overall nutrition. They also have significant influence on budgeting and

formulation of the athletes' meal plans.

After the engagement, our service will move into diagnosis phase. In this task, we will need dietitians to work with us and with experienced TCM practitioners to facilitate the communication with individual athletes. They have established trusted relationships with athletes and know personal styles, life habits, training goals, and history. They will help to determine an individual's body constitution for formulating a customized TCM Dietary meal plan.

During the implementation of the solution, dietitians will need to oversee the execution of details, including ensuring the recipes are accurately delivered to the individuals by the central kitchens, catering services or other service providers. When measuring the effectiveness of TCM Dietary, dietitians are ideally positioned to observe and record the data.

On the other hand, dietitians would need us if they want to create the value through the adoption of TCM Dietary. We own and control all the strategic resources for this operation, including the knowledge required to create the recipe and to ensure a smooth delivery to the end users. Dietitians in this BHM have no control on these resources, at least in the short-to-medium term of the operation.

2. Compete to capture value

Obviously, dietitians own the clients at the beginning.²⁰ They have established the authority and familiarity with athletes. In addition, as analyzed above, athletes are unable to, or not motivated to search for our solutions. Compared to us, dietitians dominate the client relationship in this segment market.

²⁰ But see "These 8 Amazing Athletes Use Acupuncture", available at <http://tcm007.com/these-8-amazing-athletes-use-acupuncture/>, last visited 2018.3.30. An athlete is reported to demand TCM acupuncture services as a benefit and write it into the contract with the sport team.

However, once dietitians perceive our value and would like to adopt our solution, we will have strong differentiation to capture value.

First, dietitians have limited options. Dietitians may choose to stay with the current solutions, i.e., modern nutrition science. But such dietary solutions have been standardized throughout the market. They likely will not bring extra edge to the athletes they serve. More aggressive dietitians may explore other solutions with regulatory risks. On the other hand, TCM Dietary is based on an established knowledge, has been adopted in other communities, and is completely natural. The most risk that it may bring is no effect to the athletes. In other words, the cost of the adoption on an experimental basis is manageable.

Secondly, once adoption has taken place, we could leverage our strategic resources to fine-tune the business model or incentives to extract more values. For example, in addition to the core consulting services, we may also help dietitians with sourcing and supply to gain more value if they are not familiar with the distribution networks or logistics in supplying TCM Dietary meal plans.

What if dietitians switch to our competitors for similar services? As analyzed above, they will face two kinds of switching costs associated with AI and Big Data and the efficiency in the supply networks. On the other hand, if they choose to form their own alliance with TCM practitioners to compete with us, they will be unable to deliver the service at the same level of quality and cost.

In considering whether to switch services or form their own alliances, dietitians may leverage their personal brand or image among the athletes. Currently most dietitians have no personal brand. However, if the athletes start to perceive measurable improvement from our solution, dietitians who collaborate with us will be able to differentiate themselves, and thus build up their brand or image within the BHM much faster than we could. This potentially increases dietitians' bargaining powers to extract more value in our collaborative relationship.

3. Analysis – we will have stronger bargaining power

Dietitians' collaboration is necessary for the success of our business. A closer analysis of dietitian's professions and their roles in sport teams reveals our advantages in this collaboration.

First, most dietitians are not highly paid professionals,²¹ although they influence the athletes' dietary. Many of them are acting on a consulting basis or part-time basis. There is no clear benchmark to measure or validate their expertise. As such, from an economic point of view, we have a good opportunity to design a profit-sharing mechanism to attract their collaboration.

In addition, under the current system, the training for dietitians is standardized.²² They have no way to differentiate themselves. A small portion of individuals are using the media to market themselves as star dietitians. But such differentiation may not be sustainable if they cannot deliver value to their customers. Partnering with us will help them to differentiate and create bargaining powers in the job market.

This analysis may change over time and is likely to move in our favor for following reasons.

