Assessing the Impact of Cultural Intelligence on Sustainable Career Competitive Advantage for Students in College of Design

Jui-Che Tu [1], Xiu-Yue Zhang [1,*] and Shu-Ping Chiu [2]

[1] Graduate School of Design, National Yunlin University of Science and Technology, Yunlin 64002, Taiwan; tujc@yuntech.edu.tw

[2] School of Fine Arts & Design, Lingnan Normal University, Zhanjiang 524048, China; ping_ya2001@163.com

[*] Correspondence: zhangxiuyue2018@gmail.com

Abstract: In culturally diverse career settings, some designers are performing more effectively than others. The competence and intelligence behind their performance are crucial to sustainable career development in the highly competitive and globalized design industry. We believe that cultural intelligence (or CQ as a shorthand label) is highly required in such cross-cultural design situations, and it could be trained and improved through design education. Therefore, to better prepare students in design colleges for sustainable career development, we extend and assess the CQ model in design education so that we can understand which dimension of CQ could explain and forecast the differences of design students' competitive advantage for sustainable career competitive advantage. We begin the study by determining the demographic differences of design students in terms of CQ, then clarify associations between CQ and competitive advantage. The results of variance analyses using both a *t*-test and ANOVA showed that education level had a significant effect on two dimensions of CQ (cognitive and motivational), whereas gender, age, and design field did not have significant effects on any dimensions of CQ. Further, step-wise regression analyses demonstrated that three dimensions of CQ (motivational, metacognitive, and behavioral) had significant impacts on competitive advantage. Based on these results, theoretical and practical implications, as well as suggestions for future studies, are further discussed.

Keywords: cultural intelligence; competitive advantage; cross-cultural design teamwork; sustainable design career

1. Introduction

1.1. Research Background

Cross-cultural cooperation is on the rise in the design industry [1]. Designers are working with team members from different cultural backgrounds and designing together for multicultural users. However, problems follow accordingly when designing across cultures begins to rise in prominence. Firstly, task-oriented communication and interpersonal relationships are easily hampered owing to cultural differences and misunderstanding among multicultural team members. The severe challenges facing cross-cultural teams are how to achieve good task performance, how to eliminate cultural barriers, and how to promote effective cooperation among multicultural team members [2]. Thus, the need for supportive and reliable collaborative design teamwork is critical in cross-cultural design practice [3]. Furthermore, designers' cultural awareness and wisdom are tested when facing cultural conflicts and when required to solve corresponding teamwork barriers in the collaboration

design process. Secondly, cross-cultural practice has rarely interconnected with user-centered design practice [1]. Many design practices have been formed utilizing approaches for the design team to rapidly gain insight into "users" in order to deliver concepts and prototypes, with little attention being paid to different cultural understandings about being, knowledge, participation, and life beyond the design project [4]. Designers should bear in mind that individuals are conditioned by their culture; therefore, cultural influence should be applied as a requirement when designing for multicultural users [3].

The design industry is highly competitive. For individual designers, competitive advantage is required to a significant degree in the fierce design industry. The influential Sustainable Development Goals (SDGs) issued by the United Nations address "decent work and economic growth" as one of the 17 goals to be achieved for a better and more sustainable future for all [5]. As a contributor to career sustainability, sustainable career competitive advantage is the ability to maintain constant improvement and development in career paths. Therefore, we believe that sustainable career competitive advantage is positively related to decent work and economic growth, thus requiring more attention to a sustainability blueprint. Theoretically originating from economics and management, competitive advantage is the competence employees possess to meet the requirements that employers and the labor market consider to be attractive [6]—a job performance that is better than competitors [7,8], the ability to achieve self-value and improve oneself through fulfilling the task [8,9], accomplishments to guarantee sustainable career survival and development [10], and a combination of various abilities and skills required to choose and engage in a career [11]. Therefore, the ability and competence to perform effectively in culturally diverse settings will be a significant competitive advantage for a future design career in a cross-cultural teamwork context.

Responding to the inquiry of why some individuals are more effective than others in culturally diverse situations, cultural intelligence theory and models are gradually being developed [12]. Cultural intelligence (or CQ as a shorthand label created by Earley and Ang in 2003 [13]) is the ability to function and manage effectively in culturally diverse situations [12]—a skill that is particularly important for coping with intercultural encounters in cross-cultural design teams. A team with a high level of CQ could handle more creative tasks in a cross-cultural context, and team members' CQ may also predict the efficiency of the cross-cultural team [14]. CQ theory helps to build common ground and promote effective communication for multicultural talents, thus avoiding cultural conflicts and enhancing team performance. This intellectual concept has been demonstrated to enhance students' learning processes and task performance; thus, it has been introduced into teaching models to provide theoretical bases for fostering college students' cross-cultural abilities through cross-cultural teaching practice [15–17]. From a company's perspective, CQ offers a new vision for training and assessing cross-cultural talents [2], potentially serving as an assessment for designer selection for cross-cultural projects in design companies.

Design students' cross-cultural vision should be improved through education and training to prepare them for future cross-cultural teamwork. To expand students' global design horizons and enhance competitive advantage, multiple cross-cultural activities are carried out in design schools: co-creation cross-cultural design workshops are now being widely established to increase mutual understanding through design teamwork; exchange programs are underway to place design students into a different cultural background for a certain period of time and receive design inspirations due to cultural differences; cross-cultural design internships are provided and encouraged to prepare design students for better career adaptation and career performance.

In comparison to the popular cross-cultural practice in design education, empirical research is scarce in terms of elaborating on the relationship between cross-cultural influence and sustainable career competitive advantage.

We believe that CQ could substantially impact the sustainable development of design students' competitive advantage in future cross-cultural design careers. Specifically, the introduction of CQ could solve two challenges facing future designers in a globalized cross-cultural society: (1) effective interaction with team members from different cultural backgrounds; (2) appropriate and specific designs for multicultural targeted users.

1.2. Research Purpose

In this study, we propose to extend the CQ model in design education in order to understand which dimensions of CQ could explain and forecast the differences of design students' competitive advantage for sustainable career competitive advantage. Due to the fact that CQ reflects individual differences in culturally diverse settings [12], and since there are differences and similarities between CQ and personality traits, we will begin by analyzing the relationship between basic demographic traits (such as gender, age, educational level, and design field) of design students and CQ, and then find the demographic differences and make pedagogic adjustments. As for the ultimate goal to improve design students' career competitiveness, we investigate the relationship between CQ and competitive advantage. It has been demonstrated that some personality traits such as openness to experience and being creative, imaginative, and adventurous are valuable traits for designers, and they are positively related to specific aspects of CQ [18,19]. This implies that there is a positive relationship between CQ and being a more effective designer; however, this association has yet to be demonstrated to a satisfactory degree. Therefore, the key objectives of this study are as follows:

(1) Find and compare the demographic differences of design students in terms of CQ;
(2) Clarify the associations between CQ and competitive advantage.

1.3. Research Scope

To elaborate the subject more effectively and carry out the research, we set the research boundaries from two aspects: the scope of culture in this study and the geographical location of the research.

(1) Culture scope: Cultural difference was selected as one of the sources of personal differentiation in this study. Culture is a broad concept. In this work, the traits of design students form the centered subject; hence, we narrowed the broad meaning of culture down to the personal feelings associated with it. Therefore, a "different culture" means cultures that are unique from design students' own cultural backgrounds and experience, an individual-based different feeling or perception; "cross-cultural" indicates intercultural interactions between design members in a design team; "culturally diverse settings" means the design work or teamwork collaboration environment that mixes different cultures.

(2) Location of research: This study was carried out in design colleges in Taiwan. Taiwan is a multicultural society composed of diverse cultures and ethnic groups, owing to a complicated historical background [20]. After colonization by the Netherlands, Spain, Japan, and other countries, as well as governance by the Ming and Qing Dynasties, the Republic of China, as well as different ethnic groups, moved in; this change has brought complex, diverse, and rich cultural characteristics to this multi-ethnic society [21]. Taiwan's design education has been developing rapidly in the past half-century, transforming from original class-based training to an industry covered cross-disciplinary teaching model [22], contributing to the design boom in Taiwan to some extent [23]. Design students in Taiwan are immersed in the multicultural background; therefore, they are exposed to different cultures since childhood and more or less acquire some degree of CQ.

1.4. Research Scheme

To clarify the impact of cultural intelligence on sustainable career competitive advantage, this research is elaborated using various descriptions and illustrations. We begin the paper by introducing the background, purpose, scope, and scheme of the research (section 1). We then analyze related previous studies on subjects of cultural intelligence and competitive advantage (section 2). Then, the conceptual framework and eight hypotheses are developed (section 3). In section 4, the research method and process are presented, followed by section 5, which presents the corresponding results of this study. In section 6, we further discuss the results through theoretical and practical implications. Finally, we provide conclusions and offer suggestions for future research (section 7).

2. Literature Review

In order to achieve clear insight into the impact of CQ on sustainable competitive advantage for design students, this section will begin by analyzing the theory of CQ and articulate its fitness for this study. Furthermore, we will analyze competitive advantage to clarify its application in design education.

