

# 科技部補助專題研究計畫成果報告 期末報告

## 泰雅族編織箱之文化人因工程研究(第2年)

計畫類別：個別型計畫  
計畫編號：MOST 105-2221-E-144-001-MY2  
執行期間：106年08月01日至107年07月31日  
執行單位：國立臺灣藝術大學創意產業設計研究所

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報告附件：出席國際學術會議心得報告

中華民國 107 年 10 月 09 日

中文摘要：文化人因工程學之研究目的，在於探討如何經由「人因工程」的研究，將不同的文化特色經由互動與經驗交流，將「文化創意」加值產品「設計」，也就是「創意」如何「加值」設計，進而達到豐富文化創意產業之內涵。現代設計師更需要透過與歷史文化的交流尋找設計創意，透過文化人因工程的探討，將有助於把文化內涵加入產品創意設計中。因此，本研究計畫嘗試從文化人因工程的角度切入，探討文化創意產品的設計，並以原住民編織箱的人因工程探討為例，了解這種特殊的編織工具，如何編織出那麼動人的圖案，結合「人因工程」與「創意設計」，了解「編織箱」之人因工程設計相關的考量因素。探討「原住民文物」如何經由「文化人因工程」相關研究，建立一套編織工具與服飾設計轉換原則，提供設計師設計文化創意產品之參考。

中文關鍵詞：關鍵詞：文化人因工程，編織箱，跨文化設計，台灣原住民文化。

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英文關鍵詞：cultural ergonomics, weaving box, cross cultural design, Taiwan aboriginal culture.

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(期中進度報告/期末報告)

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計畫參與人員：陳璽敬、洪珮華

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執行國際合作與移地研究心得報告

出席國際學術會議心得報告

出國參訪及考察心得報告

中 華 民 國 107 年 9 月 17 日

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# 泰雅族編織箱之文化人因工程研究

## 摘要

文化人因工程學之研究目的，在於探討如何經由「人因工程」的研究，將不同的文化特色經由互動與經驗交流，將「文化創意」加值產品「設計」，也就是「創意」如何「加值」設計，進而達到豐富文化創意產業之內涵。現代設計師更需要透過與歷史文化的交流尋找設計創意，透過文化人因工程的探討，將有助於把文化內涵加入產品創意設計中。因此，本研究計畫嘗試從文化人因工程的角度切入，探討文化創意產品的設計，並以原住民編織箱的人因工程探討為例，瞭解這種特殊的編織工具，如何編織出那麼動人的圖案，結合「人因工程」與「創意設計」，瞭解「編織箱」之人因工程設計相關的考量因素。探討「原住民文物」如何經由「文化人因工程」相關研究，建立一套編織工具與服飾設計轉換原則，提供設計師設計文化創意產品之參考。

關鍵詞: 文化人因工程，編織箱，跨文化設計，台灣原住民文化。

## A Study of Cultural Ergonomics in Atayal Weaving Box

### Abstract

Cultural ergonomics is an approach that considers interaction- and experience-based variations among cultures. Cultural ergonomics extends our understanding of cultural meaning and our ability to utilize such understanding for design and evaluate everyday products. Designers need to develop a better understanding of cultural ergonomics not just to participate in cultural contexts but also to develop interactive experiences for users. The purpose of this project is to explore the meaning of cultural objects and to extract their cultural features from Taiwan's aboriginal culture. This project attempts to illustrate how by enhancing the original meaning and images of Taiwan aboriginal culture features and by taking advantage of new production technology, they may be transformed into modern products and so fulfill the needs of the contemporary consumer market. The gungu, literally "weaving box", in the Atayal aboriginal language, was chosen as the cultural object for this study. The project focuses on and analyzes the weaving box's appearance, usability, cultural meaning, operational interface, and the scenario in which it is used. Then, this project intends to create an interface for examining the way designers communicate across cultures as well as the interwoven experience of design and culture in the design process.

Keywords: cultural ergonomics, weaving box, cross cultural design, Taiwan aboriginal culture.

## 一、前言

產品市場全球化後，消費者渴望尋求地域性的文化特色，如何以文化創意的產品，重拾消費者對文化的認同，「文化創意加值」成為產品設計可以發揮的空間。今天，企業面臨「經濟全球化」的衝擊，如何結合文化發揮設計創意，以「設計在地化」營造產品特色，面對這一波「市場全球化」的挑戰，將是未來台灣發展文化創意產業，提升設計產業競爭力的首要課題（林榮泰和王銘顯，2008）。台灣原住民族各有許多不同的生活器物，例如達悟族雖以種竿為主，實際上漁撈也是其主要的生產之一，而又適逢蘭嶼海流介於冷暖海流與黑潮交會之處，漁獲豐富，依此天然環境資源而產生著名的拼板舟。其船板是由小斧一刀一刀，從大樹幹鑿出來的，再加以其獨特的圖飾，成為達悟族的代表性的文化物品。除了達悟族外，其他各族皆有其特殊的生活器具，皆蘊涵著豐富的族群文化內涵。又如，排灣族的連杯更是少見的飲酒器。排灣族連杯的使用，除了其文化特色、慶典習俗等豐富的文化內涵外，排灣族人是如何決定兩杯口的距離、把手的形狀長度、如何協調操作等，都是非常有趣的人因研究，也因此產出了不少有助於文化創意產品設計的論述與成果，稱之為文化人因工程學研究（郭伯倫，2006；Lin, Chen, Hsiao & Lin, 2016）。如何積極的進行原住民文化保留和傳承的工作，甚至加以發揚光大是刻不容緩的任務。原住民的生活用具或其圖騰紋飾的呈現，可以傳達出原住民的生活觀、價值觀及宇宙觀，更可藉由著圖騰紋飾強調宗教信仰的力量，以維持社會秩序。近年來，由於社會的快速變遷及工商業社會環境文化的衝擊，台灣原住民文化漸漸面臨失去固有傳統的危機，如何有效的保存原住民文化，並進一步深化是非常重要的課題。

如何經由「人因工程」的研究，將原住民的文物轉換為「文化創意」，加值產品「設計」，也就是「創意」如何「加值」設計，進而達到豐富台灣文化創意產業之文化內涵。本研究計畫以台灣原住民泰雅族編織箱作為研究標的，研究其編織箱相關的人因設計、優美造形、操作介面與文化意涵。編織箱是一種特殊的生活用品的製作工具，其設計是台灣原住民表現人因工程的工具，除了造形需要考慮人體尺寸，其操作必需符合人因工程外，編織的過程就是一種創作的心靈享受，或展現創意的感情交融，這種充滿智慧的生活用具是如何產生的，正是本計畫探討主要目標。

本計畫從文化人因工程的角度切入，以原住民編織箱的人因工程探討為例，瞭解這種特殊的編織工具，如何編織出那麼動人的圖案，建立一套編織工具與服飾圖案的轉換模式，提供給設計師在設計文化創意產品過程中的參考。本研究計畫的實際操作，則是經由台灣原住民泰雅族編織箱，探討其在充滿著原住民的原始工藝下的功能性內涵，如何搭配生活文化，如何考量人因操作的設計，以致不會讓編織箱在未來使用上面臨困境，探求編織箱本身的設計內容，並進一步的利用林榮泰(2005, Lin, 2007)所提出的文化創意產品設計方法，將編織箱重新轉換設計，成為現代文化商品，以達到下述目標：

- (1) 結合「人因工程」與「創意設計」，瞭解「編織箱」之人因工程設計相關的考量因素。
- (2) 探討「編織箱」如何經由「文化人因工程」相關研究，轉換為新的現代編織工具。
- (3) 整合時尚設計產業鏈，提出如何應用編織箱之文化內涵，再現於現代織品設計的創新模式。
- (4) 培育文化創意加值產品設計的人才，進而探討文化內涵如何加值產品創意的行銷策略。

## 二、研究背景

台灣原住民分散各地，每一原住民族的風俗民情各異，其所使用的器物也因族群習性不同而各有特色。林榮泰(2007)曾經以台灣原住民排灣族的飲酒器－連杯，作為研究標的探討其人因工程相關

問題與設計，進一步研究如何應用「連杯」的文化特色，轉換到文化創意產品的設計。因此，衍生後續系列研究，並發表了相關論文，成果豐碩（Lin, Chen, Hsiao & Lin, 2016）。

近年來，從許多探討原住民服飾設計的研究中，發現不少自創設計者融合傳統與現代元素於原住民服飾設計，如圖 1 係苗栗野桐工坊的泰雅族原住民服飾設計師尤瑪達路的作品。這是一種文化再創造 (cultural reinvention)，或新傳統形成 (formation of new tradition) 的現象。很難想像這麼複雜的圖案，居然是用如圖 2 所示的這種古老而簡單的背織機所織出來的。編織者靠著背帶控制鬆緊達到編織的目的，是人與工具達到和諧的典範；其實許多擅於編織的原住民族，都使用這種類似的編織機，圖 2 左圖是台灣泰雅族原住民的背織機。



圖 1 野桐工坊尤瑪達陸的編織作品 (研究者拍攝自「職人台灣」展覽會場)



圖 2 泰雅族編織箱與使用情形 (林榮泰、Kreifeldt, 2014)

### 三、研究方法

#### 3.1 人因系統設計分析模式

「造形」是整個產品設計活動的最終成果，「造形」是「機能與美學」，「科技與人性」綜合的整體表現。由此可知，產品的造形包含了不同比重的設計要素，而不同比重因素的組合，則有不同的造形結果。符合「科學」客觀的要求，卻可能無法滿足「人性」主觀的需求。美國 Tufts 大學的人因工程專家 Kreifeldt 教授為了要探討操作介面與工程介面之間的關係，曾提出「使用者(user) -- 產品(product) -- 工作(task)」的人因系統設計分析模式 (林榮泰、Kreifeldt, 2014)。例如著名的麗奇牙刷設計就是