First, during the medium term, AI and Big Data will be introduced into our operation. AI and Big Data integrate all users who receive our services across different sports. Such wide span of data and use cases will make our solutions more comprehensive and accurate while still attending to the needs of individuals. This is a strategic position that a dietitian working for few individuals or teams could not obtain.

²¹ Salary scale and structure for sport dietitians see general <http://www.claredietitian.com/career-dietitian.htm>, last visited 2018.3.30; Range of the annual salary is USD 21,243 to USD 81,429. See https://www.payscale.com/research/US/Job=Sports_Nutritionist/Hourly_Rate, last visited 2018.3.30

²² Standardize training for sport dietitians. See "Career Path on How to become a Sports Nutritionist," available at <https://www.nutritioned.org/sports-nutritionist.html>, last visited 2018.3.30.

Second, as WOM spreads, end users and economic buyers are expected to demand the adoption. At that stage, the tables are turned. We expect to own the clients.

Third, some dietitians may improve their personal brand, which increases their bargaining power in our collaborative relationship. But we do not consider this increase would necessarily enable them to extract more value because we are also building our strategic resources at the same time.

In summary, tension exists. In the short term, dietitians have incentives to differentiate themselves through partnering with us. In the medium term, the tension will become more obvious as we build up our AI and Big Data and the switching costs increase. The dietitians who have built up personal brand in this process may also compete to extract more value created. In the longer term, we will gain more bargaining power over dietitians as we will continue to widen the advantage gap with our competitors. As such, we will enjoy great advantage in designing profit-share mechanisms to exact values while maintaining their cooperation, according to the change in the balance of bargaining powers at different stages.

IV. Key Sources of Uncertainty

A. Dietitians' Reactions

As analyzed in the value delivery section, in the short term, medium term, and long term we will have advantage over dietitians IF dietitians are willing to adopt our solution. But their adoption is based on several assumptions.

First, dietitians will need to acknowledge the TCM Dietary solution or at least feel comfortable in assisting with the delivery of our service. TCM Dietary is novel to most dietitians. The concept is distinctive from nutrition science and falls out of their knowledge domain. It is one thing to realize their counterparts in Asia have adopted the solution, it is quite another to recommend adoption to athletes.

This raises several key questions: How confident would they feel in our solution? What is at stake if they adopt and what is at stake if they do not? The answers may only be found through empirical survey to be discussed in the next chapter. But we offer a preliminary analysis here.

If dietitians do not try this solution, they lose the chance to benefit from the value created by TCM Dietary. If they adopt, but the outcome is unsatisfactory, the most they could lose is the fees we charge, if any. Under this circumstance, dietitians may adopt, or they may choose to wait and see. It is thus possible for us to provide incentives to align their interests with us. The query becomes how much incentives or profit sharing is enough to reach the tipping point and how we may design a fee structure that compensates for the risks they take in collaborating with us.

Another assumption is about how dietitians perceive their roles in our collaboration. Our model is to use TCM Dietary and AI to help dietitians deliver their services, not to replace them. As mentioned above, IBM Watsons help doctors in their diagnosis. Another example is Westlaw or Nexus, the legal database services that many law firms purchase for their

lawyers. At the end of the day, the lawyers are not replaced but working more efficiently for the firms with the data services. However, dietitians may look at the relationship differently and consider the AI or our solution as threats.

In addition, in the medium-to-long term, some dietitians may gain more bargaining power from their increased personal brand. In Chapter III we consider how this increase does not necessarily enable them to extract more value. Once WOM has taken effect, the athletes are more likely to search for our solutions by themselves. The searchability will dilute the effect of brand. In addition, even though some dietitians have created a personal brand, they still need to collaborate with a TCM Dietary solution provider to deliver the solutions.

B. Could AI Replace TCM Practitioners in Delivering TCM Dietary?

The success of our business model hinges on whether, through machine learning, AI could replace experienced TCM practitioners.