2.1. Cultural Intelligence

As a "specific form of intelligence focused on capabilities to grasp, reason, and behave effectively in situations characterized by cultural diversity" [12] (p. 337), the concept of CQ has been formed under the idea of a changing society. With the rise of globalization, a quest for intercultural understanding is sought frequently by people operating in multicultural environments such as that experienced in transnational or multinational firms [24]. Because managing cultural diversity in cross-cultural team tasks has historically been a challenge [25], academics and practitioners have directed resources toward enhancing the understanding of how best to manage team diversity and improve the effectiveness of international assignments [26].

Defined as "an individual's capability to function and manage effectively in culturally diverse settings", CQ was constructed by Earley and Ang (2003) in responding to the need to determine why some individuals are more effective in culturally diverse situations such as multicultural domestic work teams, multinational work teams, and overseas work assignments [13]. CQ is targeted at situations involving cross-cultural interactions arising from differences in race, ethnicity, and nationality [12]; thus, it is beneficial to facilitate mutual exploration, learning, and trust among multicultural team members.

CQ acknowledges the practical realities of globalization [13] and is focused on the specific domain of intercultural settings [12], which matches this study's goal to assess the cultural awareness and influence on design students' competitive advantage in a contemporary globalization background. Compared with other theories in measuring individual differences such as Emotional Intelligence (EI) and the Big Five personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism as five factors), CQ is better suited in predicting intercultural effectiveness outcomes when studying culturally diverse situations [12]. CQ is grounded in the theoretical framework of multiple intelligences [13,27] and is consistent with the definition of general intelligence as "the ability to grasp and reason correctly with abstractions (concepts) and solve problems" [28] (p. 3). The concept of intelligence in contemporary society is far from the ability to solve problems in academic settings, but rather a combination of "real-world" intelligences such as social [29], emotional [30], and practical [31] intelligence. Accordingly, CQ is the combination of "real-life" intelligences in a cross-cultural context. Design is rooted in real life, and it involves solving problems in real life, which asks for "down-to-earth" requirements from future designers. Designers with a higher CQ can solve real-life problems effectively with multi-cultural team members in sophisticated social contexts. Therefore, CQ is the most appropriate individual culturally differentiating theory and measurement for this study.

Earley and Ang (2003) conceptualized CQ as a four-dimension construct: metacognitive, cognitive, motivational, and behavioral [13]. Later, they further developed a 20 item CQ scale (CQS) through empirical research, which serves as a model to reflect specific dimensions of CQ. The four dimensions are independent in specific relevance to functioning in culturally diverse settings, and they contain different contents in CQS [12]:

(1) Metacognitive CQ: This area reflects mental processes that individuals use to acquire and understand cultural knowledge, such as being conscious of, adjusting, and checking the accuracy of the cultural knowledge used when interacting with people from different cultural backgrounds, as well as being conscious of the cultural knowledge applied to cross-cultural interactions.

(2) Cognitive CQ: This reflects knowledge of the norms, practices, and conventions in different cultures acquired from education and personal experiences. It includes knowing the legal and economic systems, the vocabulary and grammar rules, the cultural values and religious beliefs, the

marriage systems, the arts and crafts, and the rules for expressing nonverbal behaviors in other cultures.

(3) Motivational CQ: This concept reflects the capability to direct attention and energy toward learning about and functioning in situations characterized by cultural differences; for example, enjoying interacting and socializing with people from different cultures, being sure to deal with the stresses of adjusting to a new culture, enjoying living in unfamiliar cultures, and being confident in becoming accustomed to the shopping conditions in a new culture.

(4) Behavioral CQ: This reflects the capability to exhibit appropriate verbal and non-verbal actions when interacting with people from different cultures; for example, changing accent, tone, rate of speaking, nonverbal behavior, and facial expressions when a cross-cultural interaction requires it, as well as using a pause and silence differently to suit varying cross-cultural situations.

CQ also has a unique explanatory power in predicting cultural judgment and decision making, cultural adaptation, and task performance [12]. Hence, in this study, we apply CQ to predict design decision making and design performance in a cross-cultural design context. Additionally, cross-validation analyses provide strong support for the validity and reliability of the CQS across samples, time, and countries, hence making it possible to apply this scale in Taiwan. Therefore, CQ theory serves as the theoretical bases for this study, and CQS will also serve as the model for CQ testing of design students.

2.2. Competitive Advantage

The concept of competitive advantage was initially raised for market competition in economics, and it could be traced back to the revolutionary publication of "The Theory of Monopolistic Competition: A Reorientation of the Theory of Value" by Chamberlin [32], which made competitive advantage an influential notion [33]. Further, Aaker (1989) regarded competitive advantage as one or more assets or technologies that are dominant over the main competitors and extended the notion of competitive advantage by reflecting on its sustainable development [34]. This insightful sustainable perspective still benefits today's research in many disciplines, and also lays the theoretical foundation for this study to investigate sustainable competitive advantage for design students. As for the clear definition of competitive advantage, there is no universally accepted version; sometimes, it is used interchangeably with key success factors or distinctive competencies [35]. During its study in more than half a century, its theoretical discussion transformed from a market-, resource-, to the current knowledge-based view [36–39].

Gradually, the application of competitive advantage has spread from economics into other disciplines, particularly in the global education market, because people in modern society tend to attach more importance to higher education, and schools are facing harsh market tests. For example, Li (2011) uses competitive advantage theory to measure the attractiveness of colleges and students' satisfaction in higher learning in order to understand how the higher educational institution should perform to attract more outstanding students [40].

Research on students' competitive advantage has already been carried out in Taiwan, both officially and individually. According to the official report on graduate employment [41], students' competitive advantages are divided into three categories, including good working attitudes that are conducive to employment and cooperation, career planning and active learning, professional knowledge and flexible application. Chiu (2014) investigates Taiwan design students' core competencies and competitive advantages and develops a set of evaluation indicators that could function as criteria for assessing design students' competitive advantage. Chiu's model of competitive advantage is built on a literature review and expert evaluation, and it is divided into a 12 item professional ability dimension and an 11 item core competence dimension. The professional ability dimension includes items such as "I can put theory into application", "I have better skills and performance than competitors", "I have the ability to integrate resources", "I have professional license", and "I have successful design practice", whereas the core competence dimension has items such as "I have creative thinking", "I have confidence to conquer difficulty", "I have a cooperative

personality", "I agree with the company's cultures and values", and "I can keep learning to improve my self-ability" [33] (pp. 143–144).

These competitive theories will lay the foundation in this study to assess and forecast design students' sustainable career competitive advantages, and further extend the theoretical scope with relevance to CQ theory.

3. Conceptual Framework and Hypothesis Development

The relationship between gender and emotional intelligence (EI) has been explored to a significant degree [42]. For example, Tsaousis and Kazi (2013) used a trait measure of EI to test the differences between males and females, finding that females are better in expression and recognition as well as caring and empathy scales, whereas males are better at control of emotions [43]. In data published by Petrides (2009) in the trait EI questionnaire's technical manual, males scored more highly on global EI, self-control, and sociability, whereas females scored more highly on emotionality [44]. Khodadady and Ghahari (2011) explored the validity of the CQ scale and its relationship with gender and found that female's metacognitive CQ is higher compared to males [45]. Because CQ is similar yet distinct from EI [12], we propose the following hypothesis:

Hypothesis 1. *For design students, gender will have a significant effect on CQ.*

Derksen, Kramer, and Katzko (2002) offered data to support the notion that EI peaks between 35 and 44 years and drops off as one progresses into old age [46]. Petrides (2009) considered that self-perceptions of EI are likely to remain relatively stable across the life-span, but major life events or conscious effort by an individual might change a person's EI profile [44], such as changes brought by educational intervention [47]. Intelligences can develop with age and be improved through training and remedial action [48]. Some studies have even suggested a negative relationship between age and EI [49]. Thus, we propose the following hypotheses:

Hypothesis 2. *For design students, age will have a significant effect on CQ.*

Hypothesis 3. *For design students, education level will have a significant effect on CQ.*

There are different design fields in Taiwan's design system, and they are gradually being established with the development of Taiwan's design education [23], which includes practical design (such as industry, visual communication, creative, digital media, architectural, and fashion designs) and design theory study. To determine the association between design fields and CQ, we propose the following hypothesis:

Hypothesis 4. *For design students, design field will have a significant effect on CQ.*

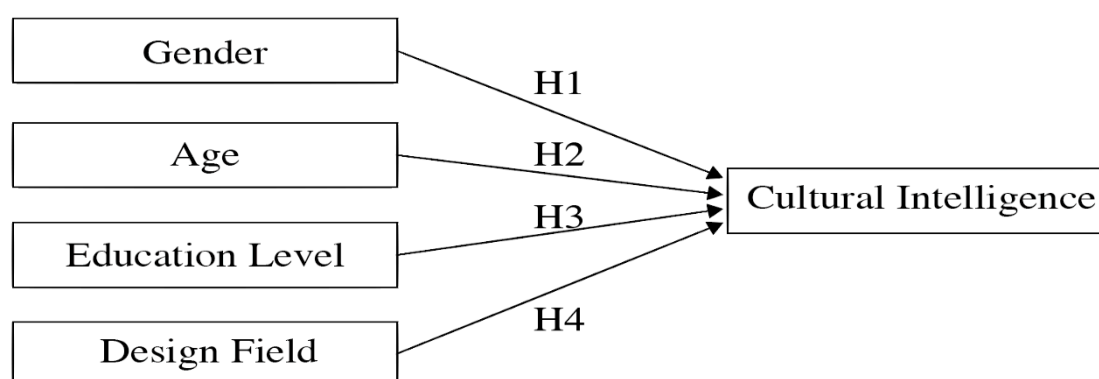The framework of Hypotheses 1–4 is presented below (Figure 1):

Figure 1. Framework of Hypotheses 1–4.