一個利用該模式成功設計的案例，亦是在人因工程應用於產品設計的文獻中，曾被提及的一個知名且典型的範例。

一個產品除了要考慮「操作介面」與「工程介面」以外，還需有一個裝飾功能或令人賞心悅目的美學介面。「操作介面」提供一個「好用」的產品，「工程介面」賦予一個「能用」產品，「美學介面」則給與一個「愉悅」的產品；三者之間的平衡就是一個設計優良的產品。就產品設計而言， Kreifeldt (1974) 教授曾提出「操作介面」、「工程介面」與「美學介面」三者之間的分析模式，圖 3 所示 (Lin, & Kreifeldt, 2001；林榮泰、Kreifeldt, 2014)。

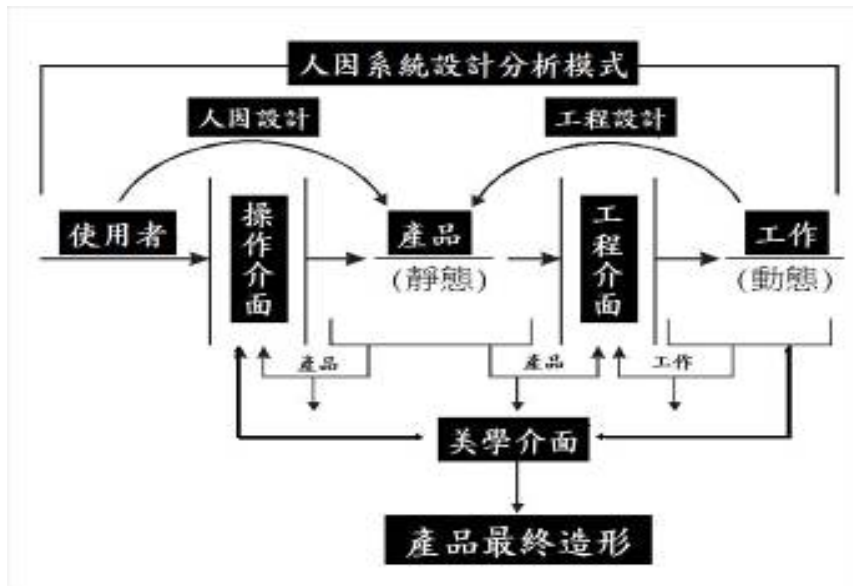


圖 3 產品設計的人因系統設計分析模式 (林榮泰、Kreifeldt, 2014)

產品功能受限於科技、工程或生產技術愈多愈偏重於「工程介面」，此時產品造形的自由性和主觀美感的成分就愈受限制，產品最終的造形也就愈機能化。當某項產品的科技層面愈趨成熟時，操作(介面)就愈容易，造形美學(介面)就愈多樣。因此，從產品設計發展的過程，設計師會在「操作介面」與「工程介面」互動關係中，發揮設計師主觀造形和個性的「美學介面」，使產品兼具理性的機能與感性的造形。透過「使用者、產品、工作」三者之間的交互影響，而形成產品的最終造形，這也是為什麼同類的產品，透過不同的設計後，會呈現造形多樣性的原因。

一般產品設計從定義設計問題、引導設計、發展構想、設計評估及設計定案等過程中，可以透過「使用者(user)－產品(product)－工作(task)」的人因工程分析模式，從分析「操作介面」的關係，探討使用者相關的人因問題，再導入相關的科技，研究有關「工程介面」的機能問題。最後，利用操作介面的人因分析和工程介面的工程探討，應用其結果來決定「美學介面」的產品造形。除了提供一般的消費產品的使用介面分析外，高科技資訊產品，也可以經由使用者/產品(工具)/功能(任務)的分析模式，提供設計師以使用者為中心的設計參考 (林榮泰、Kreifeldt, 2014)。

### 3.2 研究方法與程序

本計畫以文化人因工程為研究方法，採取質量混和研究方法，依據研究設計，分為前導研究階段、驗證階段與轉化階段等三個階段，針對編織者(user)、編織箱(tool)與編織品(task)進行研究。前導研究與



驗證階段採用質化研究方法，包含內容分析法、文本分析法，針對編織者(user)與編織箱(tool)、編織者(user)與編織品(task)，以及編織箱(tool)與編織品(task)之間的人因工程相關分析，其之間的關係如圖 4 所示 (Lin et al., 2016)。

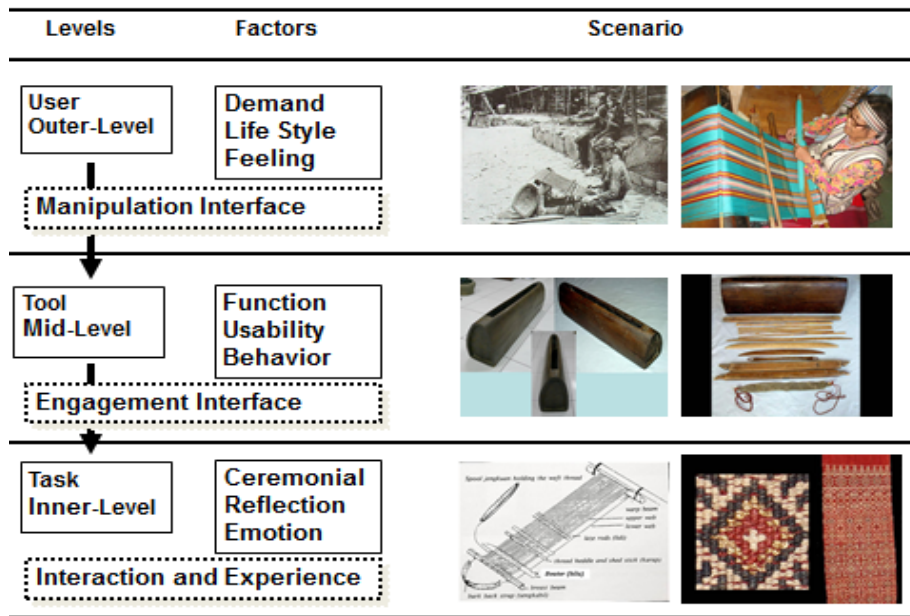


圖 4 前導研究與驗證階段的研究方法 (Lin et al., 2016)

根據 A. Stephen (1998) 的論述，資料(Data)屬於未加工的事實(raw facts)；資訊(information)是有組織過的資料，屬於資料實質性的描述；而存在於文化中的個體角色、學習行為與經驗脈絡中的資訊則是知識(knowledge)。過去數位典藏將文物實體資料予以數位化，藉由網路儲存，網站整合而成為資訊，在使用者取用數位典藏資訊進行各項學習、娛樂等活動後產出的將轉變為對使用者有意義的知識。因此轉化階段採用這個原理，在文化人因工程的研究過程中，使用者操作由資料-資訊-知識的轉換過程。因此，本計畫在轉化的過程中，將分別針對資料加值、資訊加值與知識加值等三種轉化過程，做系統的研究以相對應的文化人因工程的應用實驗，以驗證此三種類型的加值活動，未來皆能夠運用於文化創意的應用模式。其之間的關係如圖 5 所示 (林榮泰、涂良錦、蕭銘屯，2006；Lin et al., 2016)。

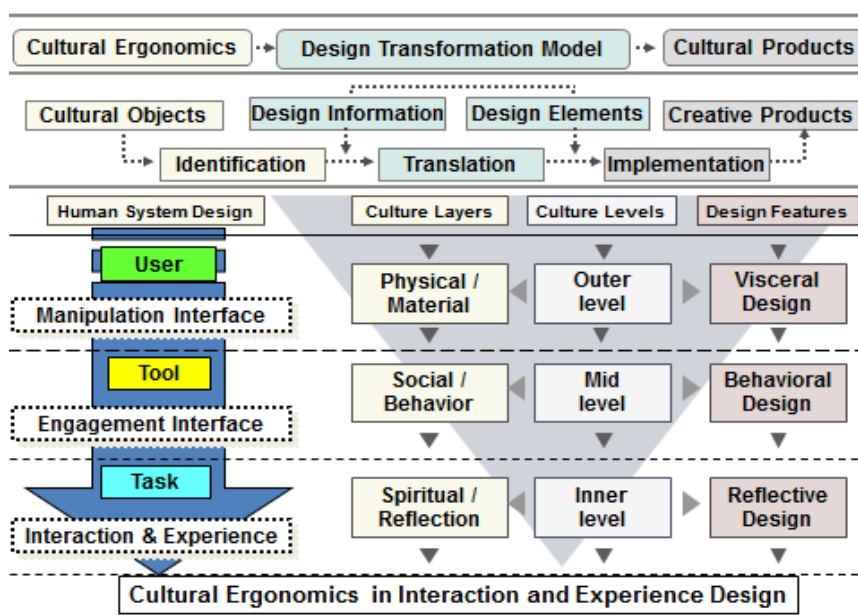


圖 5 從資料到智慧的文化創意加值模式 (Lin et al., 2016)

### 3.3 研究架構與執行步驟

臺灣原住民文化的傳承與創新：以泰雅族編織箱的創新設計為例。

此研究的重要性，在於一件傳統文化的原住民的編織工具，其文化人因工程的研究。例如，編織箱的固定棒、提綜桿、開口分經棒、分層棒、線綜棒、挑花棒、捲布夾、打緯刀、緯梭板等，如何使用這些工具，以及其設計的人性思維，其長度、高度等的適合人因考量，當然還有控制鬆緊的背帶，來調整編織圖案等都值得進一步探討研究（林榮泰、Kreifeldt, 2014）。編織箱從資料到智慧的文化創意加值模式與研究流程如圖 6、圖 7 所示。

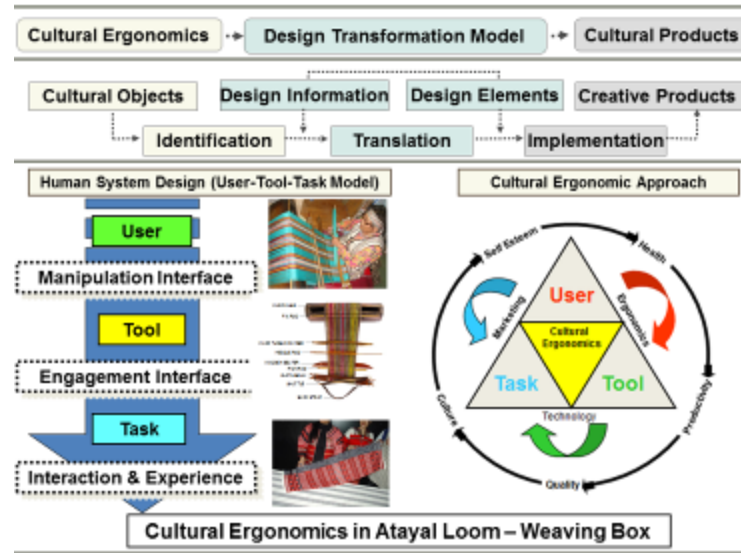


圖 6 編織箱從資料到智慧的文化創意加值模式 (本研究計畫繪製)

