The constructing model of culinary creativity: an approach of mixed methods

Kang-Lin Peng · Ming-Chu Lin · Tom Baum

Abstract   This study explores the origin of culinary creativity and trainability in culinary education from the perspective of industry and academic chefs in Chinese culture in Taiwan. This study was conducted by mixed methods in 3 stages: first, face-to-face interviews were conducted to gather rich data of culinary creativity development to develop the second stage of Analytic hierarchy process (AHP); second, this study applied the AHP method to evaluate and prioritize culinary creativity components; and third, we employed the Modified Delphi method to reach a consensus of defining culinary creativity. The results show that the constructing model of culinary creativity is based on creativity in general by adding specific principle and influenced by education and training. The AHP result shows that the chefs' perspectives in evaluating and prioritizing culinary creativity components. Lastly, the major consensuses from the modified Delphi method is that culinary creativity can fit into creativity in general with certain conditions. On trainability, culinary creativity could be trained and educated to improve and advance the quality and quantity of culinary creativity.

Keywords   Culinary creativity · Creativity in general · Education andtraining · A mixed methods approach

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1 Introduction

Culinary creativity involves the production of new dishes or ideas that can be implemented to present better and tastier dishes. Unlike artists, painters, and musicians, chefs are typically not considered artists (Horng and Hu 2008) in Chinese culture. Perhaps cooking a dish cannot be compared to paintings, music, and most artwork because of the limited shelf life of culinary creations. Some artwork can be reviewed after a long period; however, a culinary product cannot be tasted, viewed, and applied to future generations. Therefore, from a practical perspective, a model of culinary creativity might need to be modified from the model of creativity in general; the 4P (product, process, person, and press) model of creativity was used to construct a model of culinary creativity. This research also investigates chefs' perspectives on education and training for culinary creativity in western and Chinese cuisines from an academic and industry point of view.

2 Literature reviews

2.1 The nature and definitions of creativity

The nature of creativity and other related variables might depend on their genetic-environmental components (Vernon 1989). The different types or areas of creativity show some diversity and resemblance between scientific and artistic creativity. Scientific creativity involves some existing knowledge, either to advance a theory or a new idea or process, whereas artistic creation may give new representation of life or feeling, which typically does not develop from prior representations. Highly creative scientists or artists present great differences in their personality and home background. In the availability question debate, some authors believe that creativity occurs only in special people, such as the Edisons, Einsteins, Freuds, Mozarts, and Picassos, at rare moments in time. Others believe creativity can occur in a normative process, which is available to everyone (Tardif and Sternberg 1988).

Numerous definitions of creativity have been proposed from different perspectives. The psychologist, Johnson-Laird (1988) considered creativity a mystery, and thought many people believe it should remain a mystery. He also indicated the best dictionary of psychology to offer the following definition:

"Creativity refers to mental processes that lead to solutions, ideas, conceptualizations, artistic forms, theories or products that are unique and novel."

Other psychologists defined creativity as an ability to synthesize disparate ideas or to see the unusual in what would commonly be considered ordinary (Ferguson and Berger 1985).

De Dreu (2010) summarized the perspectives of many researchers, who often identified creativity from three aspects: person, product and process. Person is related to personality profiles of creative geniuses compared with less gifted individuals. Product is related to outputs, and process is related to promotion of or inhibition of creative performance. Lee et al. (2005) indicated that product-oriented views associate creativity to attributes of outcome. Only when an outcome is both novel and valuable can creativity be considered to occur. Amabile (1990) noted that product is most straightforward and scientifically conservative, and easily observed. The process-oriented definition emphasizes creativity as a process and results in innovative products, whereas product-orientation is associated with creativity outcomes within. Thus, different fields demonstrate creativity in various stages.

2.2 The model of creativity

Mooney (1963) proposed four different approaches to the creativity problem, depending on a choice from four fundamental aspects, or the Four P's (4P) Model: (1) Product: the product of creating, that is, the creative product. (2) Process: the process of creating, or the creative process. (3) Person: the person who is creative, that is, the creative person, and (4) Press: the environment in which the creation occurs, or the creative environment. Most studies focus only on one approach; however, the 4P model presented multi approaches for creativity.

2.2.1 The creative product

The products of creativity can include behaviors, performances, ideas, things, and all other types of outputs, with all channels and types of expressions (Taylor 1988). Tardif and Sternberg (1988) indicated that the products of creative thought are solutions to problems, responses on creativity tests, and explanations for phenomena. Images and behaviors are cited more as components of creativity than creative products. The key concern of the creative product is whether any generalizations can be made on products that are considered to be creative across different domains.

The creative product is often divided into two categories: artistic creativity and scientific creativity. Artistic creativity, such as the novel, is neither an imitation nor mass produced, and it may cause irreversible changes in the human environment. This type of creativity also involves an unusual sensory image or transformation and is valuable to society, whereas scientific creativity may be more relevant to problem solving and creating a new product base to fill either a gap in existing knowledge, or is cross-disciplinary or limited to within-discipline boundaries(Tardif and Sternberg 1988). Society defines creative acts through a complex process of social judgment, which may rely on the opinions of relevant experts in making judgments (Hayes 1988).

2.2.2 The creative process

Novelty is often used to define a key element of creativity. Most definitions of creativity also demand that the creative response should meet certain criterion of value. Benack et al. (1988) presented characteristics of the creative process. First, creativity is often illustrated as a response to an ill-defined problem rather than a well-defined problem, in which the nature of a solution and the path to a solution are uncertain. Second, creative thought involves the ability to move from previous thinking methods to break the mental set. Third, creativity is often considered to form relations among things formerly disconnected. Lastly, some theorists have given particular importance to the role of contradictions in the creative process.