People with high metacognitive CQ are consciously aware of others' cultural preferences before and during interactions [12]. They also make reflections and adjust mental models through interactions [50,51]. This ability is essential in cross-cultural design teamwork because it asks for mental awareness and adjustment to team members' cultural backgrounds before actual communication. Designers are sometimes too self-centered in design to take team members' feelings into consideration, which easily leads to misunderstanding among cross-cultural teams and thus causes a negative impact on teamwork efficiency. Cross-cultural design teams welcome members who are conscious of others' cultures and can pay respect to cultural differences. Thus, we propose the following hypothesis:

Hypothesis 5. *As metacognitive CQ increases, design students' career competitive advantage will improve.*

Cognitive CQ reflects knowledge of the economic, legal, and social systems of different cultures and subcultures [52], as well as knowledge of basic frameworks of cultural values [53]. Those with high cognitive CQ can understand similarities as well as differences across different cultures [50]. Recent trends in the development of the theory have placed the knowledge-based view as the main construct to build competitiveness [54–56]. New knowledge is one of the most critical sources of competitive advantage available to an organization in the 21st century [57,58]. In the process of learning norms, practices, and conventions in different cultures, it fosters communication and builds social integration and networks; hence, it could benefit the cross-cultural design teamwork and practice. Thus, we propose the following hypothesis:

Hypothesis 6. *As cognitive CQ increases, design students' career competitive advantage will improve.*

Kanfer and Heggestad (1997) argued that motivational capacities could provide control over affect, cognition, and behavior that promotes goal accomplishment [59]. Those with high motivational CQ put attention and energy on cross-cultural situations based on intrinsic interest [60] and confidence in their cross-cultural effectiveness [61]. Designers who enjoy interacting with people from different cultures are confident in socializing with new friends, easily deal with the stresses of adjusting to a new culture, and enjoy living in different cultures, are well matched for cross-cultural cooperation. Thus, we propose the following hypothesis:

Hypothesis 7. *As motivational CQ increases, design students' career competitive advantage will improve.*

Hall (1959) emphasized that mental capabilities for cultural understanding and motivation must be complemented with the ability to exhibit proper actions based on cultural values of specific contexts [62]. Those with high behavioral CQ could exhibit appropriate behaviors based on their broad range of verbal and nonverbal capabilities, such as culturally appropriate words, tone, gestures, and facial expressions [63]. For designers, behavior is the direct demonstration of cultural recognition and covers multiple expressions of communication. Since the late 1990s, communication competence has been regarded as a requirement for designers' future career development, such as in Levy's (1990) model for design core competition [64], or in designer-fostering investigations [65,66]. Thus, we propose the following hypothesis:

Hypothesis 8. *As behavioral CQ increases, design students' career competitive advantage will improve.*

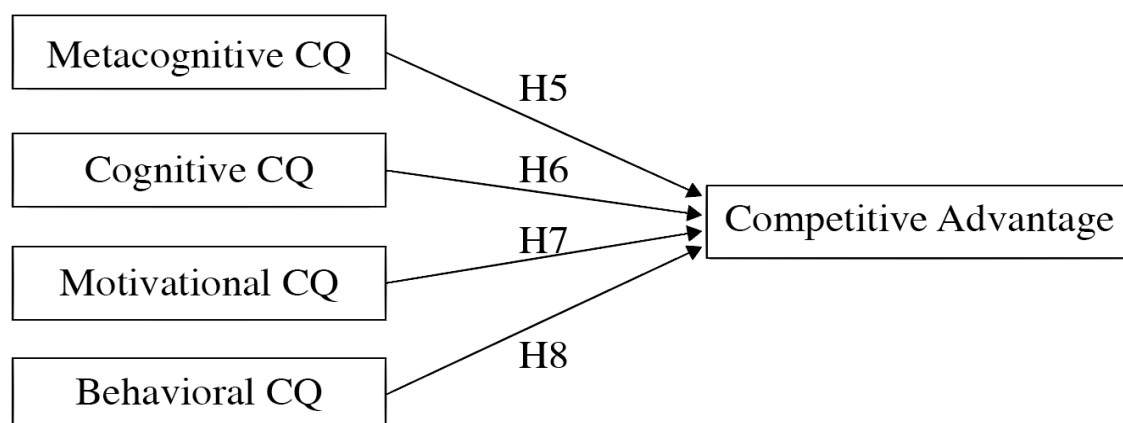The framework of Hypotheses 5–8 is presented below (Figure 2):

Figure 2. Framework of Hypotheses 5–8.

4. Research Method and Process

According to the research purpose, this study is carried out in several steps: first, we developed a draft questionnaire based on related literature; next, we invited experts and design students to check and improve the validity of the questionnaire; then, we delivered the questionnaire to design students for data collection; finally, we analyzed the data and discussed the results. The key processes are elaborated below.

4.1. Development of Questionnaire

We developed the questionnaire following a literature review and subsequent checking by experts. We invited eight experts from specific design professions to construct the questionnaire. They were seven professors from three universities in Taiwan and one experienced Taiwanese designer working in Finland. Table 1 shows their background information.

Table 1. Background of experts.

Code	Subject	Professional Background	Specialty
P-T	Professor T	PhD, professor at the National Yunlin University of Science and Technology	Design education
P-H	Professor H	PhD, professor at the National Yunlin University of Science and Technology	Design communication and strategy
P-X	Professor X	PhD, professor at the National Yunlin University of Science and Technology	Cross-culture design
P-C	Professor C	PhD, professor at the National Yunlin University of Science and Technology	Product design
P-P	Professor P	PhD, professor at the National Yunlin University of Science and Technology	Visual design
P-Z	Professor Z	PhD, professor at the Chienkuo Technology University	Digital media design
P-W	Professor W	PhD, professor at the National Taipei University of Technology	Design thinking
D-J	Designer J	Experienced Taiwanese designer working in Finland	Cross-culture design practice

The questionnaire in this study was composed of three parts according to the research purpose:

(1) "Basic data"—Comprising four items: gender, age, educational level, and design field. As for "educational level", design students are divided into bachelor's degree, master's degree, and PhD degree; "design field" includes industry design, visual communication design, creative design, digital media design, architectural design, fashion design, and design theory. Respondents were asked to check the given options.

(2) The "cultural intelligence scale"—We apply Ang et al.'s CQS after careful examination. Experts (P-T, P-H, P-X, P-C, P-P, P-Z, and P-W) were invited to check the items in the CQS scale by choosing the appropriate items and making adjustment advice on improper items. Then, we did the pre-test among 53 design students. Finally, the CQS scale was applied to test design students' CQ without modification. It includes 20 items in total, with 4 items for metacognitive CQ (coded as MC1–MC4), 6 items for cognitive CQ (coded as COG1–COG6), 5 items for motivational CQ (coded as MOT1–MOT5), and 5 items for behavioral CQ (coded as BEH1–BEH5). These 20 questions were measured on a 5-point Likert scale, ranging from 1 (extremely disagree) to 5 (extremely agree). Respondents were asked to choose the most suitable number according to their own situations.

(3) The "competitive advantage scale"—This part was intentionally designed after discussion and integration of the relevant literature, as well as expert revision and interviews. We conducted in-depth interviews with experts (P-H, P-X, and D-J) to obtain their valuable insight into future career competition. We also invited 53 design students to do the pre-test. This section was modified into 10 items, which were coded as CA1 to CA10: I can think creatively during design processes (CA1); I can consider consumers' needs when designing (CA2); I can undertake cross-disciplinary design (CA3); I can use design resources effectively (CA4); I can positively face design challenges (CA5); I can keep learning to improve design skills (CA6); I can master design trends (CA7); I can take part in cross-cultural design projects (CA8); I respect cultural differences of team members (CA9); I take an appropriate role in design teamwork (CA10). These 10 items were measured on a 5-point Likert scale, ranging from 1 (extremely disagree) to 5 (extremely agree). Respondents were asked to choose the most appropriate number according to their own situations.