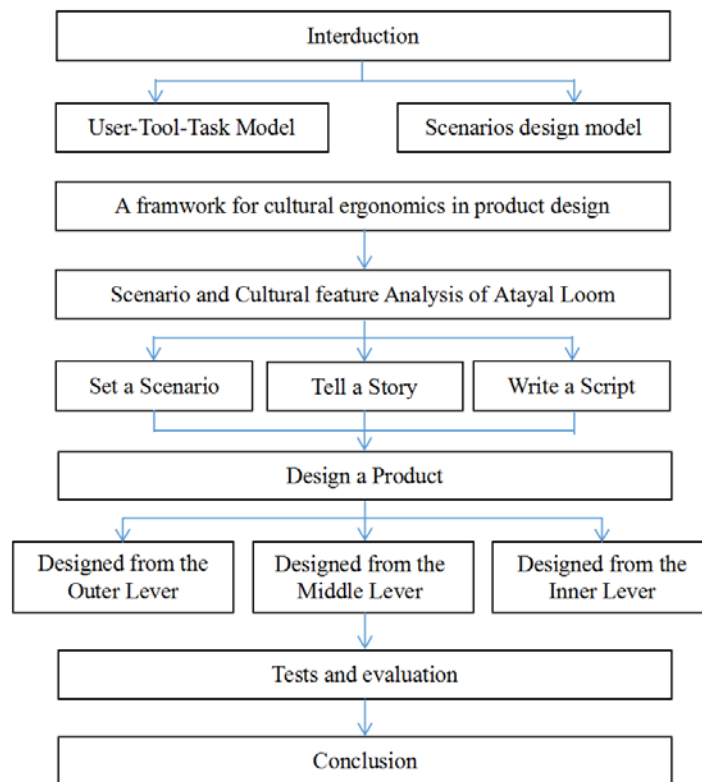


圖 7 編織箱從資料到智慧的文化創意加值模式之研究流程

## 四、研究成果 -- 編織箱改良設計 (From weaving box to modern box)

根據本研究計畫的目的完成下列的研究成果。

- (1) 結合「人因工程」與「創意設計」，瞭解「編織箱」之人因工程設計相關的考量因素。
- (2) 探討「編織箱」如何經由「文化人因工程」相關研究，轉換為新的現代編織工具。
- (3) 整合時尚設計產業鏈，提出如何應用編織箱之文化內涵，再現於現代織品設計的創新模式。
- (4) 培育文化創意增值產品設計的人才，進而探討文化內涵如何增值產品創意的行銷策略。

關於上述的部分成果，請參考附錄一。

### 4.1 從傳統的編織箱到現代編織盒

除了傳統編織箱的人因工程研究外，本章節以從傳統的編織箱到現代編織盒的改良設計為主。經由本研究計畫探討之後，其重要性將會慢慢的顯露出來，從而得知台灣原住民的智慧應用在器具上的設計，將會突破一般人對於原住民器物的觀念，並得以更科學的角度去面對，就台灣文化研究的研究領域而言，除了對先民器物以文化藝術的方向去做探討之外，更可以現代的人因工程設計部分去做器物的分析，讓先民器物的研究分析內容能更佳的完整。就文化創意設計而言，產品的形成往往具有文化本質上的基本需求，但在物質慾求盲目的追求和資本主義的炒作之下，產品可能因此而失去其本身應具備的精神與意義。本計畫希望藉由原住民族編織箱的文化人因之探索，透過有目的性的編織工具研究，期待有助於原住民服飾之設計，表達使用者內心純真的渴望與需求。從探究編織箱的「思古幽情」出發，以達到現代織品設計的「再現風華」（林榮泰、Kreifeldt, 2014）。

泰雅族是臺灣原住民文化的重要組成部分，本研究以泰雅族編織文化的傳承為基礎，探索創新性的設計思維，以傳統的織箱文化為研究物件。基於文化產品設計模式基礎上，提出一種文化與人體工程學交互設計的思考模式。目的是將文化人體工程學與交互設計相結合，探索用戶體驗中的人文交互。利用「情境故事法」引導出泰雅族人對編織箱意義傳承的需求，並從編織箱的外在造型、使用機能和精神意涵三個方面進行傳承與創新設計。目的在於將傳統文物融入現代產品，以滿足新生代泰雅族人的學習使用與文化特徵的傳播，也正是從文化傳承問題的“傷感”到創新設計的“愉悅”呈現。

本研究以臺灣泰雅族特有的編織箱為對象，瞭解其住民生活中編織的傳承問題，觀察編織箱使用情形與文化傳播現狀，並利用「情境故事法」引導出泰雅族人對編織箱意義傳承的需求。進一步採用「品質機能展開法」將用戶需求轉換成具體的技術規格、語意內涵和情感訴求，最後以紙雛型與原型測試方法，評估所發展之泰雅族編織箱的適用性，以達到對臺灣泰雅族編織文化傳承與創新設計的目的。

現代編織盒的改良設計如下圖 8 所示，改良後的現代編織盒有如下特點：

1. 尺寸縮小：明顯小於原有織布箱和織帶機的尺寸，尺寸為 36.6 釐米長，13 釐米寬，5 釐米高。
2. 重量減輕：約為 0.85kg，可輕鬆用手拿起。
3. 泰雅裝飾：選取泰雅族傳統織物顏色與圖案，用紅色與菱形紋做結合，選取木材本身的紅色與原木色拼接搭配，提升了整體裝飾性與視覺美感，凸顯了民族特徵性的識別符號。

4.收納便攜：將織帶所用到的部件與工具統統收入盒內，如將具有整經架作用的多根圓柱與盒體結合，以及將緯梭板和棒刀直接收置於盒內，很好的解決了之前的工具零散及無關聯性。

5.親民設計：以更舒適的尺度感拉近使用者與織帶機的關係，在將傳統編織文化講述與技術傳承的過程中，它起到了很好的過渡性作用，是讓初學者更為親近的設計，同時也能將編織文化和基本技藝向更廣泛區域和更多民眾進行傳播。



圖 8 現代編織盒的改良設計



## 4.2 測試與評估

本研究為了得知現代編織盒的使用性及需要改進的地方，特別與相似設計的紐西蘭版迷你織帶機一起評估。由於現代編織盒體積較小，適合國小學童使用，因此評估對象以國小學童為主。

### 1. 受訪學童

本研究邀請 5 位學童參與評估，依序編號 A、B、C、D、E，其中學童 A 及學童 B 均為 10 歲女童；學童 C 及 D 均為 9 歲女童；學童 E 為 8 歲男童。五位學童均是第一次操作現代編織盒及紐西蘭版迷你織帶機。

### 2. 評估樣品

本實驗評估現代編織盒及紐西蘭版迷你織帶機，兩款織帶機本體均為木材製，部分零件使用金屬，外型及尺寸如下表 1。

表 1 本研究評估之兩款迷你織帶機

	尺寸(公分) (長*寬*高)	圖片
現代編織盒	外盒 (36.6*13*5)	
	使用時 (36.6*23*14.5)	
紐西蘭版 迷你織帶機	使用時 (38*11*17)	

### 3. 評估方法

本評估實驗在國小某間會議室中進行，由於受訪學童均未使用過該兩款迷你織帶機，因此一開始由學童之編織老師教導操作方式，約 5 分鐘後學童即可掌握操作流程，之後由學童自行操作 5 分鐘，期間以數位攝影機錄影教學過程及自行操作的過程。圖 9 為學童使用現代編織盒的過程，圖 10 為學童使用紐西蘭版迷你織帶機的過程。最後以口頭詢問下列問題：(1)會不會覺得操作過程很複雜?(2)會不會覺得這款織帶機很難用，覺得哪裡不好用?(3)覺得哪一款織帶機比較好用?

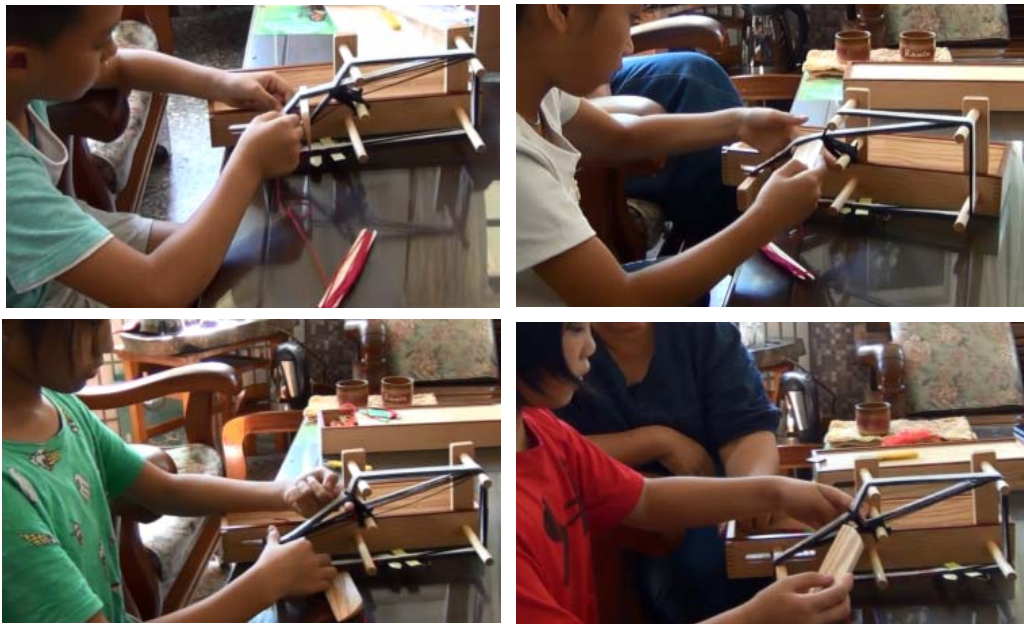


圖 9 學童使用現代編織盒之過程



圖 10 學童使用紐西蘭版迷你織帶機之過程

### 3. 評估結果

#### (1) 會不會覺得操作過程很複雜?

5 位學童經過約 5 分鐘教學後均能獨自操作，且均反應操作流程不會很複雜，可見此兩款迷你織帶機的操作流程堪稱簡易。

#### (2) 會不會覺得這款織帶機很難用，覺得哪裡不好用?

5 位學童均認為現代編織盒不太好用，原因均是“梭口過小”。編織步驟中，須上提第一組經線(上經線)，藉以產生梭口，接著卡入打緯刀固定經線，讓緯梭板(緯線)從梭口穿過，再用打緯刀將緯線打緊。接著下壓第二組經線(下經線)，接續完成產生梭口、卡入打緯刀、緯梭板從中穿過、用打緯刀將緯線打緊等步驟，一直重複這些步驟布匹才能交織而成。由於學童在上提下壓經線的時候，現代編織盒產生的梭口較小(如圖 11)，學童花費較多時間找出梭口並用手指擴大開口，紐西蘭版織帶機的梭口較大、較明顯，學童很容易地發現梭口位置，進而用手指擴大開口，導致現代編織盒的使用性評價偏低。