Wallas (1926) proposed four steps of the creative process: (1) Preparation: a problem is investigated in all directions. (2) Incubation: subconsciously thinking of the problem. (3) Illumination: appearance of the "happy idea," together with the psychological events immediately preceding and accompanying that appearance. (4) Verification: evaluating the problem and possible solutions. These four steps in the creative process have the basic framework for analyzing creativity in cognitive and organizational psychology, and have not only been widely adopted, but have also received considerable criticism. Guilford (1950) stated that it lacks mental operations, and that such an analysis is superficial from a psychological perspective (Horng and Hu 2008). However, some creations may not be the result of a process that is considered creative. The creation process is unique to a person and is an emergent

property of one's interaction with the problem domain, previous history, and societal state as a whole. Tardif and Sternberg (1988) summarized the creative process, including the time required for such processes; the role of creative thinking; how closely the process is tied to the product; the characteristics of creative thought across different domains; the level of creative processing; the need for the products of such processes to be unique to be labelled as creative, and how accessible and controllable the processes are in conscious awareness.

2.2.3 The creative person

Guilford (1950) defined creativity as the abilities of that are the most characteristic of creative people. Creative abilities determine whether the individual has the power to exhibit creative behaviour to a noteworthy degree. He argued that the psychologist's perspective is that of creative personality, or the characteristic traits of creative persons that include inventing, designing, contriving, composing, and planning. Hayes (1988) reviewed the evidence of four traits that appear to differentiate more creative from less creative people: devotion to work, independence, a drive toward originality, and flexibility. Claxton et al. (2006) grouped creativity characteristics into the acronym CREATE (curiosity, resilience, experimenting, attentiveness, thoughtfulness, and environment setting) to describe the creative personality.

2.2.4 The Creative environment (press)

The environmental effects on creativity have been an increasing research focus. People with different backgrounds or cultures demonstrate different needs for creativity expression and may be motivated to creativity by different environmental stimulants (Wong and Pang 2003). The work environment is generally defined as the social climate of an organization, although physical environmental variables may also be included (Amabile 1989). The work environment may also influence employee's creativity.

2.3 Education and training for creativity

A consideration of how creativity relates to intelligence, personality, and problem solving, can be taught in school is necessary. Thus, there has been substantial interest in training individuals for increased creativity (Guilford 1950). Amabile (1996) noted that social and environmental factors that might affect creativity could be found in some form in the educational environment. Guilford (1950) also indicated that efforts made toward improving creativity through training provide some measure of success. Developing culinary creativity in education and training can be categorized into academic and industry (organizations) aspects that provide training programs to advance creative knowledge.

Researchers have increasingly suggested the role education can play in the development of creative efficacy (Parnes 1963). Torrance (1975), and Parnes (1963) believed that the educational curriculum should include extensive training in various divergent thinking tasks from the earliest school years to improve the all-around capacity to show imaginative, flexible thinking, leading to creative problem solving. The organization viewpoint considers education as another creativity booster, which equips employees with appropriate skills to handle new challenges to build their confidence, provide new competences, and strengthen their commitment to the organization (Elizabeth and Kleiner 1995). The industry viewpoint considers education and training as providing the opportunity to develop employee creativity that enhances their confidence to face new challenges and improve performance outcomes (Ogilvie and Simms 2009); it also increases employee ability and loyalty
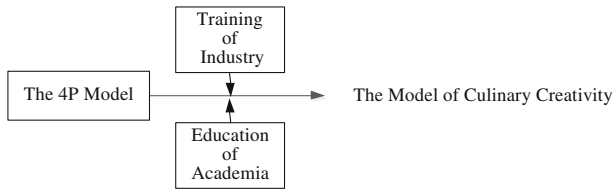
Fig. 1 The model of culinary creativity

to the organization. Similar to many other human capabilities, creativity can be enhanced or improved; however, not everyone can be equally creative. However, the side benefit of teaching creativity is to push less creative people to accept creativity and a willingness to plan using new concepts (Coates and Jarratt 1994). Thus, creativity can enhance and improve. Creativity training can constrain people to accept new concepts and be more creative. Therefore, education and training can improve the creative quality and quantity of creative people.

2.4 The model of culinary creativity

The interaction with customers was only important to creative chefs but not necessary to artists (Peterson and Birg 1988). That means some differences exist between culinary creativity and creativity in general; however, it is supposed to have some commons between these two ways of creativity. We assume that the model of culinary creativity could be derived from the model of creativity in general.

From the literature, the 4P model mainly discussed the extrinsic and intrinsic factors in cultivating creativity. In addition, the influence of education and training on developing creativity was widely discussed. Therefore, the model of culinary creativity could be constructed by combining the 4P model with the factors of education and training of creativity in general (Fig. 1).

3 Methodology

Pragmatism and a mixed methods approach are applied in this research to achieve the research objectives. The purpose of adopting the mixed methods approach is to provide more perspectives on the phenomena being investigated and to combine different forms of data to achieve research purposes. Exploratory design starts with qualitative method to gather rich data from in-depth interviews with an inductive theoretical thrust. From the qualitative study, a research model was developed using the interview responses to sort out themes and questions for the following quantitative method to get a context of research issues. The purpose of this strategy is to apply quantitative data and results to assist in the interpretation of qualitative findings (Morgan 1998). This design is appropriate to apply when testing elements of an emergent theory resulting from the qualitative phase and it can also be used to generalize qualitative findings to different samples (Creswell 2009). From the literature, culinary creativity has been extracted from debates between constructionism and constructivism, as well as industry and academia points of view for culinary creativity. The methodology picture is shown as Fig. 2.
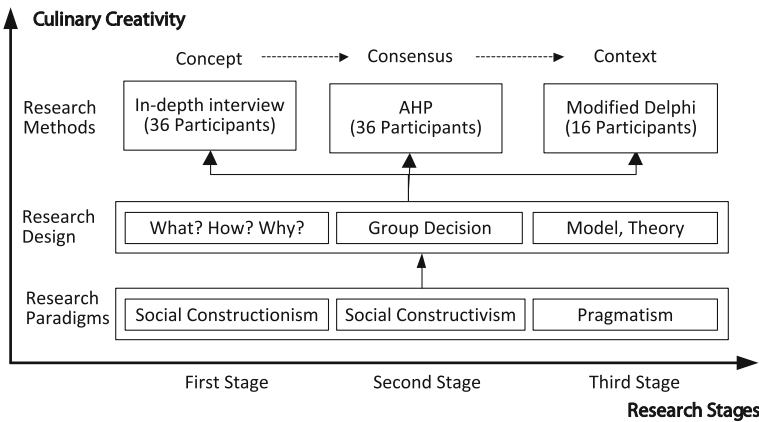
Fig. 2 Research methodology