4.2. Data Collection

A questionnaire survey was conducted to collect data from design students. Firstly, a pre-test involving 53 volunteers was carried out. Then, the modified questionnaire was applied for formal testing with 310 design students who majored in different design fields across Taiwan. Eight samples were identified as incomplete through data checking and subsequently dropped from the data analysis. Hence, the final sample size was 302.

4.3. Data Analysis

We used SPSS Statistics version 22 to test the proposed model and hypotheses.

4.3.1. Reliability and Validity Test

We began with reliability and validity testing. Cronbach's α was used to test the reliability of the CQS, the competitive advantage scale, as well as the entire questionnaire. When the value of Cronbach's α is higher than 0.7, the factor being analyzed is regarded to be of high reliability [67]. Ang et al. (2007) used cross-validation analyses to provide strong support for the validity and reliability of the CQS across samples, time, and countries (Singapore and the USA). The CQS is widely used by researchers worldwide and is regarded as the proper scale to examine an individual's performance in culturally diverse settings [45,68,69]. The expert review and pre-test also contribute to the validity of the questionnaire.

4.3.2. Factor Analysis

We use factor analysis to test the dimension of CQS as well as to reduce dimensions of the newly designed competitive advantage model. Kaiser–Meyer–Olkin (KMO) sampling adequacy detection and Bartlett's tests were firstly conducted. The value of KMO should be between 0 and 1, and the larger the KMO value is, the more applicable it is to conduct a factor analysis [70]. Next, we respectively use principal component analysis (PCA) to extract common factors out of the variables of CQ and competitive advantage. Rotation by Varimax was applied. The value after rotation by Varimax was selected as the total variance, and the sum of an eigenvalue greater than 1 was the screening condition.

4.3.3. Variance Analysis

We use variance analysis to test Hypotheses 1–4. An independent sample *t*-test (*t*-test) and analysis of variance (ANOVA) were applied. In this study, the *t*-test was applied to test the scoring differences between "genders" on CQ (Hypothesis 1), whereas one-way ANOVA was applied to test the scoring of the differences among "age", "educational level", and "design field" on CQ (Hypotheses 2–4 respectively). For the ANOVA, homogeneity of variance test was first conducted. According to Tu (2016), if a variable is significant in homogeneity, we then judge the significance of the F-value, and apply a post hoc Scheffe test to find the source of the difference; if the variable is not significant in homogeneity, and the number of grouping samples differs to a substantial degree, we judge the significance of both ANOVA's F-value and Welch's F-value, then apply a post hoc Games–Howell test to locate the source of the differences [71]. The statistical significance was set to 0.05.

4.3.4. Regression Analysis

We used a step-wise regression analysis to test Hypotheses 5–8. Metacognitive, cognitive, motivational, and behavioral CQs were the predictor variables; competitive advantage was the criterion variable. Different from other regression approaches, the sequence of predictor variance involved in the step-wise regression equation was determined by the computed results of statistical software. If the product moment correlation between any predictor variable and criterion variables was high, this predictor variable had priority to be selected into the regression equation [71]. Besides, some notes should be considered: (1) according to the suggestion of Tabachnick and Fidell (2007), if stepwise regression is applied, the sample number should exceed 40 times the number of predictor variables [72]; the sample number in this study is 302 and, therefore, it qualifies for a step-wise regression; and (2) regarding the testing of multicollinearity, singularity, normal distribution, linearity, homoscedasticity, and outliers, we follow the rules and provide the results in the next chapter.

5. Research Results

5.1. Summarization of Demographic Statistics

We summarized the basic demographic data by frequency distribution (see Table 2). The results of the numerical analysis were as follows:

- Regarding "gender", most respondents were female (206 in number), accounting for 68%.
- Regarding "age", most respondents were under 25 years of age, accounting for nearly 63% in total. They were mostly aged under 20 years (33%), closely followed by people aged 21–25 years (30%). Respondents aged 26–30 years and 31–35 years had almost even numbers, accounting for 11% and 12%, respectively. Participants aged above 41 years were the least common, only accounting for 7%.
- Regarding the "education level", individuals with a bachelor's degree made up the largest sample (51%). This was followed by master's and doctoral degrees, accounting for nearly 30% and 20%, respectively. This result is in accordance with the "age" results because as "education level" increases, people's age correspondently increases, whereas the group number decreases according to the regulation of education hierarchy.
- Regarding "design field", respondents mostly majored in creative design, accounting for 41%. This was followed by design studies (28%), visual design (14%), industry design (8%), digital design (5%), architecture design (4%), and fashion design (1%). However, this result does not indicate the distribution of design fields in Taiwan because the samples were mainly obtained from geographically central areas in Taiwan.

Table 2. Basic demographic data of respondents.

Demographic Variables		Number (N)	Percent (%)	Cumulative Percent (%)
Gender	(1) Male	96	31.8	31.8
	(2) Female	206	68.2	100.0
Age	(1) 20 years and below	99	32.8	32.8
	(2) 21–25 years	89	29.5	62.3
	(3) 26–30 years	34	11.3	73.5
	(4) 31–35 years	37	12.3	85.8
	(5) 36–40 years	23	7.6	93.4
	(6) 41 years and above	20	6.6	100.0
Education Level	(1) Bachelor	153	50.7	50.7
	(2) Master	89	29.5	80.1
	(3) PhD	60	19.9	100
Design Field	(1) Design studies	84	27.8	27.8
	(2) Creative design	124	41.1	68.9
	(3) Industry design	23	7.6	76.5
	(4) Visual design	41	13.6	90.1
	(5) Digital design	15	5	95
	(6) Architecture design	12	4	99
	(7) Fashion design	3	1	100

5.2. Reliability Test

The overall reliability of the questionnaire was 0.935, which indicates that the questionnaire in this research was highly reliable. Furthermore, the specific item in this study also presented relatively high reliability: the reliability of the CQS was also 0.935 (0.905 for metacognitive CQ, 0.886 for cognitive CQ, 0.888 for motivational CQ, and 0.853 for behavioral CQ), whereas the reliability of the competitive advantage scale was 0.941 (see Table 3). These results imply that the questionnaire and its construct were suitably designed; thus, the hypotheses using this questionnaire and contained items could be tested reliably.

Table 3. Reliability and descriptive statistics.

	Item	Cronbach's α	No of Items
Cultural Intelligence Scale	Metacognitive cultural intelligence (CQ)	0.905	4
	Cognitive CQ	0.886	6
	Motivational CQ	0.888	5
	Behavioral CQ	0.853	5
Competitive Advantage		0.941	10

5.3. Factor Analysis of Two Model

5.3.1. Factor Analysis for the Cultural Intelligence Scale

The KMO value of the CQS was 0.929, and the significance by Bartlett's testing was 0.000. Therefore, the data were highly applicable for conducting a factor analysis. Four factor components were extracted, and the total variance was 68.902% (see Table 4). This result is in accordance with CQS's four divisions. To determine whether the four extracted components fit CQS's four dimensions, we further rotated components in the matrix.

According to the factor loading significance principle, the scope of acceptance is reached when factor loading reaches 0.4 [73]. We apply the coloring feature of a heat map to help visualize the rotation result. Clearly illustrated in the colored table (Table 5), the four extracted components perfectly fit the original four dimensions of CQS. This observation indicates the highly suitable design of the original CQS because it can reliably test samples from different cultures, times, and

disciplines. This also demonstrates the validity and reliability of using CQS to test design students' CQ in this study.

Table 4. Total variance explained.

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	9.035	45.175	45.175
2	1.85	9.252	54.427
3	1.506	7.528	61.955
4	1.389	6.947	68.902

Extraction method: principal component analysis.

Table 5. Rotated component matrix.

Items of CQS	Component			
	1	2	3	4
COG4	0.84	0.138	0.181	0.154
COG3	0.801	0.113	0.256	0.126
COG6	0.75	0.162	0.085	0.296
COG5	0.708	0.124	0.193	0.23
COG2	0.67	0.378	0.118	0.135
COG1	0.647	0.263	0.2	0.038
MOT3	0.178	0.809	0.193	0.182
MOT2	0.206	0.775	0.167	0.268
MOT4	0.286	0.76	0.141	0.158
MOT5	0.166	0.681	0.286	0.251
MOT1	0.193	0.653	0.306	0.272
MC1	0.254	0.216	0.809	0.191
MC3	0.244	0.249	0.804	0.173
MC4	0.194	0.176	0.788	0.215
MC2	0.202	0.263	0.769	0.22
BEH5	0.123	0.08	0.266	0.751
BEH3	0.223	0.284	0.215	0.735
BEH4	0.155	0.166	0.37	0.723
BEH1	0.173	0.32	0.028	0.702
BEH2	0.185	0.219	0.084	0.681

Extraction method: principal component analysis; rotation method: Varimax with Kaiser normalization. CQS: cultural intelligence scale.

5.3.2. Factor Analysis for Competitive Advantage Model

The KMO value of the competitive advantage model was 0.941, and the significance by Bartlett's testing was 0.000. Therefore, the data were highly applicable for conducting a factor analysis. Only one factor component was extracted, and the total variance was 65.432% (see Table 6). This result may due to the limited number of items of the competitive advantage model, and the items tend to be single dimensional.