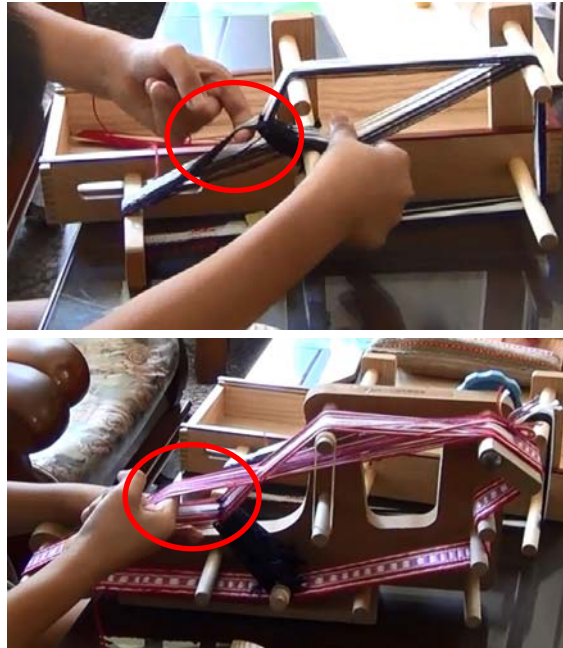


圖 11 兩款迷你織帶機之“梭口”(上圖為現代編織盒，下圖為紐西蘭版織帶機)

### (3)覺得哪一款織帶機比較好用?

由於現代編織盒在尋找梭口上較為困難，導致 5 位學童均認為紐西蘭版迷你織帶機較為好用，因此現代編織盒需針對鬆緊槓、支撐槓及綜光線槓的相對位置及距離進一步測試，以利產生較大的梭口，讓學童更容易進行編織。

### (4)其他問題

A.織帶盒在展開使用時，使用者感覺到抽拉的不順暢感，原因在於使用木材材質手工打磨而成，在整理編織線的圓柱與盒體空洞之間相互契合的精細程度上還有所欠缺，需進一步依據使用者的對圓柱的拉伸力度精細打磨。

B.在編織過程中，繞線的圓柱因承受力度不同，其中兩根受力過重產生傾斜，需調整圓柱間距，以及加強圓柱的受力程度。

C.棒刀偏短，未達到使用的最佳舒適尺度，特別是在長度上，不能完全被滿足。

D.觀察學童使用織帶機的過程中，同時發現織帶機會晃動、滑動，甚至傾倒的情形，故須針對織帶機之穩定性進行再設計。

E.編織過程需要擴大梭口以利緯梭板從中穿過，從使用過程中發現學童會側頭並低頭尋找梭口(圖 12)，如此易導致頸部疲勞與不適。

F.在未編織的情況下，現代編織盒可將鬆緊槓、支撐槓、綜光線槓及編織工具等收納於盒內。但開始編織後，半成品無法收納於盒內，降低原本設計收納的效果。



圖 12 學童側頭、低頭查看梭口位置

## 結論與建議

本計畫以台灣原住民族群所使用的生活器具 – 「編織箱」作為研究標的，「編織箱」充滿原住民族群的文化意涵與特色，如何讓如此巧妙的工具設計與其文化內涵，再現於現代的生活織品上，正是文化創意再設計的應用的新契機。本計畫以文化人因工程 (cultural ergonomics) 的角度去探討，以系統性、科學化的研究架構，從文化人因工程的角度進行探討，並透過對工具本身的人因解析、整理與歸納之後，針對工具設計的實際需求，轉化成設計過程可被運用的形式或元素，將有助於未來文化創意產品的設計。

除此以外，本計畫達到下列成果：

1. 在學術研究方面：本計畫係跨領域的研究其涵蓋：(1) 探討文化人因工程；(2) 社會人文的原住民文化特色的探討；(3) 設計專業方面有設計開發和產品語意的運用；(4) 結合企業實務落實創意設計商品化的可行性探討。文化設計的思潮，必須結合更多更廣泛的文化資源，和實際參與文化設計的執行經驗，來增加設計的能源。本計畫在有系統的研究下，嘗試結合人因工程、文化內涵、設計理論和研究方法，透過實際的設計活動來驗證學術研究的重要性。
2. 國家經濟發展方面：本研究計畫經由「人因工程」的相關研究，把典藏文物轉換為「文化創意」，加值產品「設計」，探討「創意」如何「加值」設計，進而達到豐富我國文化創意產業之文化內涵。在有限的地理資源環境之下，台灣的工業競爭力在於轉換為高價位或高品質的優質的設計商品。換言之，未來有競爭力的產品所強調的必須具備有很高的設計品質，高品質的產品包含的不只是製造品質的提昇、機能的增強和使用性的合理，同時亦強調產品的個別特色和象徵性。因此在全球化過度膨脹之後，地域性文化特色的產品，具備有滿足消費者探索文化差異的慾望和好奇心。原住民文化的原始風味、單純的美學隱含著一股神秘的吸引力，本計畫藉由原住民文化風格理念的設計探討，將產品的本質重新詮釋設計，提供未來產品市場一股清新、具有原始風味的產品。如今中國風產品特色的探討逐漸形成風潮，在這股潮流影響之下，在地的、更深入聚焦的原住民文化風格未嘗不是台灣非常寶貴的文化資源與特色，因而值得創造經濟價值與發展。
3. 在文化創意產業發展方面：如何連結「數位典藏國家型科技計畫」的「創意加值」，與「文化創意產業」，是一個值得研究探討的問題。本研究計畫係以數位典藏的原住民文物為基礎，配合政府所訂定「文化創意產業」發展計畫，探討如何透過數位典藏的創意加值，將文化創意轉換為產品設計的模式。也就是以設計鏈管理的概念，整合文化創意、加值設計、生產製造，乃至行銷通路的设计產業，達到以「創意加值」將「文化特色」轉換為商品之目的。
4. 在創意設計教育方面：文物典藏數位化，在資訊科技快速發展推波助瀾下，已經是不可阻擋的態勢。本計畫經由典藏文物的「資訊加值」、「知識加值」，進而達到「創意學習」的目的，再透過傳統文化背景的分析，將其「創意加值」轉化成文化創意產品，是數位典藏國家型科技計畫中創意加值的研究重點之一。配合政府所推動的創意教育政策，運用台灣特有的原住民文化，探索及認識族群文化，進而接納及認同，促進族群間的認同，並能習得其文化創意，開發學生的創造力，激發學生的創意設計。



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### 泰雅族編織箱之文化人因工程研究

#### 摘要

文化人因工程學之研究目的，在於探討如何經由「人因工程」的研究，將不同的文化特色經由互動與經驗交流，將「文化創意」加值產品「設計」，也就是「創意」如何「加值」設計，進而達到豐富文化創意產業之內涵。現代設計師更需要透過與歷史文化的交流尋找設計創意，透過文化人因工程的探討，將有助於把文化內涵加入產品創意設計中。因此，本研究計畫嘗試從文化人因工程的角度切入，探討文化創意產品的設計，並以原住民編織箱的人因工程探討為例，了解這種特殊的編織工具，如何編織出那麼動人的圖案，結合「人因工程」與「創意設計」，了解「編織箱」之人因工程設計相關的考量因素。探討「原住民文物」如何經由「文化人因工程」相關研究，建立一套編織工具與服飾設計轉換原則，提供設計師設計文化創意產品之參考。

關鍵詞: 文化人因工程，編織箱，跨文化設計，台灣原住民文化。

### A Study of Cultural Ergonomics in Atayal Weaving Box

#### Abstract

Cultural ergonomics is an approach that considers interaction- and experience-based variations among cultures. Cultural ergonomics extends our understanding of cultural meaning and our ability to utilize such understanding for design and evaluate everyday products. Designers need to develop a better understanding of cultural ergonomics not just to participate in cultural contexts but also to develop interactive experiences for users. The purpose of this project is to explore the meaning of cultural objects and to extract their cultural features from Taiwan's aboriginal culture. This project attempts to illustrate how by enhancing the original meaning and images of Taiwan aboriginal culture features and by taking advantage of new production technology, they may be transformed into modern products and so fulfill the needs of the contemporary consumer market. The gungu, literally "weaving box", in the Atayal aboriginal language, was chosen as the cultural object for this study. The project focuses on and analyzes the weaving box's appearance, usability, cultural meaning, operational interface, and the scenario in which it is used. Then, this project intends to create an interface for examining the way designers communicate across cultures as well as the interwoven experience of design and culture in the design process.

Keywords: cultural ergonomics, weaving box, cross cultural design, Taiwan aboriginal culture.