Table 1 Research design

Stage	Purpose/research aims/questions	Subjects	Research method
1	What is the nature of culinary creativity? The principles of culinary creativity? The role of education and training on culinry creativity?	36	In-depth interviews
2	To compare the priority of the goal, five objectives and 22 criteria of culinary creativity and to verify the modified 5P model	36	AHP
3	Confirming critical issues of training and creativity on culinary creativity	16	Modified Delphi method

3.1 Research design

The purpose of this research is to discover how culinary creativity can be developed, by comparing chefs' perspectives of creativity from two different culinary traditions in Taiwan. Furthermore, the 4P model of creativity is modified to search for the origin of creativity, so as to explore whether or not that culinary creativity can be developed through education and training for future generations. This study is conducted in three stages as shown in Table 1.

Firstly, it began with face-to-face interviews with a total of 34 participants and content analysis. By combining interview data and creativity literature, five main objectives of culinary creativity were identified as principle, person, press, process and product, which were modified from the 4P model to the modified 5P model in this research. Secondly, the Analytical hierarchy process (AHP) method is applied to a set of questionnaire, which is derived from goal, objectives and criteria of culinary creativity. The questionnaire contains one goal, five main objectives and 22 criteria, which consists of a total of 50 pair wise comparison questions in order to prioritize culinary objectives and criteria, as well as to verify the modified 5P model. Thirdly, 16 participants were chosen from previous interviews to form an

Table 2 Participantsc

Field	Code	Total	Job	Description
Academic/ Chinese cuisine	AC1-AC9	9	Public University 3	Public: Chinese culinary arts 1
			Private University 6	Public: hospitality management 2
				Private: Chinese culinary arts 3
				Private: hospitality management 2
				Private: hotel management 1
Academic/ Western cuisine	AW1-AW7	7	Public University 2	Public: western culinary arts 2
			Public training center 1	Public: hospitality management 1
			Private University 4	Private: hospitality management 4
Industry/Chinese cuisine	IC1- IC7	7	Five stars hotel 6	Teaching experience: 7
			Private own restaurant 1	No teaching experience: 0
Industry/Western cuisine	IW1-IW13	13	Five stars hotel 9	Teaching experience: 13
			Private own restaurant 4	No teaching experience: 0
Total		36		Teaching Experience: 36

expert panel to process a modified Delphi survey, so as to explore the intermediate effect of education and training on culinary creativity. The three stages of research lead to test the model of culinary creativity as shown in Fig. 1.

3.2 Sampling strategy

For in-depth interview and the AHP methods, by choosing suitable chefs within Taiwan that fit the criteria of the research, samples were selected using contacts in the industry, academia and friendship circles in order to gain access samples to interview (Table 2). Interview participants were selected from two main cuisines, Chinese cuisine and Western cuisine, and two main fields, academia and industry. There were a total of 36 participants who had over 20 years of industry experience as well as some full time or part time teaching experience. The majority of participants had experience as cooking competition judges.

First of all, Academia included universities and training centre with six participants who teach culinary arts management and ten participants who teach hospitality management. Although majors varied slightly, a total of 16 participants specialized in either Chinese or Western cuisine. Furthermore, participants who teach culinary arts management have more related culinary courses than participants who teach hospitality management. All academic participants had transferred from industry to academia, some of them retired from industry. Secondly, the industry field included 20 participants who are working in five stars hotels and holding either chef, executive sous chef, executive chef or general manager positions. Four participants who are working privately own restaurants–three participants own restaurants and one participant is the executive chef in a restaurant chain. Industry participants all have part-time teaching experience.

Each participant code starts with A (academic) or I (industry), followed by cuisine type C (Chinese cuisine) or W (Western cuisine), and finished with the number of each participant in each category. For instance, AC1 represents chef number 1 in academia and Chinese cuisine and IW5 represents chef number 5 in industry and Western cuisine.

3.3 Research methods

For the first stage, the in-depth interviews with the 36 culinary educators and chefs were conducted in Taiwan. The aim of the interviews was to elicit views and opinions from the participants (Creswell 2009). Open-ended questions were used to identify possible determinants of culinary creativity and to generate insights into chefs' concept of their culinary creativity, as well as to explore the effect of education and training on culinary creativity. The advantages of this method are that it offers a concept for understanding behaviour and attitude in developing culinary creativity.

For the second stage, the AHP, a decision algorithm, was used to investigate the priority of factors that influenced culinary creativity. It can be decomposed into a hierarchy, which is an effective way to approach unstructured problems, because it is efficient in organizing the structure of a system as well as controlling and passing information down the system (Saaty 1987). The AHP is also suitable for qualitative and quantitative research because it makes the selection process very transparent by revealing in details and putting complicated questions into a systematic layout.

For the third stage, the modified Delphi was used to get a consensus of the effects of education and training on culinary creativity. It was designed by Dalkey and Helmer (1963) and revised by Delbecq et al. (1975) which can start from literature review and previous exploratory studies to develop questionnaires. Rather than in the conventional Delphi, start with questions and let participants fill out the answers.

4 Research findings

4.1 Findings from interviews

A total of 36 Industry chefs and academic educators from Chinese and Western cuisines were interviewed to get their opinions on culinary creativity. The interview included the following three main themes: defining culinary creativity, modelling culinary creativity and the effect of education and training on culinary creativity.