Table 6. Total variance explained.

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	6.543	65.432	65.432

Extraction Method: principal component analysis.

Because only one component was extracted, the solution cannot be rotated. The component matrix is listed in Table 7. We name the only factor as "key competitive advantage", which represents a higher level of competitive advantage.

Table 7. Component matrix.

	Component
	1
CA5	0.849
CA6	0.835
CA1	0.829
CA3	0.819
CA2	0.818
CA7	0.809
CA10	0.807
CA8	0.797
CA4	0.789
CA9	0.731

Extraction method: principal component analysis.

5.4. t-Test and One-Way ANOVA for Cultural Intelligence

5.4.1. Overall Analysis of Extracted Factors

After the extraction of factors out of CQ and competitive advantage, we analyze the mean value and standard deviation of extracted factors (see Table 8) in order to understand the data type distribution of the sample. Based on the study purpose and hypotheses, we then test the scoring differences among four variables (gender, age, education level, and design field) on the CQ (metacognitive, cognitive, motivational, and behavioral).

Table 8. The overall analysis of extracted factors.

Factors	Mean (M)	Standard Deviation (SD)	Number (N)
Metacognitive CQ	3.952	0.715	302
Cognitive CQ	3.314	0.708	302
Motivational CQ	3.660	0.744	302
Behavioral CQ	3.673	0.667	302
Key competitive advantage	3.896	0.639	302

5.4.2. *t*-Test of Gender on Cultural Intelligence

As shown in Table 9, the scores sorted by gender did not reach significance levels for any of the four CQ factors, judging by a *p*-value of more than 0.05. Hence, neither male nor female respondents were shown to have significant differences with respect to metacognitive, cognitive, motivational, or behavioral CQs. Because gender does not have a significant effect on the four dimensions of CQ, Hypothesis 1 was not supported.

Table 9. *t*-test of gender on cultural intelligence.

Factors	Gender	N	M	SD	T-Value	*p*-Value
Metacognitive CQ	Male	96	4.0078	0.79509	0.926	0.355
	Female	206	3.926	0.67466		
Cognitive CQ	Male	96	3.3976	0.74785	1.402	0.162
	Female	206	3.2751	0.68717		
Motivational CQ	Male	96	3.7375	0.76849	1.243	0.215
	Female	206	3.6233	0.73161		
Behavioral CQ	Male	96	3.6896	0.67986	0.297	0.766
	Female	206	3.665	0.66188		

5.4.3. ANOVA of Age on Cultural Intelligence

The test of homogeneity of variances showed equal variances in metacognitive, cognitive, and behavioral CQs ($p > 0.05$), whereas unequal variances in motivational CQ ($p < 0.05$) were found. The significances of the ANOVA test for metacognitive, cognitive, and behavioral CQs were more than 0.05 (see Table 10), whereas the significance of the "robust tests of equality of means" for motivational CQ was also more than 0.05 ($p = 0.143$) (see Table 11).

Therefore, none of the six age groups (20 years and below, 21–25 years, 26–30 years, 31–35 years, 36–40 years, and 41 years and above) reached a significance level on the four factors of CQ ($p > 0.05$); thus, respondents of different ages did not have significant differences with respect to metacognitive, cognitive, motivational, or behavioral CQs. Therefore, age had no significant effect on the four dimensions of CQ. Thus, Hypothesis 2 was not supported.

Table 10. ANOVA of age on cultural intelligence.

		SS	df	MS	F	Sig.
	Between Groups	0.739	5	0.148	0.286	0.921
Metacognitive CQ	Within Groups	153.065	296	0.517		
	Total	153.804	301			
	Between Groups	4.25	5	0.85	1.716	0.131
Cognitive CQ	Within Groups	146.665	296	0.495		
	Total	150.915	301			
	Between Groups	2.25	5	0.45	1.013	0.41
Behavioral CQ	Within Groups	131.507	296	0.444		
	Total	133.757	301			

Table 11. Robust tests of equality of means for motivational CQ.

		Statistic [a]	df1 [b]	df2 [b]	Sig.
Motivational CQ	Welch	1.706	5	80.827	0.143

Note: [a] asymptotically F distributed. [b] degrees of freedom.

5.4.4. ANOVA of Education Level on Cultural Intelligence

The test of homogeneity of variances showed equal variances in metacognitive, cognitive, and behavioral CQs ($p > 0.05$), whereas unequal variances in motivational CQ ($p < 0.05$) were noted. The significances of the ANOVA test for metacognitive and behavioral CQs were more than 0.05, but this value was less than 0.05 for cognitive CQ (see Table 12). The significance of the "robust tests of equality of means" for motivational CQ was also less than 0.05 ($p = 0.043$) (see Table 13). Regarding cognitive CQ, because equal variances were assumed, and the F value differed significantly, a post hoc Scheffe test was applied. With respect to motivational CQ, because equal variances were not assumed, a post hoc Games–Howell test was applied.

Post hoc results showed that there were significant differences in education level on some dimensions of CQ. Regarding respondents with different education levels (bachelor's, master's, and PhD), only scores for cognitive and motivational CQs reached significance. Specifically, respondents with a bachelor's degree had a higher cognitive CQ than respondents with a PhD degree; respondents with a master's degree had a higher motivational CQ than respondents with a bachelor's degree. Hence, education level had a significant effect on CQ (cognitive and motivational CQs); thus, Hypothesis 3 is supported.

Table 12. ANOVA of education level on cultural intelligence.

		SS	df	MS	F	Sig.	Scheffe
Metacognitive CQ	Between Groups	1.265	2	0.633	1.24	0.291	
	Within Groups	152.538	299	0.51			
	Total	153.804	301				
Cognitive CQ	Between Groups	4.453	2	2.226	4.545 *	0.011	
	Within Groups	146.462	299	0.49			1 > 3 [a]
	Total	150.915	301				
Behavioral CQ	Between Groups	0.924	2	0.462	1.04	0.355	
	Within Groups	132.834	299	0.444			
	Total	133.757	301				

Note: * $p < 0.05$. [a] 1: Bachelor; 3: PhD.

Table 13. Robust tests of equality of means for motivational CQ.

		Statistic [a]	df1	df2	Sig.	Games–Howell
Motivational CQ	Welch	3.223	2	137.951	0.043	2 > 1 [b]

Note: [a] asymptotically F distributed. [b] 1: Bachelor; 2: Master.

5.4.5. ANOVA of Design Field on Cultural Intelligence

Because there are only three respondents who majored in fashion design, the number is too low to perform ANOVA. We begin this test by combining "fashion design" (the least number) with "architecture design" (the second least number) and renamed this new group as "other area". "Other area" has 15 numbers in total, accounting for 5% of the total number.

The test of homogeneity of variances showed equal variances in all the four factors ($p > 0.05$). Thus, we did not perform the Welch test. The ANOVA test showed significant differences in design field on two factors (motivational and behavioral CQs) of CQ ($p < 0.05$) (see Table 14). To determine which design fields had differences, a post hoc Scheffe then followed. However, the scores did not have any significant differences, judging by the p-value, which was more than 0.05. Thus, irrespective of which design field respondents majored in, they did not have significant differences with respect to the four factors of CQ. Because the design field does not have a significant effect on CQ, Hypothesis 4 is not supported.

Table 14. ANOVA of design field on cultural intelligence.

		SS	df	MS	F	Sig.
Metacognitive CQ	Between Groups	4.143	5	0.829		
	Within Groups	149.661	296	0.506	1.639	0.15
	Total	153.804	301			
Cognitive CQ	Between Groups	5.258	5	1.052		
	Within Groups	145.657	296	0.492	2.137	0.061
	Total	150.915	301			
Motivational CQ	Between Groups	6.202	5	1.24		
	Within Groups	160.485	296	0.542	2.288 *	0.046
	Total	166.687	301			
Behavioral CQ	Between Groups	6.258	5	1.252		
	Within Groups	127.499	296	0.431	2.906 *	0.014
	Total	133.757	301			

Note: * $p < 0.05$.

5.5. Regression

We conducted a step-wise regression to examine the predictors of CQ to competitive advantage. To check for multicollinearity, the tolerance values of the predictor variables were assessed using the conventional cutoff value of 0.10. In the first round of testing, all predictor variables (metacognitive, cognitive, motivational, and behavioral CQs) had tolerance values above the cutoff line (range =

0.515–0.602). In addition, the data met the criterion for variance inflation factors (VIFs) with values less than 10 (range = 1.660–1.941) [74]. Thus, multicollinearity was not an issue among these predictor variables. To avoid singularity, we used separate scales (metacognitive, cognitive, motivational, and behavioral CQs) as predictor variables instead of the entire CQS scale. A scatterplot of regression standardized residuals showed that the predicted values were scattered evenly around the 0-valued residual line, an observation that supports the requirements for normal distribution, linearity, and homoscedasticity. However, when the outliers were tested, we found six outlier samples ($p < 0.001$) after a Mahalanobis distances test. Therefore, we deleted the outlier samples and ran the stepwise regression test again. The overall analysis after deleting outliers is provided in Table 15.