## 1. Introduction

Cultural ergonomics extends our understanding of cultural meaning and our ability to utilize such understanding for design and evaluating everyday products (Kaplan, 2004). Designers need to develop a better understanding of cultural ergonomics not just to participate in cultural contexts but also to develop interactive experiences for users. Thus, cultural ergonomics is an approach that considers interaction and experience-based variations among cultures in cultural product design (Lin et al., 2016). Hence, cultural products can extend the heritage and traditional values of different cultures to the consumer and increase the sense of spiritual essence in human life (Varutti, 2015; Guttentag, 2009). Perhaps the best way to extend a unique culture, as for example when we talk about the impressions of different culture garments, crafts, decorations, utensils, furniture, ornaments, packages, etc., is to promote it to users' daily lives through product usage (Lin, 2007, 2009).

Taiwan is a multi-culture fusion of traditional Chinese with significant East Asian influences. Over time, Taiwan gradually developed its own distinct culture, mostly from a variation of Southern China culture (Lin, 2007). Evidence shows that the prospect of Taiwan's local cultures will undoubtedly become crucial cultural elements in future design applications (Lin, 2009). Of course, the Taiwanese aboriginals also have distinct and abundant cultures. With their beautiful, primitive, and spiritually motivated visual arts and crafts, Taiwan's aboriginal cultures should have great potential for enhancing design value, and being recognized in the global market (Hsu, Chang & Lin, 2013).

For example, the Atayal tribe which is composed of several subgroups is one of the best weaving tribes in Taiwan. In their traditional society, Atayal men did the hunting, fighting, farming and house building, while Atayal women were known for the artistry of their handwoven artifacts (Chang, Wall & Chang, 2008). Having suffered from their traditions being nearly extinguished in the past colonial periods, the Atayal tribe members are now trying to retrieve their textile traditions and they have already achieved fruitful innovations rooted in their ancestors' wisdom (Yoshimura, Wall, 2014). For example, the first author has spent years "reverse engineering" many old woven tribal patterns to preserve the knowledge of how to weave them, a knowledge that was formerly passed from mother to daughter. She also runs and is trying to improve a school for the children of a poor village in the hills above Miaoli, has built a cultural center called lihang workshop and promotes interest in their culture (<https://www.facebook.com/lihangworkshop>).

The weaving art of the Atayal in Taiwan has developed rapidly over the past decade. Women's weavings have performed outstandingly in various textiles exhibitions through combining traditional textiles with modern weaving techniques. For example, Yuli Taki is also trying to preserve cultural patterns by commercializing use of them (Lin & Kreifeldt, 2014). The Truku used to be one of the several subgroupings of the Atayal peoples but are now officially recognized as an independent group. (The aboriginal groups seem to be fractioning at a great rate.) However, while Truku weaving has much in common with other Atayal peoples, Truku textiles are distinguished by their light weight, thinness, quiet color and patterns mostly of single lozenges (<https://www.facebook.com/yuli.taki/>). Among some Atayal peoples such as the Malikuowan, these seemingly simple lozenge shapes are called "eyes" and stand for the blessings of

countless ancestors. With those blessings the people could enter the land of happiness and join their ancestors forever.

Such spirituality characterizes much tribal design giving it an immediacy which even outsiders can feel deeply and respond to without knowing much, if anything, about the culture of the peoples who produced it. Such feeling can transcend cultural differences. An outsider may say that certain primitive art “speaks” to him which is more than just an expression.

By using a cultural ergonomic approach, the gungu, literally “weaving box” in the Atayal aboriginal language, was chosen as the cultural object for discussion in this study. A framework will be proposed for examining the way designers communicate across cultures as well as the interwoven experience of ergonomic design and culture meaning in the design process. Using the framework, this study attempts to illustrate how, by enhancing the original meaning and images of Taiwan aboriginal culture features, and taking advantage of new production technology, they may be transformed into modern products and so fulfill the needs of the contemporary consumer market (Lin, 2007, 2009).

## 1. Cultural Object of Atayal Loom

Although the date of the first loom or even what it looked like is unknown. As a weaving tool in one form or another it dates back at least to the ancient Egyptians and Greeks (Roth, 1913, 1918). Three main types of loom were used in the ancient world: the horizontal ground loom, the vertical loom with upper and lower beams around which the warp threads are wound, and the vertical loom with warp weights. The warp is the stationary threads across which the weft threads are woven in and out. The horizontal ground loom is the older of the looms of Ancient Egypt (Crowfoot, 1937; Faxon, 1932).

The Atayal woven crafts played a large role in the tribe's social customs and organization. These crafts were woven on a type of loom called a “backstrap” loom which is the subject of this study. “Backstrap” refers to the strap behind the weaver’s back as in Figure 1 and Table 1. The Atayal loom is one of the original types of simple movable backstrap-type looms (Broudy, 1979). The earliest example (201 B.C. – 8 A.D.) of a backstrap loom in eastern Asia is found at a site in Shizhaishan, Yunnan Province (Broudy, 1979). It was similar in principle to the Atayal loom in being “foot braced”. That is, the weaver controlled the tension of the warp threads by pushing with her feet against a brace. The foot brace could be a simple bar but in the Atayal loom it is the culturally important “box” By changing the arrangement of the warping bench and one's way of weaving, simple even weaves to Atayal's own characteristic complex patterns can be woven.

Traditional Atayal looms were composed of many parts, with one of the most important being the Weaving Box, made of tough woods like beech and Formosan michelia. The weaving box was not only an important part, but could also be used for storage when weaving wasn't taking place (Broudy, 1979). In the days long ago when head hunting was practiced, the hollow box could be struck to make a loud drum sound as a signal to the village that a warrior had returned with a head. For a clear understanding of the Atayal loom, the

features of all parts of the Atayal loom must be understood. Diagrams of their parts are therefore included in Figure 1 and Table1.

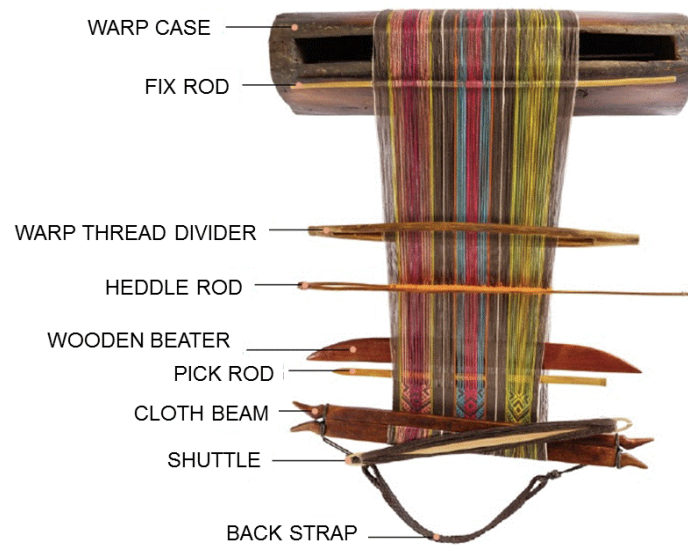


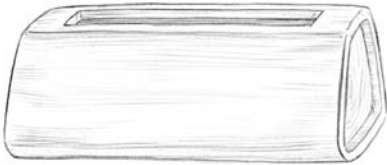





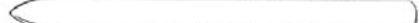



Figure 1. Atayal Backstrap Loom

The threads in Figure 1 are called the “warp”. Weaving consists of lacing a “weft” thread over and under selected warp threads as it goes from one side of the warp to the other and then reverses direction and repeats lacing and so on until finished. The “art” consists of choosing the colors for the warp threads and the complexity of the lacing of the weft thread (which also may change colors) as it goes over some warp threads and under others. It is the particular lacing plan in combination with the coloring of the warp threads which makes the pattern. Practically infinite combinations of colors and lacings (i.e., patterns) exist. Creativity comes in designing aesthetically pleasing combinations. In tribal days before writing and modern means of recording such information existed, these highly complex combinations had to be committed to memory and passed as instructions from mother to daughter - prodigious feats of memory. Sadly, once that mother to daughter chain was broken, as by outside disruptions, this information was lost. It takes modern “reverse engineering”, special coded weaving annotation, and great dedication, to reconstruct these instructions from careful examination of existing examples and record them permanently for posterity. Lest it be thought that weaving is somehow inferior to the other arts because it can be described in this mechanical sounding fashion, it is also true that making piano or organ music can be described (as Bach did) as just pressing the right keys down at the right time and the music makes itself.

The weaves used by the Atayal and patterns produced with them are technically interesting and aesthetically pleasing (Lin & Kreifeldt, 2014). In the past, each tribe could be distinguished by the unique types and patterns of its weavings. Recently, with the rapidly changing social trends and progress in technology, tribes or individual studios weaving textiles hope to see this field embracing both tradition and originality in order to create different possibilities for future development (Yoshimura & Wall, 2014). Furthermore, the new Atayal weavers work closely with tourism marketing channels to balance the production and marketing of

textiles. Therefore, the future of weaving art is full of hope and potential. The Atayal loom is apparently unique and deserves in-depth study (Nettleship, 1970).