4.1.1 The nature and definition of culinary creativity

The nature of culinary creativity is the result of interactions among creators (chefs), organizations and customers; this creativity leads trends of food fashion, meets the demands of the markets, and also makes the profits for the culinary industry. Many aspects of culinary creativity can be developed such as ingredients, knife skills, cooking methods, and presentations; moreover, when culinary creativity combines with regional (local) culture, it can raise to a higher level.

Most of interviewees agreed that culinary creativity is a very significant business strategy to survive in hospitality industry; however, it also depended on what type and level of restaurant. For example, culinary creativity to hotel and high end restaurants may not as important as democratic (mid-level) restaurants (Table 3).

The purpose of culinary creativity was divided to internal and external aspects. To internal aspect, culinary creativity is to develop chefs' talent and self-achievement and to organization is to make maximum profit for long term operation. To external aspect, culinary creativity is to meet the market demand and satisfy customers in order to create a competitive business strategy. Furthermore, to call culinary creativity has to be accepted by the current market

Table 3 Define culinary creativity

Separation	Academia	Industry
Chinese cuisine	Destroy something to create a better one (AC2). Creativity should refine from traditions without missing original flavour and satisfy customers (AC4). Creativity is based on foundation and personal elements (AC5). Creativity is developed from stress which is also an object to survive (AC8).	There is no direction for creativity. However, you need to use your fundamentals to create without forgetting your original (IC3). Creativity should be developed from foundation with reasonable changes (IC4).
Western cuisine	Culinary creativity is to destroy and create a better one with a reasonable sense (principle) (AW2). Culinary creativity is to develop from traditions and feasibility (AW3). Culinary creativity should keep its original traditions (AW4). With basic skills and knowledge, culinary creativity has to enhance with its own characters and make valuable outcome (AW5).	Creativity is developed from fundamentals, not necessary from traditions. But it should be able to challenged and last forever (IW2). Creativity is based on fundamental and keeps the original components in order to extend with the local culture. A creative person should also understand market demand (IW4). Using local ingredients to integrate with cuisine's origin in order to create value and meet market demand (IW9).

which is unlike to paintings and artworks that after years these can still be recognized and evaluated by people to call for creativity, whereas, culinary creativity has time limitation.

Culinary creativity is involved more skills and techniques than creativity in general. Most of participants stated that culinary creativity is required to build up from fundamentals and principle of cooking which include knife skills, food science and knowledge, sanitation and hygiene, and cooking methods and history in order to develop creativity.

To summarize from most of participants' opinion that culinary creativity is based on the foundation of traditional cuisine by adding various elements in order to extend and escape from culinary traditions and satisfy customers.

Most of participants stated that a cuisine has its own traditions, cultural background and history behind; however, Western cuisine and Chinese cuisine culinary creativity and development should have similar principle.

Both cuisines chefs consent that culinary creativity is one of the strategies to survive within this competitive industry. They also agreed product, process, environment (political, economic, social and technological factors) and the principle of culinary creativity play an important role to culinary development. Most of Western cuisine and Chinese cuisine chefs agree that Chinese culinary creations adopt many elements from Western cuisine. Moreover, many of Western cuisine restaurants like to use oriental ingredients and also use diverse variety of Asian cooking technique for their culinary creations. For example: wonton skin to wrap seafood.

Both cuisines have the same purpose which is to fill with starving, and provide nutrition. The only differences are location, presentation, and eating habit (food culture). For instance, using fork to eat spaghetti versus to using chopsticks to eat noodle, both can create different dining experience and presentations. The differences between Chinese cuisine and Western cuisine in culinary creativity are geographic and food culture which includes original cooking traditions, cooking utensil, produces, eating habit and living style.

4.1.2 The modified 5P model of chef's creativity

After coding from the in-depth interview, this study found the modified 5P model of culinary creativity from the 4P model of creativity. Principle is another important concept of culinary creativity out of the14P model. Thus the product, process, person, press, and principle are applied to discuss the context of chef's creativity.

(1) Product
Comparing food and beverage in eastern and western culture, due to the different culinary system and consumers' demand, participants indicated both culture have diverse levels and development in terms of culinary creativity. For instance, culinary creativity products in western culture have present better quality and quantity in terms of books and TV shows. Hence, the evaluation system of food and beverage (restaurant guide-Michelin food guide) in western culture has built reputation and trust which are agreed by most of participants that western culinary creativity is more advanced than any other cuisine.

(2) Process
For the purpose of producing a creative product, this research applied four steps of creative process: preparation, incubation, illumination and verification (Wallas 1926). Most of participants agreed that majority of their creativity processes were developed from similar stages by planning, trying to find some information, exploring new ideas and testify their ideas. Some of participants emphasized that their culinary creativity can ignite spontaneously, for example, enjoy visiting arts gallery, museum, window displays and even fashion shows where they can be inspired and interpret to their culinary creations. Thus, culinary creativity process can be developed from planning and out of planning.

(3) Person
This study applied character of creativity into the acronym CREATE (curiosity, resilience, experimenting, attentiveness, thoughtfulness, and environment setting) (Claxton et al. 2006) to investigate what could be the personal characteristics for developing culinary creativity. Participants pointed out several of personal characteristics that can appeal in creative person. They all agreed with the character of CREATE in various ways. Hence, they also pointed out that personal characteristic was related with family support and personal passion for cooking. Beside these characters, some of participants stated that creativity may have some inherent factors in different persons and various aspects. With inherent strength and proper training, participants believed that creativity can be developed to a competitive position. Furthermore, participants also pointed out that sensitivity was very important in culinary creativity development that chefs had sensitive judgments to understand food combination and techniques, as well as market demands.

(4) Press (environment)
This research adopted PEST model (political, economic, social and technological fac-

tors) by Middleton (2003) as environmental impact factors to investigate how does environmental factors influence on culinary creativity development. Political, economic, social and technological factors show various levels of impacts on culinary creativity development.