Table 15. The overall analysis after deleting outlier.

Factors	M	SD	N
Metacognitive CQ	3.976	0.653	296
Cognitive CQ	3.336	0.675	296
Motivational CQ	3.693	0.680	296
Behavioral CQ	3.702	0.615	296
Key competitive advantage	3.927	0.568	296

The second-round regression test showed a slightly different result from the first round. There were only three predictor variables (motivational, metacognitive, and behavioral CQs) left after the stepwise regression. The multicollinearity testing for these three variables also met the criterion of tolerance values being higher than 0.1 (range = 0.599–0.624) and VIF values being less than 10 (rang = 1.603–1.670). Thus, multicollinearity was not an issue among these three predictor variables. Singularity was also avoided by using separate CQS scales. Normal distribution, linearity, and homoscedasticity were all supported, judged by the scatterplot of regression standardized residuals.

The final regression result consists of three models (see Table 16). Model 1 included the motivational CQ factor as predictors and explained 37.6% of the variance in key competitive advantage. When the metacognitive CQ factor was added, Model 2 explained 45.2% of the variance, indicating a small improvement from Model 1 ($p < 0.001$). With the addition of the behavioral CQ factor, Model 3 demonstrated a slight but statistically significant improvement ($R^2 = 47.2\%$, $p < 0.01$). As can be seen from Table 16, the final model shows that motivational, metacognitive, and behavioral CQs were positively related to key competitive advantage. Thus, Hypotheses 5, 7, and 8 were supported.

Table 16. Summary of three models.

	Model	R	R^2	Adj. R^2	F	F Change	B	β	Tolerance	Variance Inflation factor (VIF)	Condition Index
1	Motivational CQ	0.613	0.376	0.374	176.906	176.906	0.512	0.613	1.000	1.000	10.967
2	Motivational CQ	0.673	0.452	0.449	121.020	41.036	0.371	0.445	0.731	1.368	13.378
	Metacognitive CQ						0.282	0.324	0.731	1.368	15.297
3	Motivational CQ	0.687	0.472	0.467	87.012	10.859	0.307	0.368	0.599	1.670	15.378
	Metacognitive CQ						0.241	0.277	0.676	1.479	17.191
	Behavioral CQ						0.164	0.177	0.624	1.603	18.326

6. Discussion

6.1. Theoretical Implications

This study is based on two important theories: CQ and competitive advantage. We apply the measurements of the cultural intelligence scale (CQS) created by Ang et al. (2007) because this scale has been widely tested by other researchers [45,68,69] and has an excellent reputation for its reliability and validity. To best match the topic of this study, we first retested the CQS scale among design students in Taiwan. The value of Cronbach's α was particularly high ($\alpha = 0.935$), indicating that this scale is highly applicable to this study; additionally, the four extracted factors and corresponding items perfectly matched CQS's four dimensions, further confirming Ang et al.'s study noting that "cross-validation analyses provide strong and support for the validity and reliability of CQS across samples, time and countries" [12] (pp. 359, 362). Therefore, this research enhances the knowledge about CQ as an effective intercultural competency construct by providing a relationship between CQ and competitive advantage. This work also cements the theoretical development of the CQ concept by Earley and Ang (2003), within a multicultural context (Taiwan), as well as in a specific discipline (design). Specifically, it confirmed the construct validity and reliability of the four-dimension model of CQS across more diversified samples, and within a diverse cultural background, thus increasing the generalizability of the CQS.

In terms of competitive advantage theory, this study adds to previous literature by extending the discipline boundary to design and making connections with CQ. As for the measurements, this study improves upon Chiu's (2014) scale [33] with more focused items by an expert review and adds the predictors of competitive advantage by introducing the concept of CQ. Therefore, we place competitive advantage in a more diversified multicultural setting and emphasize cultural factors as an important influence on students' competitive advantage.

By testing the hypotheses, related theories are also extended. Although gender has a complicated relationship with EI in previous works [43–45], this study found that gender does not have a significant effect on CQ. The result is also different from Khodadady and Ghahari's (2011) study finding that there is a gender difference for some dimensions of CQ (metacognitive CQ) [45]. Because these two studies were conducted in two distinct cultures (one in Taiwan and another in Iran), we assume that the impact of gender on CQ may be influenced by cultural differences. As for the impact of age on CQ, this research did not find any connections between them, which is contrary to our subjective expectation because intelligences have been found to develop with age [48]. This observation may be partly due to the special feature of CQ, which focuses on the ability to function effectively in culturally diverse settings. Young people today in Taiwan are exposed to cultural diversity at an early age, and they are equipped with a certain ability to cope with cultural diversity before going to college; this could partly explain why age is not an influential factor to different CQs. In this way, we extend the knowledge between age and intelligences. Although there is an overlapping of people categorized by age and education level, the latter factor provided a contrasting result to age. Education level had a significant effect on CQ in this study and was the only influential demographic factor. This result is in accordance with a previous study finding that intelligence can be improved through training [48]. Further, respondents with a bachelor's degree had a higher cognitive CQ than respondents with a PhD degree, possibly due to the openness and curiosity of younger people in terms of absorbing new cultural knowledge, such as another language and exotic artifacts. Respondents with a master's degree had a higher motivational CQ than those with a bachelor's degree; this difference may reflect the fact that people with a master's degree have more capability to direct attention and energy toward learning and functioning in diversified cultural situations than those with bachelor's degree. Regarding the influence of design field on CQ, the sample showed an uneven number distribution, with the maximum design field having 40 times the number of the minimum design field. This result may have partly caused the insignificant influence of design field on CQ. To summarize, through the testing of Hypotheses 1 to 4, we supplemented theoretical knowledge on the relationship between certain demographic factors and CQ.

Different from the separate impact of the four demographic factors on CQ through Hypotheses 1 to 4, Hypotheses 5 to 8 were tested together through a regression analysis in order to develop a predictive model for competitive advantage. The final model shows that three dimensions of CQ (motivational, metacognitive, and behavioral) could jointly promote competitive advantage. From the regression coefficients, we can see that these three dimensions all have positive impacts on competitive advantage to varying degrees, with motivational CQ being the most important contributing factor and behavioral CQ the least. One possible explanation for this observation could be the unique features of motivational CQ, which could control over affect, cognition, and behavior for goal accomplishment [59]; thus, it is a relatively inclusive factor to some extent. Another explanation is that motivational CQ is connected to intrinsic interest and confidence [60,61], which could trigger constant personal improvement and therefore also increase personal competitive advantages. As for the exclusion of cognitive CQ from the final model, we assume that this dimension is more "static" compared with the other three CQ forms. Judging by the containing items, metacognitive, motivational, and behavioral CQs all present strong interactions and communication with multicultural people or new surroundings; thus, they are "dynamic" dimensions in CQS. In contrast, cognitive CQ contains more knowledge-level content, such as knowing laws, language regulations, religions, and artifacts; thus, it is a relatively "isolated" self-regulated learning process compared with other interaction-requiring dimensions. Therefore, the fact that cognitive CQ did not exist in the final model may partly be due to its static feature or that its influence is too small to be included. What is more, we could further assume that in terms of CQ dimensions, interaction-related factors (metacognitive, motivational, and behavioral CQs) are more effective in predicting competitive advantage than the relatively static factor (cognitive CQ). Hence, through step-by-step investigation, the final predictive model of competitive advantage put forward the theoretical building of the relationship between CQ and competitive advantage, as well as competition in design education.

6.2. Practical Implications

Because CQ contributes to students' career competitive advantage, certain educational programs should be carried out to serve the students who face a highly competitive design career more effectively. We consider that the core spirit in designing corresponding programs is to guide students to become aware of the existence of CQ, and then help them to master the right approach to improve CQ. For example, because students with a master's degree have higher motivational CQ than students with a bachelor's degree, schools could organize activities to let master's students share their experience related to motivational CQ; for example, how to cope with people from different backgrounds, and how to deal with the pressure of new surroundings. Students with a bachelor's degree could obtain cross-cultural knowledge through interactions with experienced peers. In this way, cognitive CQ could become alive through mutual communication instead of static one-way teaching or learning.

As for the benefits for graduate employment and sustainability in a global and changing labor market, CQ is the competency required in order to respond to the needs of a changing labor market and design industry. It can promote the development of effective design partnerships through international design cooperation and help students perform better in both higher education and employment institutions (such as design studios and companies).

The findings of this study will also be of interest to design companies because CQ could serve as an important selection tool. Companies could use the CQS to recruit and select those employees who would best fit the company's cross-cultural design assignments. Culturally intelligent designers are able to give their best performance in cross-cultural settings, and these people can be sent for foreign or overseas assignments because they are able to interact and cooperate effectively with people from different cultural backgrounds. On the other hand, companies can develop training programs to increase designers' CQ capabilities. Because CQ has a positive impact on career competitive advantage, developing culturally intelligent competence will help designers have a sustainable competitive advantage; thus, they could perform better in design practice. Such an

approach could finally contribute back to the sustainable development of companies and form a harmonious multi-improvement cycle between individuals and companies.