Table 1 All parts of the Atayal Backstrap loom

	<p>There are “large” and “small” sizes for warp cases, which could have the length of 90cm or 60cm, depending on the need of a weaver or the custom of a tribe. Usually it is sized to meet special physical needs of the weaver. The wooden materials usually are selected from trees that possess properties of sturdiness and firmness such as camphor tree, beech tree, Formosan Michelia tree and so on.</p>
<p>Warp Case</p>	
	<p>The Fix Rod is made of straighter and longer Yushania bamboo internode. The diameter of a fix rod should be 0.6cm to 1.3cm and the required length of a rod is usually based on the width of the demanded fabric, thus several different fix rods with different sizes should be prepared in advance.</p>
<p>Fix Rod</p>	
	<p>The length of a warp thread divider is determined by the width of the piece of weaving fabric, which could be 50cm or 35cm wide. Wood or Yushania bamboo is the selected material for making it. There are 2 different types of warp thread dividers. The first type is widely used in most of the Atayal people’s areas, whilst the second type of warp thread divider is especially used in the catchment area of Ta’an river and also it’s used especially for pick-up pattern weaving techniques.</p>
<p>Type 1 Warp Thread Divider</p>	
	
<p>Type 2 Warp Thread Divider</p>	
	<p>The length of a heddle bar is around 35cm long, determined by different fabric widths. Wood or Yushania bamboo material is selected for making heddle rods. There’re two types of them. The first type is made of thin and long Yushania bamboo and will get wound around with warp-tying yardage. The second type is a hairpin-shaped rod, which is made of twig wood and is widely used in the catchment area of Ta’an River. Both prongs of the hairpin-shaped rod are drilled with small eyes for fine threads to string through and get ready for sealing this part after warp threads are fixed into the oblong slot. The sealing secures the warp threads from sliding off while weaving.</p>
<p>Type 1 Heddle Rod</p>	
	
<p>Type 2 Heddle Rod</p>	
	<p>Pick rods are made of Makino bamboo or wood materials, and usually will be prepared in many different sizes for making fabrics of different widths.</p>
<p>Pick Rod</p>	
	<p>A wooden beater is made of sturdy hardwood material. The blade should be thicker at the upper part and get thinned towards the lower edge. It is typically 60cm in length and 5-6cm in width.</p>
<p>Wooden Beater</p>	
	<p>A Shuttle is a tool designed to neatly and compactly store the weft thread and carry it across the warp yarn while weaving. Shuttles are thrown or passed back and forth through the shed – an opening made between the threads of the warp - in order to weave in the weft.</p>
<p>Shuttle</p>	
	<p>Cloth beams are made of sturdy wood material from the elm tree, camphor tree or Formosan Michelia tree. A tongue and a matching groove are cut into a pair of the cloth beams respectively for fastening the finished fabric tightly between them. The length of each beam is about 50 to 60cm.</p>
<p>A Pair of Cloth Beams</p>	



Back Strap

The Back Strap is woven out of rottan material or made of ramie through the bow weaving technique. The usual length is 50cm and width is about 50cm. Extra binding strings can be made based on a weaver's need.

## 2. A framework for studying cultural ergonomics

Piegorsch (2009) described how an ergonomic bench was designed for indigenous weavers in Guatemala that is a typical example of cultural ergonomics. The ergonomic bench helps weavers enhanced their productivity and improved textile quality, while also preventing cumulative trauma to their health. The bench focused on user-centered ergonomic design and also stimulated self-awareness in traditional weaving. The benefits of cultural ergonomics can be represented as a cycle with five stages: health, productivity, quality, culture and self-esteem (Piegorsch, 2009). It is likely to be a never-ending process and can be applied universally, strengthening the connection between the designers and their cultural heritage as shown as the outer circular factors in Figure 2.

For the human system design, Kreifeldt and Hill (1974) proposed a user-tool-task system design model that integrates ergonomics into product design for producing aesthetically pleasing and functionally superior products. Base on the user-tool-task model, Lin et al. (2016) proposed a framework for combining cultural features with ergonomic design which facilitating an understanding of cultural ergonomics in product design shown as the inner triangular factors in Figure 2.

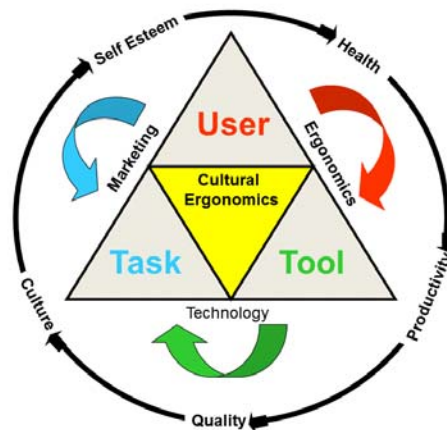


Figure 2. A framework for studying cultural ergonomics

For the cultural ergonomics approach (Kring, Morgan & Kaplan, 2006), the framework consists of two main parts that function to explore the cultural ergonomics issues of the cultural object and to study problems related to human factors. To accomplish the outer circular factors: health, productivity, quality, culture and self-esteem, the inner triangular factors must be considered in practical ergonomic design (Piegorsch, 2009). Thus, Figure 2 details the various influences and interactions in a user-tool system and emphasizes the threefold nature of the design: user, tool (product), and task. Among the user-tool-task, there are the two interfaces of the user-tool manipulation interface (ergonomics) and the tool-task



engagement interface (technology); and the various interactions between user needs and design requirements in the practical design process (marketing).

The user-tool-task model is designed to solve the problem of completing a task with a tool; it focuses first on the manipulation interface between the user and the tool and then on the engagement interface between the tool and the task. Finally, for the global market, adding a cultural dimension to ergonomics has become an important issue for exploring interaction and experience in product design (Lin et al. 2016). Along with technological progress, while product design has been transferred from being manufacturing-based to marketing driven to user centered for some time, there is now greater emphasis specifically on user experience, with ergonomics being increasingly considered in interactional design for marketing.

### 3. Thoughts on studying the weaving box

The weaving box, a cultural object and part of the Atayal loom, is the subject of this study. Based on the cultural ergonomic approach in Figure 2, the weaving box could be employed for a systematized and scientific method to study the three aspects of cultural ergonomics. First, ergonomic study of the weaving box across user operational situations needs to be analyzed to study the manipulation interface (ergonomics) between users and the weaving box. Then, based on that analysis, the engagement interface (technology) is studied to identify the relationship between the weaving box and the task. Finally, based on the cultural-feature transformation model, the weaving box is identified with three levels of cultural ergonomics and used to demonstrate how to design cultural products (marketing) (Lin & Kreifeldt, 2001).

Considered from the perspective of ergonomics, to develop an ideal loom in the form of the weaving box, the social and operational interfaces of the weaving box both need to be well designed using a user-tool-task approach. Especially, many studies were made to evaluate the prevalence of low back pain among the handloom weavers (Chaman et al., 2015; Durlov et al., 2014; Montamedzade et al., 2014). These studies suggested the need for further research regarding the postural strain of weavers and also emphasized the implementation of ergonomic design into the weaver's loom. For a good example, the ergonomic bench in Piegorsch's research (2009) provides a culturally, environmentally, and economically viable alternative to traditional methods of working with the backstrap loom.

Considered from the perspective of technology, many tools were needed in traditional Atayal weaving as shown in Table 1. Women produced beautiful cloth relying on their professional and aboriginal weaving skills (Wu, 1998) but their tools are inconvenient for fetching due to their overweight and numbers, and the tradition of weaving while sitting on the ground. In recent years Atayal people has been seeking creative and alternative ways. A new type of loom called a desktop inkle loom has been devised. Inkle weaving is a type of warp-faced weaving where the shed is created by manually raising or lowering the warp yarns (Patrick, 2010), some of which are held in place by fixed heddles on a loom known as an inkle loom ([https://en.wikipedia.org/wiki/Inkle\\_weaving](https://en.wikipedia.org/wiki/Inkle_weaving)).



Considered from the perspective of marketing, aboriginal cultural products that tourists purchase as souvenirs are often actually imitations of the original products, and sold without authorization from the aboriginal group (Guttentag, 2009). Atayal textiles are now handwoven by some aboriginal women in Wulai who weave primarily for the Wulai Atayal Museum. Weaving exhibitions are the main purpose of the Wulai Atayal museum since it opened in 2005. Other than displaying materials, techniques and final works, the museum arranges to have weavers do live demonstrations on weekends to attract tourism. The museum also sells the works by the members in the weaving association and invites them to be the seed teachers to design promotional activities such as do-it-yourself for user experience, and promote traditional weaving through the flourishing tourism (Varutti, 2015). Meanwhile, the reintroduction of weaving not only required the Atayal weavers to retrace their weaving history and to reconstruct and revive lost skills but also opened up a new opportunity to create new motifs with the Atayal loom (Chang, Wall & Chang, 2008; Yoshimura & Wall, 2014).

#### 4. Summary

Based on a previous discussion (Lin et al., 2016), this study proposes a cultural ergonomic research model to provide designers with a valuable reference for designing a successful cross-cultural product as shown in Figure 3. The model consists of four main parts: conceptual model, research method, human system design, and cultural ergonomic approach. The conceptual model focuses on how to extract cultural features from cultural ergonomics and then transfer those features to the design transformation model to design cultural products.

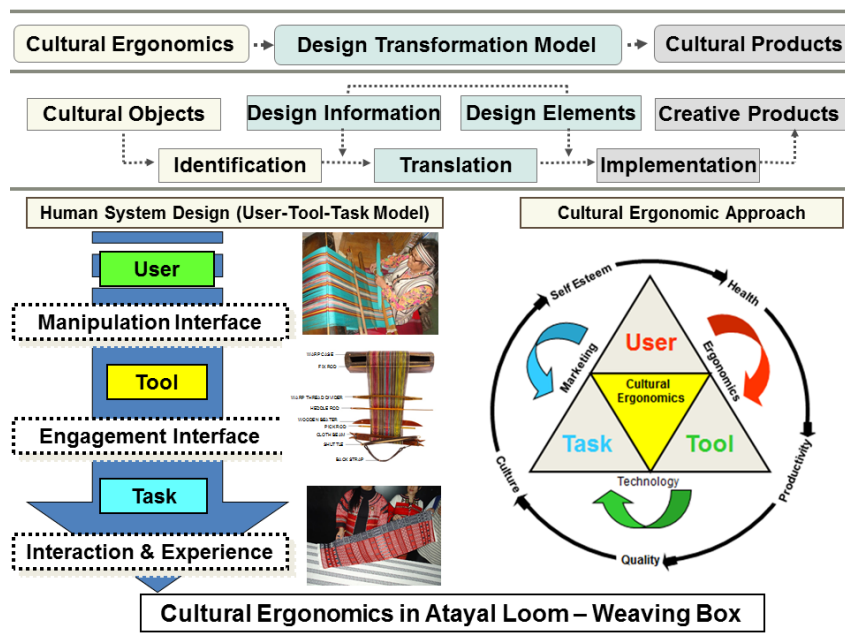


Figure 3. A cultural ergonomic research model in Atayal loom

The research method consists of four steps: from cultural object to design information, then to design elements, finally to creative products; and three stages: (1) extracting cultural features from original

cultural objects (identification), (2) translating these features into design information and design elements (translation), and (3) designing a cultural product (implementation).