(a) Political factor
    Most of participants stated that political status showed some influence on culinary industry. Furthermore, according to each political party leading to city and country, this was also impact on their tourism business from mainland China. For instance, in Taiwan, Taichung city is belong KMT party which is more mainland China friendly, this can create a business for Taichung restaurants and hotels business. Whereas, Kaohsiung is belong to DPP party which is advocate for Taiwan independent. This caused some Chinese tourists not willing to go to this city. Participant (IW9) also pointed out how political impact on their hotel business, in terms of their menu creation to fit into Chinese tourists' taste.

(b) Economic factor
    Economic factor is a major concern to industry chefs. Participant (IW5) pointed out that a well economic performance can directly impact on its food culture which meant more business interactions involved and more creativity brought into food culture. Participants stated when the stock market is doing well which is a good sign for culinary industry. They also agreed that culinary creativity development was dominated by market demand and irritation that is related with market competition, organizational support, budget control and ingredients availability.

(c) Social factor
    Participants' perspective of how social impact on culinary creativity was family background, food trend, career recognition and language. For family background, many participants mentioned that mother was the most influential person in their culinary creativity development. The well-known example in Taiwan is pastry chef Pao Chun Wu won the champion in Coupe Louise Lesaffre 2010 (International selections for bakery world cup). He expressed that this champion was for his mother who raised him up in a very difficult time. Family background was not only impact on their culinary creativity development but also on their personality's development. For food trend, Shifting from agriculture to Information technology industries as economic development in Taiwan, people have improved their living style to better quality. Synchronizing, customers have been changed their dietary habit from large portion and inexpensive cost to higher quality and costly food. With trends of dietary revolution, customers have been more conscious with healthy diet and also follow by some Western culture influence of fast food or slow food trend. Participants concluded that food diversity has been brought more creativity in culinary industry. For career recognition, In terms of recognitions of chef as a profession (career), due to social-culture difference, chefs in Chinese culture have greater limitations in developing their creativity. Participants pointed out that in Chinese culture, people thought that cooking was a low status and greasy job which cannot compare with scholars, doctors, and businessman. Therefore, culinary career has not been well recognized in Chinese culture. Most of participants agreed that culinary career recognition has been improved gradually since culinary education began in Taiwan. As well as, booming economics brought more business to culinary industry which also improved customers level of understand culinary arts and creativity. For language factor, most of participants agreed that

their creativity had lot of influence from Western cuisine and some parts of Japanese cuisine. Language was one of the key factors to enhance their new knowledge and profession; in addition, it was also an advantage for career development, especially working within international hotel chains. Most of participants stated that they spent time to learn foreign language to assist them to understand the trend of Western cuisine and Japanese cuisine to bring more creativity.

(d) Technological factor

Participants agreed that technological factor was playing an important role to their culinary creativity process. Some participants pointed out that culinary creativity was a combination of science and art, by using scientific and artistic senses to change and enhance culinary creativity was a trend to culinary industry. They also agreed that Western cuisine had more improvement from time to time; however, Chinese cuisine still hardly changed anything. Even Western fast food chain can control quality and standard by using modern technology to ensure all the products are suitable for each country's custom and traditions.

(5) The principle of culinary creativity

There were five main principles considered the nature of culinary creativity: Time limitation, professional skill, market acceptance, practical experience, and culture. The five principles were also the critical of culinary creativity from creativity in general. Although there existed differences, participants all agreed that final goal of culinary creativity and creativity in general was to be accepted by the customers.

(a) Time limitation

Time was a limitation to culinary creativity compare with creativity in general. Participants (IW2 and IW10) stated that time limitation was the character of culinary creativity which meant culinary creativity was required to be accepted by the current market within short period of time. If the creation was not accepted by the market which meant creation was not successful.

(b) Professional skills

Professional skills were the foundation of culinary vocation. Without professional knowledge and skills, it was difficult to learn cooking professionally and properly. A dish can be prepared by one, two or the whole team of kitchen staffs which was similar to play music. Cooking was also involved with chemistry and science changing which was similar to music with mathematical counting.

(c) Market (commercial driven)

Market was like a stage to chefs where their culinary creations can be presented and promoted. However, market was also very critical to the reality of culinary creations. All of participants confirmed that the goal of culinary creativity was to be accepted by the market. Participants agreed that culinary creativity was driven by commercial sense which meant the purpose of culinary creativity was to make profit and gain customers satisfaction. They admitted that there is no point to ignite culinary creativity without making profit and to be accepted by customers. More importantly, culinary creativity should be practical to prepare in actual commercial kitchen in order to gain customers' acceptance.

(d) Experience accumulation

Experience accumulation from culinary industry was a major source of advancing culinary creativity. Culinary creativity was more hands on and techniques involved which participants agreed that experience accumulation was vital to culinary creativity and career development. Experience accumulation included food knowledge,

management, and cooking techniques that chefs can excel their learning and experiences into a higher level of career.

(e) Culture

Participants stated that economic performance, nationality, living style, and regional arts were part of culture environment which influenced on their culinary creativity development. Most of participants expressed that to learn how to cook a dish was to understand where the dish came from and the story behind in order to have a well understanding of a dish. Many of industry participants stated that they combined their regional culture, arts and specialties into to their culinary creativity which produce to the new local specialties and create local dishes to gain the reputations of their regions' arts, produces and restaurants. They stated cross-industry alliance not only benefited to their business but also promoted their local industry and tourism. Most of chefs liked to visit local market when they entered to a new country. Some of chefs liked to understand the new culture by reading the history, learning their language, and working together.

Culinary creativity had to develop from origin and tradition of food culture by adding local (regional), historical and cultural elements to merge a diverse food culture. Participants agreed that their creativity had to depend on the food trend and culture in order to be accepted by local market. Some participants pointed out when crossed the limitations of country borders, cross-cultural culinary communication can form boundless and creative cuisine. The implications of European settlement to Taiwan have been also brought the rich food culture to mix with local culture. Therefore, food culture could have great impact on culinary creativity.

4.1.3 Education and training on culinary creativity

Participants pointed out arts (culinary arts, living arts), food culture, and morality courses were essential curriculum to improve students' culinary creativity. They emphasized that foundation courses were still required, for instance, product identification, knife skills, language courses etc. However, budget for cookery course was the major limitation to some educators and part time industry educator. Participants stated that culinary creativity may be placed in the last year of bachelor degree after students returned from internship and had more sense of what professional kitchen should be.