This appears optimistic for two reasons. First, TCM Dietary operates on a structured knowledge framework and concrete rules derived from TCM. For example, in determining the body constitution, TCM teaches a four-sensory diagnosis approach²³, i.e., Observation, Olfaction, Inquiry, and Palpation. The classification system and interacting rules are also concrete. Applying these rules to provide TCM Dietary advice requires experience and judgment. But to handle such challenge is exactly the strength of AI and Big Data.

Secondly, research into TCM is blooming. Because of the increase in computing powers, quantitative study of TCM is becoming more manageable. Application of IoTs, including sensing technologies and mobile devices, are facilitating data collection. Scientific research

²³ See "Observation, Olfaction, Inquiry, and Palpation - four methods of TCM diagnosis," by Australia Natural Medicine Centre, available at http://www.chineseherbal.com.au/four_diagnostic_methods.htm, last visited 2018.3.30. The four methods are (1) observation of physique, complexion, tongue fur, expression, voice, cough, breath, etc. (2) olfaction of halitosis, body odor, etc. (3) questioning about symptoms, medical history, etc. (4) palpation including pulse feeling and belly pressing to see if there is any lump in the abdomen.

on TCM has become a national campaign in China,²⁴ as well as increasing in mainstream research institutes in the United States.²⁵

Currently scientific TCM research appears more focused on teachings of Meridians, (the theoretical base of acupuncture and cupping).²⁶ The outcomes of the research can also validate TCM Dietary, as both are derived from the same knowledge framework. More importantly, these controlled experiments will help to increase the authentication of TCM's application in dietary.

The direction appears promising. As such, the uncertainty here is over how long it will take for AI to replace experienced TCM practitioners?

How good is good enough?

TCM Dietary may offer multiple solutions. Applying TCM rules to give advice requires judgment. Sometimes two TCM practitioners give different recipes, while both are effective. This is like playing Go. The rules are concrete; but different moves may result in the same victory. The performance of AI cannot be simply ascertained by comparing its output with the advice of experienced TCM practitioners.

The quantity of ingredients raises another issue. Even though the AI could advise the same ingredients, the quantity of each ingredient matters. Is 80% similarity to the experienced TCM practitioners good enough? The slight variation might break the balance (the underlying

²⁴ See "TCM Modernization Research Project," by Chinese TCM News on 2017.8.17, available at http://www.sohu.com/a/162883254_456034, last visited 2018.3.30. Science and Technology Bureau of People's Republic of China announced 19 key research directions and allocated 500 M RMB on TCM research in 2017.

²⁵ The same example above - the X-research projects initiated by Harvard University Medical School. See <https://xresearch.co/aboutus/>, last visited 2018.3.30.

²⁶ This includes military experiments in the US. See for example, "Military Pokes Holes In Acupuncture Skeptics' Theory," by Blake Farmers on Heard on Morning Edition, 2012.2.16, available at: <https://www.npr.org/2012/02/16/146944270/military-pokes-holes-in-acupuncture-skeptics-theory>, last visited 2018.3.30; See also "Acupuncture: Ancient technique complements modern medicine," by Military Health System (MHS) Communication Office on 2017.11.19, available at <https://health.mil/News/Articles/2017/11/29/Acupuncture-Ancient-technique-complements-modern-medicine?page=3#pagingAnchor>, last visited 2018.3.30.

theory of TCM) and render the recipe less effective.

The touchstone should be the effectiveness TCM Dietary offers. We will discuss in more detail in the Section C below how to benchmark the effectiveness of TCM Dietary in our solution.

How long does it take?

Even though research on TCM is increasing in number and in scope, the progress of introducing AI to TCM Dietary is not in our control. It could take 5, 10 or even 30 years for the AI and supportive technologies to reach the desired satisfactory level.

Before the technology matures, we need to rely on experienced TCM practitioners to deliver the minimum viable product/services. We need to adopt a sensible approach to cope with such uncertainty.