The purpose of human system design research focuses on and analyzes the weaving box's appearance, usability, cultural meaning, operational interface, and the scenario in which it is used. There are social meanings, ergonomic concerns and the functional achievement associated with this cultural object. To develop an ideal loom, both the cultural and operational interfaces of the "weaving box" need to be well-studied using a user-tool-task approach (Lin & Kreifeldt, 2001).

Recently, the reintroduction of weaving has had multiple effects on the Atayal community. Now the Atayal proudly claim their weaving culture as a part of their ethnic identity. The meaning of weaving has changed from the representation of the Atayal women's gender identity alone to the representation of the Atayal's collective ethnic identity as a whole (Yoshimura, 2007). It has become an ethnic symbol and a tourism product. However, the Atayal tribe, especially the residents of Wulai, are now barely involved directly with tourism business although symbols of their identity are used to promote tourism (Yoshimura, 2007; Yoshimura & Wall, 2014). As an example of reviving tribal arts, a "carved, blackware pottery jar" recently made by Tammy Garcia of the Santa Clara pueblo tribal people in the US state of New Mexico sold at auction for \$47,500. It expressed feelings of modernity but in the tradition of her people (Johnson, 2015).

Having this in mind, we need to consider the following questions before using the research model to explore the weaving box of Atayal loom.

1. For the user and ergonomics: Do we want simply to keep the craft alive? Or provide work for the weavers? Or make an art of it? Or produce a high priced artist? Deciding what will be a successful product has long been a problem. For every 100 "great" ideas, maybe one is commercially successful.
2. For the tool and technology: Crafts such as loom weaving are unique. Is "design" really compatible with cultural tradition which tends to be conservative if it is to retain its uniqueness? Hand work will always be a limited production technique. So its value must be in aesthetics.
3. For the task and marketing (works): Maybe make individual design works which would be prohibitive for machine making. Or create an artist weaving maker demand. Also incorporate cultural motifs and designs. Or create an association which will verify and can enforce a particular product as being of that culture. When there is not enough authentic art to meet the demand and for the price, imitations will be made for the market. The United States has a similar problem of the cultural arts of the American Indians being imitated, misrepresented as authentic and sold. Therefore the US Federal Government has enacted the Indian Arts and Crafts Act. Under this act: "Native American art and craftwork must be marketed truthfully regarding the Native American heritage and Tribal affiliation of the producer." ([www.iacb.doi.gov](http://www.iacb.doi.gov))

There are many parallels to these questions and problems everywhere that native cultures are disappearing and their arts and crafts along with them. It is strange that as these cultures diminish or vanish altogether, their old traditional art pieces become more and more sought by museums and private collectors and

consequently become more and more valuable. Beauty is the soul of the artist expressed in her art. Being based in strong religious beliefs, tribal arts express that soul very strongly. It is a mystery how tribal arts can speak to someone even across cultural oceans if not for soul-to-soul communication. As others begin to see the beauty of the art and are moved by it, they wish to possess it even without understanding or even knowing the culture behind the art. That is the passion of the collector. Such cross cultural attraction with consequent desire for possession is what designers of products for the international market should hope to have their products evoke.

Continuing studies of what makes tribal arts such as the weavings of the Atayal, or even a “tool” like the weaving box, so attractive cross culturally can definitely aid in designing successful cross cultural products.

#### Acknowledgements

The authors gratefully acknowledge the support for this research provided by the Ministry of Science and Technology, Taiwan under Grants 103-2221-E-144 -001 -MY2 and 103-2410-H-144 -003 -MY2. The authors also wish to thank those who contributed to the research.

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## 科技部補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否有嚴重損及公共利益之發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■ 達成目標

2. 研究成果在學術期刊發表或申請專利等情形：

論文：■已發表 □未發表之文稿■撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：已發表國際研討會論文數篇

### 投稿中論文

泰雅族編織箱之文化人因工程研究 A Study of Cultural Ergonomics in Atayal Weaving Box

### 期刊論文

- C. L. Lin, 2018. The Effect of Object Form and Tactile Enticement Material on the Motivation of Haptic, *International Journal of Liberal Arts and Social Science*, 6(5), 8-16.
- C. L. Lin and S. J. Chen, 2018. The influence of product presentation mode and academic major on the motivation of haptic, *Humanities & Social Science Reviews*, 6(2), 29-34.
- T. J. Wang, R. Lin, and C. L. Lin, 2018. Concept model and applied design of height-adjustable desks and chairs, *Journal of the Science of Design*, 2(1), 67-76.
- T. J. Wang, R. Lin and C. L. Lin, 2017. The Research of Chinese Opera Mask- Jing role as example, *The International Journal of Social Sciences*, 52(1), 7-15.
- C. L. Lin, S. J. Chen, W. H. Hsiao and R. Lin, 2016. Cultural Ergonomics in Interactional and Experiential Design: Conceptual Framework and Case Study of the Taiwanese Twin Cup, *Applied Ergonomics*, 52, 242-252. DOI: 10.1016/j.apergo.2015.07.024. [SCI, IF=2.02]
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### 研討會論文

- Lin, R., Li, H. L., Wu, J., & Bi, W. (2018, July). Cross-Cultural Communication in Design Collaboration. In International Conference on Cross-Cultural Design (pp. 31-42). Springer, Cham.
- Taru, Y., Kreifeldt, J., Sun, M. X., & Lin, R. (2016, July). Thoughts on Studying Cultural

Ergonomics for the Atayal Loom. In *International Conference on Cross-Cultural Design* (pp. 377-388). Springer, Cham.

- Kreifeldt, J., Taru, Y., Sun, M. X., & Lin, R. (2016, July). Cultural Ergonomics Beyond Culture-The Collector as Consumer in Cultural Product Design. In *International Conference on Cross-Cultural Design* (pp. 355-364). Springer, Cham.

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性），如已有嚴重損及公共利益之發現，請簡述可能損及之相關程度（以 500 字為限）

本計畫係跨領域的研究其涵蓋：(1) 探討文化人因工程；(2) 社會人文的原住民文化特色的探討；(3) 設計專業方面有設計開發和產品語意的運用；(4) 結合企業實務落實創意設計商品化的可行性探討。文化設計的思潮，必須結合更多更廣泛的文化資源，和實際參與文化設計的執行經驗，來增加設計的能源。本計畫在有系統的研究下，嘗試結合人因工程、文化內涵、設計理論和研究方法，透過實際的設計活動來驗證學術研究對社會、經濟發展等面向的重要性。

## 科技部補助專題研究計畫出席國際學術會議心得報告

日期：107 年 08 月 16 日

計畫編號	MOST105-2221-E-144 -001 -MY2 MOST 106-2221-E-034-015		
計畫名稱	泰雅族編織箱之文化人因工程研究 (共同主持人) 感質要素應用於文創產品設計之研究(II) (主持人)		
出國人員姓名	顏惠芸	服務機構及職稱	中國文化大學廣告學系助理教授
會議時間	107 年 07 月 15 日 至 107 年 07 月 20 日	會議地點	Caesars Palace in Las Vegas, Nevada, USA.
會議名稱	(中文) 第二十屆人因互動國際研討會 (英文) The 20th International Conference on Human-Computer Interaction		
發表題目	(中文) 產品情感設計要素之評估模式探討與建構 (英文) Constructing and Analyzing a Measurement Model of Product Emotional Design		

## 一、參加會議經過

HCI 國際研討會已經行之多年，1984 年為第一屆，迄今已舉辦了 20 屆，過去每兩年舉辦一次，近年更轉變為年年舉辦。主要在提供學者一個關於人機互動理論、文化、設計和相關應用在人因設計領域的研究分享與探索的學術會議，目前已經逐步形成為一個卓越的全球性研討會。每年都有來自世界五大洲、數十個國家的專家學者投稿參與，研討會中的研究論文除了於會中發表，也由 Springer 集卷出版在 HCI2018 年國際學術會議論文集之中，此會議之論文被收錄至以下資料庫：Conference Proceedings Citation Index (CPCI-S), part of the Web of Science; EI Engineering Index (Compendex and Inspec databases); ACM Digital Library; DBLP; Google Scholar; IO-Port; MathSciNet; Scopus; and Zentralblatt MATH.

本次會議地點在美國 內華達州 拉斯維加斯的凱薩宮飯店會議中心舉辦。會議舉行日期為 2018 年 7 月 15 日（日）至 20 日（五）；會議於 7 月 17 日（二）晚間六點舉行開幕典禮與專題演講，晚間八時舉行歡迎晚宴。7 月 15 日~17 日白天為各領域工作坊共 23 場，7 月 18 日~20 日為論文發表與壁報展示，其他並有相關學術廠商展示與學生發表競賽...等。根據大會的統計資料，18 日~20 日 parallel sessions 共有 217 場論文發表會議，來自來自全球不同國家的專家學者註冊參加，口頭發表約上千篇，分屬 14 個不同領域議題，會議集卷



共 30 類。

筆者參加此次 HCI2018 國際研討會主要為發表研究論文一篇，為科技部補助研究計畫（MOST 106-2221-E-034-015 -）的部分成果，經大會審查為認可的投稿論文，並於大會安排的 Cross-Cultural Design 主題中發表。筆者參加此研討會除了發表論文、瞭解文化創新與生活設計最新的研究趨勢，每場演講後的討論更是各個學者意見互相交流的時間，可以相互激發思慮，此次與各相關領域的專家學者進行學術交流，建立學術交流的管道，對個人的研究與教學而言，將有深遠的影響，亦為參加此次 HCI2018 國際研討會的目的。

## 二、 與會心得

本次會議在開幕式，特別邀請美國 Principal Researcher and Research Manager, Visualization and Interaction (VIBE) Research Group, Microsoft Research, USA 的 Mary Czerwinski 教授作專題演講，講題為「Technology in Support of Healthy Habits」。演講主要內容說明人與機器之間的互動，說明人類可透過機器的運算過更方便美好的生活，主要提及情感計算、體驗設計等方面。



參與國際會議是直接又有效的學術交流方式之一；除可藉此與國際學者交換研究心得之外，並得以瞭解當前相關學術領域之最新研究動態與趨勢，作為日後研究之參考。以本屆 HCI2018 國際研討會為例，規劃有 Human-Computer Interaction; Human Interface and the Management of Information; Engineering Psychology and Cognitive Ergonomics; Universal Access in Human-Computer Interaction; Virtual, Augmented and Mixed Reality; Cross-Cultural Design; Social Computing and Social Media; Augmented Cognition; Digital Human Modeling and Applications in Health , Safety, Ergonomics and Risk Management; Design, User Experience and Usability; Distributed, Ambient and Pervasive Interactions; HCI in Business, Government and