From culinary industry aspect, to train for culinary creativity had two key elements, organization and human resource (HR). The purpose of industry was aim for operating business successfully and making profit, therefore, to train for culinary creativity had to match with operation's theme and strategy.

The direction and position of an organization had highly impact on the culinary creativity development. Most of industry chefs agreed that their organizations fully supported to their culinary creativity in various ways. Depend on the size of the organization and business strategy, some of industry chefs argued that hotels offered cross training opportunities, which included cross-section/department training and cross-hotels local/ overseas training, monthly theme ingredients cooking competitions, international promotions and attending international cooking competitions to encourage staffs to put more thoughts and efforts on their professions. Therefore, from industry perspective, organizational direction and strategy were the major impact factors to train and educate chefs' creativity.

According to the size of the organization and business strategy, HR department played an important role to provide various practical training courses to their staffs. Most of hotel chefs stated that they received various training and on job training from HR departments
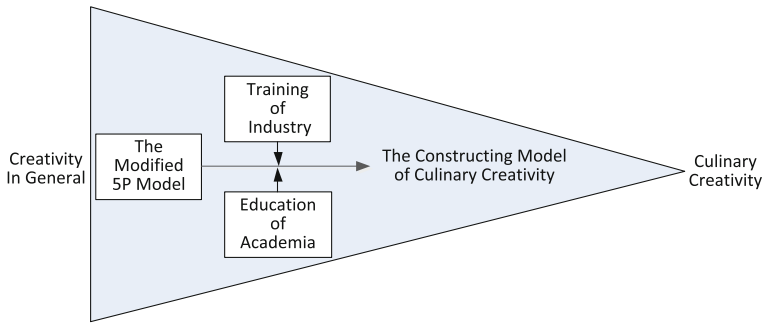
Fig. 3 The constructing model of culinary creativity

which includes cost control, communication skills, language skills, and each outlet (kitchen and front of house) manager would offer wine courses and other relate service skills courses. Not necessary focused on creativity, however, after training most of chefs agreed that they learned the new knowledge which helped them to create new dishes.

4.1.4 The constructing model of culinary creativity

The in-depth interviews compared creativity in general with culinary creativity, thus establishing the constructing model of culinary creativity through the modified 5P model with the intermediary factor of education and training (Fig. 3). The constructing model of culinary creativity manifests a unique factor, principle of the 5P, which does not appear in creativity in general. Thus, the 4P model of creativity in general is revised to the modified 5P model specific to culinary creativity. The principle shows that culinary creativity is commercially driven, which means that said culinary creativity needs to be accepted by the markets within a short period of time to confirm its success. This concludes that culinary creativity in Chinese culture is product driven and chefs are viewed as contemporary commercial artists who have to demonstrate their creativity within a time limitation, satisfy their customers' palates and generate organizational profits. In addition, education and training can raise the numbers of qualified chefs as well as enhance the quality of culinary creativity.

4.2 Research findings from the AHP

An AHP survey was conducted to verify how the participants perceived the relative importance of the evaluation criteria in culinary creativity. It was also used to clarify the modified 5P model of culinary creativity which was based on in-depth interviews. The three major levels of the AHP included the goal level (level 1), the objectives level (level 2), and the criteria level (level 3). The goal level was the first level which described the key issue in this study, culinary creativity. The objectives level was the second level which comprised of five aspects: principle, person, press, process, and product (the modified 5P model). The criteria level was the third level which consisted of 22 criteria. The AHP was used to identify the priorities of the objectives and the criteria level. Participants were asked to compare among objectives and criteria with respect to culinary creativity. A set of 50 pair wise comparison questions were distributed to 36 participants to conduct the AHP.

4.2.1 Sample and reponses

The AHP questionnaire was distributed to 36 participants from the culinary industry and academia; 34 responses were received for a return rate of 94.4 %. The Expert Choice software was used to analyse the AHP questionnaire. This yield 17 effective responses which included seven adjusted matrices with an inconsistency rate 0.0. If there was any matrix with an unacceptable consistency ratio (C.R.), i.e. C.R.>0.1, the expert was required to make a judgment on that matrix again. In order to improve the consistency in ratings, the concept of pair wise comparison was explained to the experts (Lee and Chan 2008). The inconsistency rate of this study matched the requirement of the AHP methodology, which was that the C.R. should under 0.1. The main purpose of the inconsistency measure was not only to identify possible errors and actual inconsistencies in judgments themselves but also to clarify logical inconsistencies of judgment (Nguyen et al. 2010).

4.2.2 The AHP outcome

Table 4 shows the results of the priority of level 2 objectives (principle, person, press, process and product, with respect to culinary creativity) and level 3 criteria. These results indicated that product of culinary creativity had the highest priority vector of 0.234, followed by process (0.219), person (0.212), press (0.182) and principle (0.153). The results of level 3 criteria with respect to product indicated that creative integration had the highest local priority vector (0.402), followed by competitiveness (0.320), and originality (0.279). The results of level 3 criteria with respect to process indicate that verification had the highest local priority vector (0.318), followed by illumination (0.262), incubation (0.220) and preparation (0.200). The results of level 3 criteria with respect to person indicate that environmental setting had the highest local priority vector (0.229), followed by thoughtfulness (0.226), attentiveness (0.186), experimenting (0.117), curiosity (0.101), and resilience (0.081). The results of level 3 criteria with respect to press indicate that technological had the highest local priority vector (0.339), followed by economic (0.330), social (0.256), and political (0.076). The results of level 3 criteria with respect to principle indicate that time limitation had the highest local priority vector (0.257), followed by professional skill (0.225), market acceptance (0.224), practical experience (0.201) and culture (0.094). The results validated the modified 5P model from creativity in general to culinary creativity and identified the priorities of culinary creativity as shown in Fig. 4.