7. Conclusions and Suggestions

7.1. Conclusions

To assess the impact of CQ on sustainable career competitive advantages for students in design colleges, we started by finding demographic differences of design students in CQ, and then clarified the associations between CQ and competitive advantage. To measure students' CQ, we applied Ang et al.'s (2007) cultural intelligence scale (Cronbach's α = 0.935); to measure students' competitive advantage, we designed a 10 item list (Cronbach's α = 0.941) based on previous studies and an expert review. We named the four factors of CQ as they originally were (metacognitive, cognitive, motivational, and behavioral CQs) and named the only the factor of competitive advantage as "key competitive advantage".

In terms of the eight hypotheses, half were supported (Hypotheses 3, 5, 7, and 8), and the other half were not (Hypotheses 1, 2, 4, and 6). Specifically, education level had a significant effect on two dimensions of CQ (cognitive and motivational CQs): respondents with a bachelor's degree had a higher cognitive CQ than respondents with a PhD degree, and respondents with a master's degree had a higher motivational CQ than those with a bachelor's degree. Gender, age, and design field did not have significant effects on any dimensions of CQ. These results illustrated the highly specific demographic differences of design students in CQ. Next, to clarify associations between CQ and competitive advantage, step-wise regression analysis was applied. This statistical analysis selected three predictor variables (motivational, metacognitive, and behavioral CQs) in the final regression model, indicating that these three dimensions of CQ have significant impacts on competitive advantage from a statistical perspective. A standard regression equation could be further developed if the predictor variables (metacognitive, motivational, and behavioral CQs) and criterion variable (key competitive advantage) could be calculated: key competitive advantage = 0.368 * Motivational CQ + 0.277 * Metacognitive CQ + 0.177 * Behavioral CQ. This equation demonstrates that students' motivational CQ contributed the most to competitive advantage, followed by metacognitive and behavioral CQs. Therefore, as three factors of CQ (motivational, metacognitive, and behavioral) increase, students' competitive advantage will improve.

7.2. Suggestions

There are methodological limitations in the current study. Thus, there is an opportunity for further refinement in future works. First, we conducted the research in a specific cultural setting (Taiwan), focused on one discipline (design), and took limited samples from one target group (college students). Thus, the findings may not be generalizable to different populations in another culture, such as the demographic differences of design students with respect to CQ, and the impact of CQ on competitive advantage. Therefore, we presented the research details in this study through elaboration to make the variables clear. A possible direction for future study is replication in other cultural settings because cross-cultural researchers have suggested that findings from one culture may not be generalizable across cultures [75]. Although CQ has high reliability and validity across samples, time, and countries [12], some demographic differences may still exist across cultures—these differences could be demonstrated by comparing our study with previous work [45]. This work also represents an extension of Chiu's competitive advantage assessments [33]. We extracted the only factor (key competitive advantage) with ten items under the specific context of discipline (design) and location (Taiwan); the application scope of this key competitive advantage scale is yet to be tested in different cultural and social environments as well as in various industries. Furthermore, the predictive model of CQ for competitive advantage is worth investigating across cultures due to the varied definition and perception of competitive advantage worldwide.

As for the measures, the scale used to assess CQ was the cultural intelligence scale (CQS), whereas the scale used to assess competitive advantage was created based on previous literature and

an expert review. We used the CQS without modification in order to allow for comparisons between the current research with previous works using the same measures; we also extracted reliable items for competitive advantage from previous studies. However, because the scales are based on the literature, the boundaries are set correspondingly for limited predictors of both CQ and competitive advantage. Some important predictors may not have been included for the specific purposes of this study. One possible way to improve the scales for CQ could be by embellishing the wording of each item for a design-targeted setting, or by adding new items when properly reviewed and tested; a potential approach for improving scales for competitive advantage could be to use open-ended questions among experienced designers to capture important predictors. Further, the connection between CQ and competitive advantage could be retested when including more factors involved, such as the mediation or moderation effect of demographic factors.

References

1. Gray, C.M.; Boling, E. Designers' articulation and activation of instrumental design judgements in cross-cultural user research. *CoDesign* **2018**, *14*, 79–97.
2. Yang, Y.F. Discussion on the development of teachers in Confucius Institute from the perspective of cultural intelligence. *Educ. Teach. Forum* **2014**, *45*, 17–19.
3. Suadamara, R.; Werner, S.; Hunger, A. Cross-cultural design of a groupware application for global virtual team. In Proceedings of the 2011 International Conference on Internationalization, Design and Global Development, Orlando, FL, USA, 9–14 July 2011.
4. Brereton, M.; Roe, P.; Amagula, T.; Bara, S.; Lalara, J.; Hong, A.L. Growing existing aboriginal designs to guide a cross-cultural design project. In Proceedings of the IFIP Conference on Human-Computer Interaction (INTERACT 2013), Cape Town, South Africa, 2–6 September 2013.
5. Sustainable Development Goals. Available online: https://www.un.org/sustainabledevelopment /sustainable-development-goals/ (accessed on 12 December 2019).
6. Harvey, L.; Knight, P.T. *Transforming Higher Education*; Society for Research into Higher Education & Open University Press: Buckingham, UK, 1996.
7. Ke, Y.; Liu, X.F. Discussions on evaluation system of career competitiveness for college graduates. *Heilongjiang Res. High. Educ.* **2004**, *1*, 117–119.
8. Gao, S.; Wang, J.M. A study of college students employment competitive strength under the background of mass higher education. *J. Inn. Mong. Univ. Financ. Econ. Coll.* **2008**, *5*, 19–22.
9. Lou, X.J.; Zhou, S.H.; Wu, L.Y. Analysis on college students' career competitiveness. *Res. Educ. Dev.* **2005**, *13*, 49–52.
10. Zhao, Z.C.; Chen, X.L. Discussion on college students' career competitiveness and improvement. *Heilongjiang Res. High. Educ.* **2006**, *4*, 60–63.
11. Xiang, Z.Y.; Ding, K. Research on the evaluation of college graduates' career competitiveness. *Stat. Decis.* **2009**, *24*, 82–84.
12. Ang, S.; Dyne, L.V.; Koh, C.; Ng, K.Y.; Templer, K.J.; Tay, C.; Chandrasekar, N.A. Cultural intelligence: Its measurement and effects on cultural judgment and decision making, cultural adaptation and task performance. *Manag. Organ. Rev.* **2007**, *3*, 335–371.
13. Earley, P.C.; Ang, S. *Cultural Intelligence: Individual Interactions Across Cultures*; Stanford University Press: Palo Alto, CA, USA, 2003.
14. Zhuang, C. Research on Team Cultural Intelligence, Team Coordination and Team Effectiveness in Cross-Cultural Teams. Master's Thesis, Shanghai Jiao Tong University, Shanghai, China, 2011.
15. Wang, Y. Study on cross-cultural cultivation model of college students' cultural intelligence from post-modernism's critical perspective. *Read Write Period.* **2014**, *4*, 25–26.

16. Fan, Y.H. Take Chinese as a second language: From the perspective of cultural intelligence. *Data Cult. Educ.* **2008**, *11*, 55–56.

17. Wang, L. Research on the cultivation of the cross-cultural quotient pattern of college students. *Educ. Teach. Res.* **2010**, *24*, 61–63.

18. Costa, P.T.; McCrae, R.R. *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual*; Psychological Assessment Resources: Odessa, FL, USA, 1992.

19. Ang, S.; Van Dyne, L.; Koh, S.K. Personality correlates of the four-factor model of cultural intelligence. *Group Organ. Manag.* **2006**, *31*, 100–123.

20. Fu, C.L. Reflection and criticism on the multiculturalism in Taiwan under multiethnic field. *J. Jishou Univ. Soc. Sci. Ed.* **2012**, *33*, 92–96.

21. Su, M.J. Multi-Culture study on project of Taiwan local cultural museums. *J. Mus. Cult.* **2013**, *6*, 35–68.

22. Feng, Y.T.; Lin, P.S.; Liu, C.C. A Research of context of design education students graduation exhibition in TAIWAN. *J. Commer. Des.* **2018**, *22*, 130–150.

23. Lv, Q.C.; Lin, R.T. The influence of Bauhaus style on Taiwan design education. *Art Apprec.* **2010**, *6*, 28–43.

24. Earley, P.C. Redefining interactions across cultures and organizations: Moving forward with cultural intelligence. *Res. Organ. Behav.* **2002**, *24*, 271–299.

25. Earley, P.C.; Gibson, C.B. *Multinational Work Teams: A New Perspective*; Lawrence Erlbaum: Hillsdale, NJ, USA, 2002.

26. Tsui, A.S.; Nifadkar, S.S.; Ou, A.Y. Cross-national, cross-cultural organizational behavior research: Advances, gaps, and recommendations. *J. Manag.* **2007**, *33*, 426–478.