C. Measurement of Improvement in Performance

Assuming AI generates TCM Dietary advice comparable to experienced TCM practitioners, whether the recipes deliver satisfactory outcomes to the athletes is another uncertainty. Current adoption of TCM Dietary in some communities does not eliminate this uncertainty. The end users in our segment market will look for more concrete proof of value in adopting our solution.

Could TCM Dietary satisfy the functional needs of athlete?

We may elaborate on this uncertainty at two levels:

At the team level, most team sports require coordination among team players. An individual player who has adopted TCM Dietary may play better than before, but the team could still lose the game for numerous reasons. This may diminish the perceived value.

At the individual level, numerous variables may affect athletes' performance. Factors other

than dietary, such as a bad night's sleep, may reduce their attention, affecting performance that requires hand-eye coordination. It is challenging to isolate the effect of TCM Dietary from these variables without controlled clinical trials.

In addition, personal perception is difficult to evaluate by objective means. An athlete who adopts TCM Dietary may feel that he is more energized or recovered more quickly. But his feeling may result from psychological effects or placebo effects. As the lesson learnt from many so-called "energy products," even without solid proof, sports players who adopt these products insist value exists.

Further, the improvement through TCM Dietary is progressive. The essence of TCM Dietary is to use nature approach to regulate the body balance, and in turn enhance the desired functionality. As such the change may be marginal and insignificant if observed on a day-to-day basis. In contrast, most modern medicines are designed to boost certain function through precise interference in relevant bio-chemical pathways. This distinct approach makes it hard to measure the value of the TCM Dietary for users who are used to modern medicines.

The uncertainty in the measurement bears important implications in determination of our BHM. As mentioned in Chapter I, our BHM are athletes who play individual sports or certain positions in team sports. We assume it is easier to measure the improvement brought by TCM Dietary on such targeted users, as their performance does not rely on team coordination or the strategy of team play and is mainly determined by relatively simple and repeated actions.

D. Measurement Issue Pivotal to The Uncertainties

Through the above analysis we find the measurement of improvement to be pivotal among these uncertainties. Other uncertainties may be mitigated or enhanced, depending on how the measurement issue is resolved. Below we elaborate on the relationship between the measurement issue with respect to the development of AI in TCM applications, and dietitians'

response in a short-term as well as in a medium-to-long term.

As to whether AI could replace experienced TCM practitioners, the uncertainty is mainly about timing. If we can reasonably measure the improvement of performance brought by TCM Dietary, we can satisfy the users more easily. The users' willingness to pay will be high. The market mechanism will attract research focus and more resource to expedite the development of the AI application in TCM Dietary.

As to dietitian's adoption in the short-term, the uncertainty concerns how much incentive is required to reach the tipping point of adoption. Measurable improvement in athletes' performance would play an important role in our relationship with the dietitians. As mentioned above, dietitians have limited options in differentiating their services. Adding an effective solution to their existing service will instantly create extra value in and quickly differentiate them from competitors. This benefit will effectuate their adoption of our solution even without any incentive provided by us.

On the other hand, if measurement issue remains unsolved, dietitians will take more risks to explore the BHM together with us. We will then need to allocate proportional incentives to convince them to adopt.

In the medium-to-long term, dietitian's personal brand may increase their bargaining power. In Chapter III we consider the increase may not enable them to extract more value for two reasons. First, the WOM will dilute the effect of brand; second, our strategic resources to satisfy end users will also grow over time.

The assumptions appear sensible, but eventually they also hinge on the measurement issue. WOM will take place only after our solution has satisfied the early adopters, while the satisfaction mainly results from measurable improvement in their performance. Likewise, our strategic resources could help us to dominate our collaboration with dietitians, but the strategic resources will not grow without measurable improvements for end users.