4.3 Research findings from the modified Delphi method

The AHP findings testified to the modified 5P model of culinary creativity impact factors and the modified Delphi questionnaires were continued to verify the intermediary effect of culinary creativity development. For the modified Delphi method, 16 participants responded to a Likert style survey that rated items on a five-point scale from strongly agree to strongly disagree and provided comments on the subjects. Consensus was established when the inter-quartile range (IQR) score was less than 1.2 (Zeliff and Heldenbrand 1993). The IQR was referred to the middle 50% responses for each statement (i.e., distance between first and third quartiles) (Wicklein 1993).

Table 4 AHP outcome from industry and academic

Level 1 goal	Level 2 objective	Priority vector	Priority vector	Level 3 criteria	Inconsistency	Priority vector local	Priority vector global	Local priority/ global priority
Culinary creativity	Principle	0.153	5	Culture	0.01	0.094	0.014	5/21
				Market acceptance		0.224	0.034	3/17
				Time limitation		0.257	0.039	1/14
				Practical experience		0.201	0.031	4/18
				Professional skill		0.225	0.034	2/16
	Person	0.212	3	Curiosity	0.00	0.101	0.021	5/19
				Resilience		0.081	0.017	6/20
				Experimenting		0.177	0.038	4/15
				Attentiveness		0.186	0.039	3/13
				Thoughtfulness		0.226	0.048	2/9
				Environmental setting		0.229	0.048	1/8
	Press	0.182	4	Political	0.01	0.076	0.014	4/22
				Economic		0.330	0.060	2/6
				Social		0.256	0.047	3/11
				Technological		0.339	0.062	1/5
	Process	0.219	2	Preparation	0.00	0.200	0.044	4/12
				Incubation		0.220	0.048	3/10
				Illumination		0.262	0.057	2/7
				Verification		0.318	0.070	1/3
	Product	0.234	1	Originality	0.00	0.279	0.065	3/4
				Competitiveness		0.320	0.075	2/2
				Creative integration		0.402	0.094	1/1

Note: Inconsistency of level 2 (objective level) is 0.00

4.3.1 Sample and reponses

The expert panel consisted of Chinese and western cuisines experts who were selected on the basis of in-depth interviews. 16 experts were selected and they included eight industrial chefs and eight academic educators. Every experts, including the educators had more than 20 years of culinary work experience in either five starts hotels or high end restaurants. The modified Delphi questionnaire was distributed in two rounds to get a consensus on the effects of education and training on culinary creativity. The first round questionnaire was sent out to 16 experts by both email and post with a reply rate of 100%. The second round questionnaire was sent out to the same 16 experts by both email and post with a reply rate of 93.8%.
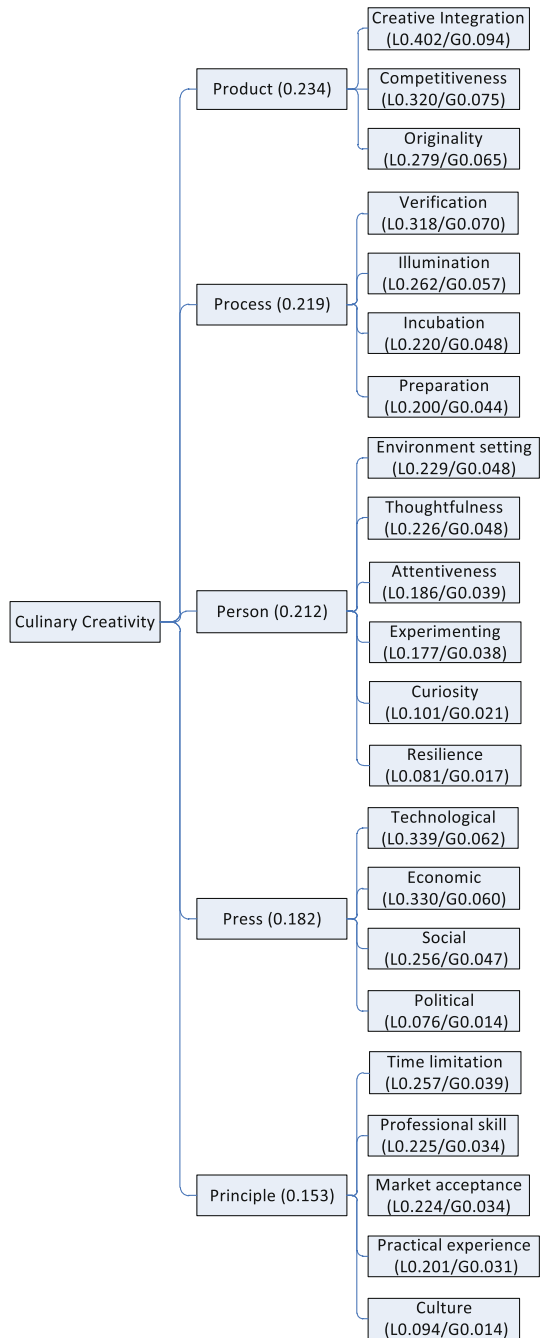
Fig. 4 AHP results of modified
5P model

Culinary Creativity

Product (0.234)
- Creative Integration (L0.402/G0.094)
- Competitiveness (L0.320/G0.075)
- Originality (L0.279/G0.065)

Process (0.219)
- Verification (L0.318/G0.070)
- Illumination (L0.262/G0.057)
- Incubation (L0.220/G0.048)
- Preparation (L0.200/G0.044)

Person (0.212)
- Environment setting (L0.229/G0.048)
- Thoughtfulness (L0.226/G0.048)
- Attentiveness (L0.186/G0.039)
- Experimenting (L0.177/G0.038)
- Curiosity (L0.101/G0.021)
- Resilience (L0.081/G0.017)

Press (0.182)
- Technological (L0.339/G0.062)
- Economic (L0.330/G0.060)
- Social (L0.256/G0.047)
- Political (L0.076/G0.014)