27. Sternberg, R.J.; Detterman, D.K. *What Is Intelligence: Contemporary Viewpoints on its Nature and Definition*; Ablex: Norwood, NJ, USA, 1986.

28. Schmidt, F.L.; Hunter, J.E. Select on Intelligence. In *The Blackwell Handbook of Organizational Principles*; Locke, E.A., Ed.; Blackwell: Oxford, UK, 2000; pp. 3–14.

29. Thorndike, R.; Stein, S. An evaluation of the attempts to measure social intelligence. *Psychol. Bull.* **1937**, *34*, 275–285.

30. Mayer, J.D.; Caruso, R.R.; Salovey, P. Emotional intelligence meets traditional standards for an intelligence. *Intelligence* **2000**, *27*, 267–298.

31. Sternberg, R.J.; Forsythe, G.B.; Hedlund, J.; Horvath, J.A.; Wagner, R.K.; Williams, W.M.; Snook, S.; Grigorenko, E.L. *Practical Intelligence in Everyday Life*; Cambridge University Press: New York, NY, USA, 2000.

32. Chamberlin, E. *The Theory of Monopolistic Competition: A Reorientation of the Theory of Value*, 7th ed.; Harvard University Press: Cambridge, MA, USA, 1960.

33. Chiu, S.P. A Study of Students' Core Competencies and Competitive Advantage from Design Colleges. Doctor's Thesis. National Yunlin University of Science & Technology, Yunlin, Taiwan, 2014. Available online: https://ndltd.ncl.edu.tw/cgi-bin/gs32/gsweb.cgi/ccd=ytscbQ/search#XXX (accessed on 2 November 2019).

34. Aaker, D.A. Managing Assets and Skills: The Key to a Sustainable Competitive Advantage. *Calif. Manag. Rev.* **1989**, *31*, 91–106.

35. Bharadwaj, S.G.; Varadarajan, P.R.; Fahy, J. Sustainable competitive advantage in service industries: A conceptual model and research propositions. *J. Mark.* **1993**, *57*, 83–99.

36. Prasetyo, A.H. Contextualizing sustainable competitive advantage: A perspective of social entrepreneurship. *J. Entrep. Bus. Econ.* **2017**, *5*, 41–66.

37. Tiwana, A. *The Knowledge Management Toolkit: Orchestrating IT, Strategy and Knowledge Platforms*, 2nd ed.; Prentice-Hall: Upper Saddle River, NJ, USA, 2002.

38. Murray, P. Designing for Business Benefits from Knowledge Management. In *Knowledge Horizons: The Present and the Promise of Knowledge Management*; Chauvel, D., ed.; Butterworth-Heinemann: Boston, MA, USA, 2000; pp.171–194.

39. Teece, D.J.; Pisano, G.; Shuen, A. Dynamic capabilities and strategic management. *Strateg. Manag. J.* **1997**, *18*, 509–533.

40. Li, T. *Competitive Advantage In Higher Education Institution*; LAP LAMBERT Academic Publishing: Saarbrücken, Germany, 2011.

41. Report on Employment Situation of College Students in Taiwan. Youth Development Administration. Available online: http://www.nyc.gov.tw/main.php (accessed on 20 September 2012).

42. Mcnulty, J.P.; Mackay, S.J.; Lewis, S.J.; Lane, S.; White, P. An international study of emotional intelligence in first year radiography students: The relationship to age, gender and culture. *Radiography* **2016**, *22*, 171–176.

43. Tsaousis, I.; Kazi, S. Factorial invariance and latent mean differences of scores on trait emotional intelligence across gender and age. *Personal. Individ. Differ.* **2013**, *54*, 169–173.

44. Petrides, K.V. *Technical Manual for the Trait Emotional Intelligence Questionnaires (TEIQue)*; London Psychometric Lab: London, UK, 2009.

45. Khodadady, E.; Ghahari, S. Validation of the Persian Cultural Intelligence Scale and exploring its relationship with gender, education, travelling abroad and place of living. *Glob. J. Hum. Soc. Sci.* **2011**, *11*, 65–75.

46. Derksen, J.; Kramer, I.; Katzko, M. Does a self-report measure for emotional intelligence assess something different than general intelligence? *Personal. Individ. Differ.* **2002**, *32*, 37–48.

47. Nelis, D.; Quoidbach, D.; Mikolajczak, M.; Hansenne, M. Increasing emotional intelligence: (how) is it possible? *Personal. Individ. Differ.* **2009**, *47*, 36–41.

48. Palmer, B.R.; Manocha, R.; Gignac, G.; Stough, C. Examining the factor structure of the bar-on emotional quotient inventory with an Australian general population sample. *Personal. Individ. Differ.* **2003**, *35*, 1191–1210.

49. Day, A.L.; Carroll, S.A. Using an ability-based measure of emotional intelligence to predict individual performance, group performance, and group citizenship behaviours. *Personal. Individ. Differ.* **2004**, *36*, 1443–1458.

50. Brislin, R.; Worthley, R.; MacNab, B. Cultural intelligence: Understanding behaviors that serve people's goals. *Group Organ. Manag.* **2006**, *31*, 40–55.

51. Triandis, H.C. Cultural intelligence in organizations. *Group Organ. Manag.* **2006**, *31*, 20–26.

52. Triandis, H.C. *Culture and Social Behavior*; McGraw Hill: New York, NY, USA, 1994.

53. Hofstede, G. *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*; Sage: Thousand Oaks, CA, USA, 2001.

54. Theriou, N.G.; Anggelidis, V.; Theriou, G.N. A theoretical framework contrasting the resource-based perspective and the knowledge-based view. *Eur. Res. Stud.* **2009**, *12*, 178–192.

55. Rahmeyer, F. From a routine-based to a knowledge-based view: Towards an evolutionary theory of the firm. In *Elgar Companion to Neo Schumpeterian Economics*; Hanusch, H., Pyka, A., Eds.; Edward Elgar: Cheltenham, UK; Northampton, MA, USA, 2006.

56. Halawi, L.; Aronson, J.; McCarthy, R. Resource-based view of knowledge management for competitive advantage. *Electron. J. Knowl. Manag.* **2005**, *3*, 75–86.

57. Sheikh, S.A. Use of new knowledge and knowledge management to gain competitive advantage. *Commun. IBIMA* **2008**, *1*, 34–41.

58. McFayden, A.; Canella, A. Social capital and knowledge creation: Diminishing returns of the numbers and strength of exchange relationship. *Acad. Manag. J.* **2004**, *47*, 35–37.

59. Kanfer, R.; Heggestad, E.D. Motivational traits and skills: A person-centered approach to work motivation. *Res. Organ. Behav.* **1997**, *19*, 1–56.

60. Deci, E.L.; Ryan, R.M. *Intrinsic Motivation and Self-Determination in Human Behavior*; Plenum: New York, NY, USA, 1985.

61. Bandura, A. Social cognitive theory in cultural context. *Appl. Psychol. Int. Rev.* **2002**, *51*, 269–290.

62. Hall, E.T. *The Silent Language*; Doubleday: New York, NY, USA, 1959.

63. Gudykunst, W.B.; Ting-Toomey, S.; Chua, E. *Culture and Interpersonal Communication*; Sage: Newbury Park, CA, USA, 1988.

64. Levy, R. Design education: Time to reflect. *Des. Issues* **1990**, *7*, 42–52.

65. Zhang, W.X.; Xu, F.H.; Lai, M.M. Research on the education mode for designing talents based on professional design practice. *J. Technol.* **1997**, *12*, 219–226.

66. Zheng, Y.J. Design education based on professional design ability. *Design* **1997**, *75*, 48–53.

67. Guilford, J.P. *Psychometric Methods*, 2nd ed.; McGraw-Hill Book Company: New York, NY, USA, 1954.

68. Yousofpourfard, H. Cultural Intelligence: A New Approach to Manage Teamwork in Culturally Diverse Teams. Doctor's Thesis, McMaster University, Hamilton, ON, Canada, 2010.

69. Jyoti, J.; Kour, S.; Bhau, S. Assessing the impact of cultural intelligence on job performance: Role of cross-cultural adaptability. *J. IMS Group* **2015**, *12*, 23–33.

70. Kaiser, H.F. An index of factorial simplicity. *Psychometrika* **1974**, *39*, 31–36.
71. Tu, J.T. *Quantitative Research with SPSS*, 2nd ed.; Wu Nan: Taipei, Taiwan, 2016.
72. Tabachnick, B.G., Fidell, L.S. *Using Multivariate Statistics*, 5nd ed.; Allyn and Bacon: Boston, MA, USA, 2007.
73. Hair, J.F.; Anderson, R.E.; Tatham, R.L.; Black, W.C. *Multivariate Data Analysis*, 5th ed.; Macmillan: New York, NY, USA, 1998.
74. Field, A. *Discovering Statistics Using SPSS*, 2nd ed.; Sage: London, UK, 2005.
75. Kim, Y.J.; Yoon, H.J. Predicting green advertising attitude and behavioral intention in South Korea. *Soc. Behav. Personal. Int. J.* **2017**, *45*, 1345–1364.