Overall, we may cope with these uncertainties with corresponding processes to be discussed in the next chapter. But the uncertainty in measurement is pivotal to all uncertainties and thus bears the most implications to our strategic decisions.

V. Process of Resolving the Uncertainties

A. PMR and Empirical Data Collection on Dietitians

The uncertainty in dietitians results from various behaviors and response to our moves. As such, resolving the uncertainty requires different approaches at different stages as discussed below.

Before engagement, preliminary market research (“PMR”) appears the most sensible tool to understand dietitians’ motivation. The PMR could gain insights from dietitians’ roles for a professional athlete or in a professional sport team, the current industry practice, and their career aspirations. As analyzed above, we believe the standardized training, compensation system, and nature of the advisory work would motivate them to seek to differentiate themselves.

If the desire to differentiate exists, we could use a serial of tests to validate their interests and confidence in adopting our solution. For example, we could provide certain TCM Dietary recipes on-line for dietitians to download on a trial basis. We could also provide pre-portioned packs for home-cooked TCM Dietary meals to certain selected targets.

If these preliminary tests prove that interest exists, we will design follow-on tests to measure its strength. We could hold seminars on TCM Dietary to gauge their motivations in becoming partners with us. The feedbacks from the seminars or conferences could also help to understand their comprehension of the solution.

Once the partnership moves forward, the feedback from the direct field sales (the go-to market strategy we adopt at the initial stage) provide an important information source to determine effective incentives for dietitians. As analyzed above, we have great flexibility in designing an incentive structure to attract dietitians. We could analyze their feedback and modify the mechanism base on the empirical data we collected in the field. As we expect our bargaining power to increase over the time, we can afford to be generous to kick off the

process at the beginning. Once mass adoption and WOM starts to take place, we could then adjust the mechanism to extract more value at later stages.

B. Timing for Maturity of AI in TCM Application

In Chapter VI we concluded that application of AI in TCM has a bright future. It is just a matter of time when the benefits will extend to TCM Dietary. As observed in the development of other emerging technologies, market interests, resources inputs, response to the emerging needs, etc., will determine the speed of this development process. But these are external variables over which we have no direct control.

This factor has implications for the success of our business. At the beginning we will rely on experienced TCM practitioners to deliver the services. In the second phase, we will further integrate AI into our operation, mainly for machine learning and algorithm improvement. If the maturity of the application is not synchronized with our development phases, we may get stuck. In this case we will not be able to build up the strategic resources (as analyzed in Chapter III) required scale up and compete with new entrants.

We consider the following approaches to cope with this uncertainty.

The first is to align with well-established institutions to gain first-hand information to synchronize our business expansion. Such research conglomerate has been proved to be effective in driving commercialization of innovation, as exemplified by the MIT Media Lab or MIT Industrial Liaison Program.

This subject of research may be more appealing to research institutes in China, because of the culture background, existing adoption, and the general encouragement on TCM research at its national policy level. In addition, China is trying to build its “innovative ecosystem” in the wake of MIT’s various successes. Such value proposition is likely to gain attention from these targeted research partners.

Another approach is not aimed at solving the uncertainty proactively for now, but to maintain

a position that give us enough flexibility to pivot. Namely, we do not aggressively seek to scale up. Instead, we will focus on sustaining our operation and occupying a strategic position before the AI application become mature. We may launch our business with a minimum viable product/service and wait for a right time to move into AI adoption for scaling up. While waiting we will start collecting data and use cases. The successful story of Merge Healthcare discussed above indicates such accumulation will also increases our strategic advantage, although its value may be realized only after the technology becomes mature.

In taking this approach, we will remain low key and will not grow too fast, to avoid attracting competitors before we have the chance to build up our strategic resources.

A practical solution may combine these two approaches. For example, after we establish partnerships with dietitians at the BHM, we could start to leverage the use cases and convince well-established research institution to form alliance with us for dedicated AI research on TCM Dietary application.