Organizations; Learning and Collaboration Technologies; Human Aspects of IT for the Aged Population 等十四項研討議題；在每一議題之下，又分為許多子議題，幾乎含括從軟體、硬體，實體、虛擬，技術、管理、理論、基礎、到應用研究等各方面。在最後三天的 parallel sessions，每一時段有近 20 場次同時進行口頭報告，讓參與者目不暇給，有許多的機會讓參與者選擇自己喜歡的場次參加。整體而言，也讓與會者深切體會 Human Computer Interaction 研究蓬勃發展、與時俱進的現況。

如上所述，parallel sessions 論文報告之多，無法全部參與；只能選擇聆聽與跨文化設計相關的研究，以下是聆聽 parallel sessions 論文研討的心得摘要：

- (1) 設計師與用戶之間的關係在跨文化交流中可以透過更多的測試和驗證方法進行評估設計。
- (2) 透過藝術欣賞理論將藝術家作品通過問卷調查以提升藝術教學品質並促進文化創意產業發展
- (3) 設計應具有同理心，設計作品應具情感並滿足消費者的需求。
- (4) 生態設計是一種產品設計方法，包括材料和決策，更應特別考量對環境的影響。
- (5) 科學，藝術和設計領域的跨文化交流是影響創意產品的重要因素。
- (6) 科學，藝術和設計的融合，可以彌合學術界之間的差距和產業達成協作。
- (7) 構建產學合作的新模式，融入文化創新設計課程是發展中的一個優勢，協作教學建立在“研究，教育和服務”之上，能夠成為文化創意的設計教育參考。
- (8) 在全球化的背景下，地方文化可以成為創造創意產品的靈感來源。
- (9) 設計可以整合藝術，技術，生態，人文和物質特徵，以設計各種跨界元素的產品。
- (10) “設計導向”的發展模式，可以為房地產領域做進一步驗證開發模式，以“設計”為主導手段可以從根本上改善發展問題，如浪費資源，劣質產品，延長工期....等。

此次會議得到與會學者一些寶貴的建議與評論，藉此以使本篇研究論文更紮實，對後續投稿到國外期刊會有很大的幫助。並觀摩與請益來自不同國家的與會學者與專家的研究心得與經驗分享，有助提昇個人的研究能力與視野。雖然筆者已有多次參與國際研討會的經驗，但每一次的發表與交流都像是一次新的經驗。本次的研討會也強調生活中的設計，筆者也在此次行程中感受人因與跨文化設計的創意與蓬勃發展，其徹底應用於生活上的各種概念實在值得借鏡與參考，也成為筆者未來想繼續探討的領域之一部分，最後非常感謝科技部的支持與補助。

### 三、發表論文全文或摘要

#### **Abstract**

The cultural consumer market, characterized by the aesthetic economy, experiential economy, and emotional consumption, has matured with the advent of the Internet and communication technology. This study investigated the commercial design products by professional designers and university students to determine the influences of product emotional design dimensions on consumers' purchase intention of and preference for those products. The differences between currently available design products in the consumer market and the assignments of product design

courses were explored and analyzed to identify the prevailing principles of product design at present. In addition to being integrated into design education to cultivate design talents who satisfy market needs, these principles can serve as a reference for related industries in product design. This study reached two conclusions. First, the proposed measuring scale for product emotional design is proven to be feasible. Second, the emotional design of a product influences preference for the product, which subsequently enhances purchase intention of it.

#### 四、 建議

此次非常感謝科技部給筆者這個機會，能讓筆者出國參與國際研討會並發表論文，瞭解目前國際間的研究現況並且認識各國不同的教授學者。筆者十分期待在未來能再次獲得相關補助，也期待科技部未來能多開放相關機會，讓設計領域學者多出國發表相關論文以提升台灣設計在國際的能見度，以增進工商業界與學術界之間互相交流與合作的機會。

#### 五、 攜回資料名稱及內容

1. 2018 HCI Final Program: 內容為會議議程與投稿者之論文摘要。
2. 大會附贈資料袋
3. 會議識別證

#### 六、 其他

##### 過程記錄照片





圖 3. 筆者與會議主持人 John Kreifeldt 教授合影



圖 4. 全體發表人與會議主持人 John Kreifeldt 教授及林伯賢教授合影





圖 5. 筆者於 HCI 研討會識別證



圖 6. 筆者參與會議開幕式

Registration ID: 1446



## HCI International 2018

15 - 20 July 2018

Las Vegas, Nevada, USA

### CERTIFICATE OF PARTICIPATION

This is to certify that **Ms. Hui-Yun Yen, Chinese Culture University, Taiwan**, has registered and participated in HCI International 2018, the 20th International Conference on Human-Computer Interaction, and the Affiliated Conferences, held in Las Vegas, Nevada, USA from 15 to 20 July 2018.

18 July 2018  
Las Vegas, Nevada, USA

Constantine Stephanidis  
General Chair, HCI International 2018

圖7. 筆者論文發表證明

105年度專題研究計畫成果彙整表

計畫主持人：林榮泰		計畫編號：105-2221-E-144-001-MY2	
計畫名稱：泰雅族編織箱之文化人因工程研究			
成果項目		量化	單位 質化 (說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等)
國內	學術性論文	期刊論文	3 篇 <ul style="list-style-type: none"> <li>• C. L. Lin, 2018. The Effect of Object Form and Tactile Enticement Material on the Motivation of Haptic, International Journal of Liberal Arts and Social Science, 6(5), 8-16.</li> <li>• T.-J. Wang, R. Lin, C.-L. Lin, 2018. Concept model and applied design of height-adjustable desks and chairs, Journal of the Science of Design, 2(1), 67-76.</li> <li>• C. L. Lin, S. J. Chen, W. H. Hsiao and R. Lin, 2016. Cultural Ergonomics in Interactional and Experiential Design: Conceptual Framework and Case Study of the Taiwanese Twin Cup, Applied Ergonomics, 52, 242 - 252. DOI: 10.1016/j.apergo.2015.07.024. [SCI, IF=2.02]</li> </ul>
		研討會論文	3 篇 <ul style="list-style-type: none"> <li>• Lin, R., Li, H. L., Wu, J., &amp; Bi, W. (2018, July). Cross-Cultural Communication in Design Collaboration. In International Conference on Cross-Cultural Design (pp. 31-42). Springer, Cham.</li> <li>• Taru, Y., Kreifeldt, J., Sun, M. X., &amp; Lin, R. (2016, July). Thoughts on Studying Cultural Ergonomics for the Atayal Loom. In International Conference on Cross-Cultural Design (pp. 377-388). Springer, Cham.</li> <li>• Kreifeldt, J., Taru, Y., Sun, M. X., &amp; Lin, R. (2016, July). Cultural Ergonomics Beyond Culture-The Collector as Consumer in Cultural Product Design. In International Conference on Cross-Cultural Design (pp. 355-364). Springer, Cham.</li> </ul>
	專書	0	本
	專書論文	0	章

國外		技術報告		0	篇		
		其他		0	篇		
	智慧財產權 及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權		0			
		營業秘密		0			
		積體電路電路布局權		0			
		著作權		0			
		品種權		0			
		其他		0			
	技術移轉	件數		0	件		
		收入		0	千元		
	學術性論文	期刊論文		3	篇	<ul style="list-style-type: none"> <li>• C. L. Lin, 2018. The Effect of Object Form and Tactile Enticement Material on the Motivation of Haptic, International Journal of Liberal Arts and Social Science, 6(5), 8-16.</li> <li>• T.-J. Wang, R. Lin, C.-L. Lin, 2018. Concept model and applied design of height-adjustable desks and chairs, Journal of the Science of Design, 2(1), 67-76.</li> <li>• C. L. Lin, S. J. Chen, W. H. Hsiao and R. Lin, 2016. Cultural Ergonomics in Interactional and Experiential Design: Conceptual Framework and Case Study of the Taiwanese Twin Cup, Applied Ergonomics, 52, 242 - 252. DOI: 10.1016/j.apergo.2015.07.024. [SCI, IF=2.02]</li> </ul>	
研討會論文		3		1. 透過國際研討會的論文發表，培養學生的國際觀。 2. 初步成果的發表，將據此改寫成論文投稿國際期刊。			
專書		0	本				
專書論文		0	章				
技術報告		0	篇				
其他		0	篇				
智慧財產權 及成果		專利權	發明專利	申請中	0	件	
	已獲得			0			

		新型/設計專利	0		
		商標權	0		
		營業秘密	0		
		積體電路電路布局權	0		
		著作權	0		
		品種權	0		
		其他	0		
	技術移轉	件數	0	件	
		收入	0	千元	
參與計畫人力	本國籍	大專生	0	人次	
		碩士生	0		
		博士生	2		透過本計畫引導學生，如何從資料收集。分析，如何按照研究步驟，得到相關資料，如何把raw data，變成information，再轉化成論文。參與的研究助理均感受益良多。
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	4		到相關資料，如何把raw data，變成information，再轉化成論文。參與的研究助理均感受益良多。
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)					

## 科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以100字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）

論文： 已發表  未發表之文稿  撰寫中  無

專利： 已獲得  申請中  無

技轉： 已技轉  洽談中  無

其他：（以200字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

本計畫係跨領域的研究其涵蓋：(1) 探討文化人因工程；(2) 社會人文的原住民文化特色的探討；(3) 設計專業方面有設計開發和產品語意的運用；(4) 結合企業實務落實創意設計商品化的可行性探討。文化設計的思潮，必須結合更多更廣泛的文化資源，和實際參與文化設計的執行經驗，來增加設計的能源。本計畫在有系統的研究下，嘗試結合人因工程、文化內涵、設計理論和研究方法，透過實際的設計活動來驗證學術研究對社會、經濟發展等面向的重要性。

4. 主要發現

本研究具有政策應用參考價值： 否  是，建議提供機關

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現： 否  是

說明：（以150字為限）