Principle (0.153)
- Time limitation (L0.257/G0.039)
- Professional skill (L0.225/G0.034)
- Market acceptance (L0.224/G0.034)
- Practical experience (L0.201/G0.031)
- Culture (L0.094/G0.014)

Table 5 First round of modified Delphi

Question	The 1st round of modified Delphi	Mean	SD	Median	IQR
Q1	Culinary creativity can be trained; however, personal characteristic could cause different outcome.	4.6	0.5	5	1
Q2	Culinary competition can enhance creativity identity and get recognition of professional.	4.3	0.7	4	1
Q3	Education and training cannot influence a personal approach towards creativity	3.4	1.3	3	2
Q4	Education and training can enhance creative concept.	4.5	0.6	5	1
Q5	Practical training in education course can enhance creativity development.	4.4	0.5	4	1
Q6	Professional educator can lead and inspire students' creativity.	4.6	0.5	5	1
Q7	Theory and practical liaison system can inspire students' creativity.	4.6	0.5	5	1
Q8	Hospitality education should consider students' own interest and will.	4.8	0.4	5	1
Q9	Hospitality Vocational senior high school should focus on foundation and theory, for example: sanitation and hygiene; attitude and reasonability.	4.5	1.0	5	1
Q10	College level of hospitality should focus on: developing mid-level management position (management, marketing, language skills etc.)	4.8	0.4	5	1

4.3.2 The first run of modified Delphi

The first round of the Delphi questionnaire was developed from the research objective on the effects of education and training of culinary creativity. In the first round, the responses for nine of the ten questions reached a consensus with IQR less than 1.2. Only 1 question has not reach the consensus (IQR = 2) which was Q3, education and training cannot influence a personal approach towards creativity. This question continued to proceed to the second round of the modified Delphi method which included 4 additional questions raised by respondents in the first round. Most of standard deviations (SD) in the first round were under 1 except Q3 with SD of 1.3. The results are shown in Table 5 and can be summarized as follows: Firstly, culinary creativity can be trained and enhanced; however, personal idiosyncrasies could yield different outcomes of culinary creativity. Secondly, practical training, such as an internship, can enhance creativity development; however, one should consider students'

Table 6 The second round of modified Delphi

Question	The 2nd round of modified Delphi	Mean	SD	Median	IQR
Q1	Education and training cannot influence a personal approach towards creativity	2.9	0.9	3	2
Q2	Academic faculties should have both theoretical and practical background.	4.7	0.6	5	1
Q3	Culinary creativity should have strong foundation and well understanding ingredients in order to advance creativity.	4.8	0.4	5	1
Q4	Culinary creativity process and unsuccessful experiment experience can enhance creativity development.	4.4	0.5	4	1
Q5	Culinary creativity can be trained; however, personal characteristic can influence on motivation.	4.3	0.8	4	1

desires and interests. Lastly, hospitality vocational high schools should focus on educating culinary foundation and theory, whereas colleges should focus on training for mid-level management positions. Participants also stated that culinary education and training should focus on basic skills and professional knowledge. After students learned the various skills of the culinary professions, creativity courses could be arranged for the last stage of their education; these courses can be combined with arts courses to inspire students' greater creativity.

4.3.3 The second round of the modified Delphi

The second round of the Modified Delphi method survey consisted of five questions, which included one question without a consensus from the first round with an IQR of over 1.2, 4 extra questions were collected from the first round of responses. Each participant received anonymous consolidated responses from the first round in order to provide interaction between experts so as to allow them to reconsider their judgments in the second round (Tavana et al. 1993).

As shown in Table 6, by the end of the second round, four questions reached a consensus with IQR scores of less than 1, and one question did not reach consensus with an IQR score of 2, which was Q1: education and training cannot influence a personal approach towards creativity. From Q1, the results showed 5/15 experts agree, 5/15 experts neither agree nor disagree and 5/15 experts disagree and strongly disagree, which indicated experts have diverse opinions on this statement. The mean value was relatively low, standard deviation was nearly 1 and the IQR was over 1.2 which means that consensus did not reached for Q1.

4.4 Discussion—the constructing model of culinary creativity

In summary, after two rounds of the Modified Delphi survey in this study, consensus was reached among most of the 15 experts. The only question that did not yield consensus was

"Education and training cannot influence a personal approach towards creativity." This might validate the assumption that education and training is an intermediary factor in culinary creativity, education and training needs to combine the modified 5P model to cultivate culinary creativity. Therefore, the constructing model of culinary creativity (Fig. 3) was shown to be true by combining the results of AHP and modified Delphi method. Education and training could enhance creativity to some extent; however, culinary creativity also depends on other factors as details in the modified 5P model. That is the modified 5P model of culinary creativity-product, process, press, person and principle-are critical to culinary creativity development; however, education and training could enhance the quantity and quality of culinary creativity.

5 Conclusions

The constructing model of culinary creativity has been applied significantly to determine an integrated model of culinary creativity, which helps to identify the modified 5P model (principle, person, press, process and product) and to clarify the intermediate role of education and training. To summarize the main theme of this research, firstly, in the principle of culinary creativity, creativity comes from the chef's cultural background combined with practical experience and professional skills, as well as the cuisine's traditions in order to satisfy customers and to be accepted by the market. Time limitation is a unique element in culinary creativity compared with creativity in general. Culinary creativity has to be accepted by the market of the time. Secondly, personal factors, such as the environment setting, thoughtfulness, attentiveness, experimenting, curiosity, and resilience (CREATE), of culinary creativity is critical to creativity development. Thirdly, the press -environment factors- such as political, economic, social and technological factors (PEST) may influence culinary creativity development. Fourthly, the process of culinary creativity corresponds to four stages of process(Wallas 1926). Lastly, the product of culinary creativity is commercially driven, which is necessary to be practical in order to maximize the profits. In terms of education and training, it is important to culinary industry and culinary academia working together toward to the development of culinary creativity. That is culinary education and training should be based on strong fundamental skills from industry and abundant basic knowledge from academia in order to advance and inspire culinary creativity.

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