These approaches are not ideal, as the other assumptions may change over time. But we do not have much control on the development timeline. While surviving the waiting period is possible, we have opportunity costs in continuing the status of “living dead.” This turns on the question of how we may quickly assess whether developing this business idea make economic sense. We address this important question in the section below.

C. Consensus on Measurement

Whether TCM Dietary may satisfy athletes is a major source of uncertainty. Controlled clinical trials may answer this question best. But we need other approaches for three reasons. First, large-scale, scientific research on this subject is not available at this stage. If we wait for the scientific community to reach a conclusion, we lose the opportunity to build up our strategic resources against followers in this potential market. Second, we are not operating a drug discovery business. There is no need for us to comply with rigid FDA standards. All we need to ensure is that we do not cross the regulatory red lines in our business activities. Third,

consumer satisfaction is influenced by numerous factors. An SOP that brings a precise effect may not be a sufficient and necessary condition to satisfy our users.

In this regard, we will adopt the following three approaches to cope with the uncertainty in customers' satisfaction.

1. Self-reported values

We will explore whether end users' self-reporting is feasible to measure satisfaction.

This approach is highlighted by the example of pain relief. The feeling of pain is very subjective. Even Western medical science needs to ask patients to report their own pain. The practice is to use a predetermined "pain scale" to facilitate the communication.

Most athletes have a pressing need in seeking quick pain relief or recovery from sore muscles without side effects. Some of them turn to acupuncture or cupping. Even though this TCM solution has no objective measurement on effectiveness so far, the users claim the value, and WOM has been spreading in their circles.

Similarly, feeling "energetic" does not have an objective measurement. That may explain why "energy necklaces" have been popular in certain communities and have become a profitable business. Athletes may insist they perceive the value, even without any endorsement from the scientific community.

As such it does not appear completely impractical to adopt athletes' self-reporting in measuring their satisfaction. As long as the self-reports are recorded in a systematic and standardized approach, they could be used as benchmarks to measure the value. In this regard, we may follow the practice of "pain scale" in establishing a predetermined "energy scale" (or scale in other dimensions, such as feeling of recovery, etc.) for athletes to communicate their subject observations.

A relevant issue here is placebo effect. The athletes may "feel" TCM Dietary boosts their

performance. Such improvement may in fact happen. However, the mechanism may not be completely clear to the mainstream scientific community. But such value should not be ignored lightly. In highly competitive sports, the placebo effect may bring a margin that leads to victory. Before mainstream scientific research resolves this issue, we could keep open to that question and focus on feasible means to achieve our commercial success.

2. Narrow defined scope

Another approach to cope with the uncertainty is through the definition of benchmarks. We will use narrow and quantifiable benchmarks, for example, response time, strength, and endurance., to measure the improvement in performance. We will work with the dietitian and athletes to agree on one specific item according to the nature of the sport and individual's needs. We will also discuss and agree on how we measure that specified item before and after the adoption of a TCM Dietary meal plan. The measurement can be conducted by standard devices commonly used in physiological exams or by tailored-made ones for our business.

We will also itemize tasks that require their cooperation, as a precondition to measure our value delivery. For example, if the athlete adopts our solution but continues with his lifestyle or dining habits contradictive to the "balance" TCM Dietary aims to achieve, we could consider such precondition not fulfilled for an effective measurement in the value we deliver.

We understand complete control on the end users is not possible, but this process serves two purposes. First, at the initial stage we need to carefully identify the source of negative outcomes on which we cannot take responsibility. End users should be informed and agree upon what we may deliver and under what circumstance. This is important to establish our credentials and to kick off effective WOM. Second, such cases may also provide valuable data for machine training at the later stage. We could build up our strategic resources through both successful and unsuccessful use cases.

3. Prioritized users

Our diagnosis may find that some athletes have everything in balance from TCM's point of view. They may have been performing at their peak status. Although our services help athletes to maintain their peak status, such users may not be the early adopters we should target. Because the improvement by TCM Dietary on this group of users would be minimal, it would be harder to satisfy them.

In contrast, at the beginning we will prioritize our service to users who appear to have unbalanced dietary from TCM's points of view, and the users who have similar pain points that have been routinely and successfully addressed by TCM Dietary in other communities that have adopted the solution.

4. Experiments centered around measurement

As mentioned above, the measurement issue is pivotal to all the uncertainties under our business model. How this issue is solved has implications for many strategic decisions in this new business. As such we should first conduct experiments on the solution for this issue. The best experiment should be centered on this key issue with carefully selected BHM, narrowly defined benchmarks, and prioritized users.

Regarding BHM, we will target professional athletes who play individual sports (e.g., swimming, tennis, etc.) or certain positions in team sports (e.g., baseball hitters) for reasons as analyzed above.

Likewise, we must narrowly define the measurement benchmarks to eliminate noise that may affect the perception of improvement. The benchmarks are preferably based on objective observations. They may be also based on subjective self-reports, but a clear reporting scale and systematic system of recording must be in place. The definition should also include the preconditions of the measurement. Consensus among dietitians, athletes, and us on the measurement must be obtained.

We also prioritize the users within the BHM because of the measurement issue. Users considered by TCM diagnosis to be “unbalanced” are easier to perceive measurable improvement brought by TCM Dietary.

The above approaches will slow down our business expansion. But they will help to determine if we can cope with the uncertainties before scaling up. If the measurement issue are not resolved, it will be very challenging to grow the business quickly. In this case we will need to assess other relevant factors in determining whether to continue the business. If the experiment produces positive outcomes, the business is likely to move into expansion stage quickly.

VI. Follow-on Markets

As discussed above, our operation in the BHM is expected to strengthen our strategic resources over time, including the first mover's advantage in AI and Data Mining, efficiency in the distribution network, sourcing for certain ingredients, and switching costs. With these strategic resources we will gain an advantageous position in entering the adjacent markets.

A. Adjacent Segment Markets

The most immediate follow-on markets are users in other kinds of sport or exercise. In these segments, the users may not face severe face-to-face competition. But they also need to maintain peak status, pay attention to their body conditions, and have the WTP for a competitive edge. Such users may include but are not limited to serious yoga practitioners or professional golf players.

In the next extension we leverage the value proposition of TCM Dietary in increasing performance. Everyone in his/her life has some moments that demand high performance to cope with challenges. Adoption may potentially be extended to someone who needs to:

- **Cope with jet lag.** In this market segment we may partner with central kitchens of airlines running intercontinental flights;
- **Avoid altitude sickness.** We may target non-professional climbers who have already had bad experiences. They may need some boosts while visiting high altitude destinations. Their experience generates the WTP for an easy solution, but they are not committed to the same rigid training and preparation as professional climbers;
- **Mitigate seasickness.** In this market segment we may partner with catering services on cruises; and
- **Maximize performance in exams or gaming.** We may target graduate students during the exam seasons with pre-portioned packs for home-cooked meals (differentiating from Blue Apron).

B. Other Follow-on Markets

The essence of TCM Dietary is to adjust the balance of a human body to effectuate its self-healing process. The process may enhance physiological functions or other aspects in wellness. In addition to the physiological performance of athletes in our BHM, TCM also teaches other valuable applications including enhancement of brain function, management of emotion, and release of stress. These teachings would provide value propositions for the follow-on markets below:

1. Professionals whose performance rely upon inspiration

This segment market may include artists, playwrights, music composers, and other professionals whose work needs creative thinking. The users in this segment have a strong willing to pay to cultivate a flash of genius, which is unpredictable, but extremely valuable in their work. Many of them turn to alcohol, cigarettes, or even drugs.

TCM Dietary solution is completely natural. In addition, the users in this segment usually experience a broader cultural exposure, so that they are more open to perceiving the value of TCM Dietary.

2. Dedicated business professionals

This segment market may include lawyers, accountants and bankers, especially senior-level associates at big firms on Wall Street.

The users in this segment are constantly challenged both physiologically and intellectually. Many of them feel stress at work but are bored in life. This is especially true for associates who are at a senior level but not yet become partners. They are the busiest class in their organizations. They may welcome new solutions that bring both joy in life and efficiency in work. Many of them are fans of technological gadgets.

These traits and behaviors create the potential for TCM Dietary to add value in these

segments. In addition, the users of this segment market are more open to and can afford new services or products.

3. Emotion management

Both nutrition science and TCM food therapy study dietary's influence on emotion.²⁷ For example, nutritionists suggest potatoes (rich in carbohydrates and Vitamin B) help to lower blood pressure and decrease stress. On the other hand, TCM teaches that anger is associated with livers, and as such diets containing bergamot, which regulates the energy in liver, will help to control temper. As an old saying goes, you are what you eat. TCM teaches that the food you eat influences your mood.

In this application, the use case could include cold-calling salesmen, customer service personnel, lawyers, etc., those who deal with prolonged frustrating situations and those who hope to boost their positive spirits. In a further extension, the market could include anyone who wants to use dietary for EQ management.

²⁷ See general "6 Food to Control your Anger," by Praveen Kumar on 2014.11.28, available at <https://www.boldsky.com/health/wellness/2014/foods-to-control-your-anger-055395.html>, last visited 2013.3.30; See also "Can You Curb Anger, Release Fear & Reduce Anxiety With Food?" by MBG on 2014.10.26, available at <https://www.mindbodygreen.com/0-15840/can-you-curb-anger-release-fear-reduce-anxiety-with-food.html>, last visited 2018.3.30. See also general "Use Traditional Chinese Medicine to Manage Emotional Health: How Herbs, Natural Foods, and Acupressure Can Regulate and Harmonize Your Mind and Body," by Zhang Yifang on 2013.3.26, published by Shanghai Press.

VII. Conclusion

Based on Traditional Chinese Medicine, TCM Dietary has been adopted as a natural and customized solution in Asian communities to maintain general wellness and enhance certain physiological functions. With emerging technologies and effective marketing strategies, the adoption has a potential to extend to larger market segments, especially professional athletes, because they are sensitive to their body conditions. They also have high willingness to pay for solutions that can help to achieve peak status in a competitive environment.

The success of this business is based on an assumption that we may reasonably measure the improvement in the performance of the athletes who have adopted our TCM Dietary solution. There is uncertainty in measurement resulting from multiple factors, including the genuine effect of TCM, the rules of the sports, and personal variance in bodily status or lifestyles.

The measurement issue is pivotal to other uncertainties under our business models, including the time line for developing mature AI applications in TCM Dietary, and the reactions of dietitians, who cooperate with us to create value, but also compete with us to extract value. A broad range of strategic decisions will depend upon how the measurement issue is resolved.

As such we must first experiment on this issue before scaling up. With this guideline we identify our BHM as professional athletes who play individual sports or certain positions in team sports, because their performance is not relied on team coordination or the strategy of team play and is mainly determined by relatively simple and repeated actions. This will make it easier to measure the improvement brought by TCM Dietary.

Likewise, we must narrowly define measurement benchmarks. We should also identify the users within the BHM for whom it is easier to measure the improvement brought by TCM Dietary.

If the measurement issue cannot be resolved, we will need to assess whether to continue the

business. On the other hand, if the experiment produces positive outcomes, the business is likely to move into the expansion stage quickly. We will then use the same value propositions of TCM Dietary for users in the immediately adjacent segments in sports, or other generalized users who need to increase psychological performance to cope with challenging scenarios in life. We will also consider markets that could benefit from other value propositions offered by TCM Dietary, including enhancement of brain functions, management of emotion, and release of stress.