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Two-Port SRAM Cell with Improved Write Operation

Chien-Cheng Yu*, Ming-Chuen Shiau

Abstract

In this paper, a novel seven-transistor (7T) two-port SRAM cell incorporating an assist circuit is proposed. Wherein, the assist circuit is used to deal with the memory cell failures. During a write operation, this circuit is activated to connect a diode-connected transistor to the source of the drive transistor located near to the write bit line. Accordingly, it can provide an efficient solution to the writing '1' issue to improve write operations in this manner. Simulation results for the proposed cell design confirm that there is a conspicuous improvement over the conventional two-port SRAM cells, and fast writing also can be achieved.

Keywords: Two-port, Assist circuit, Single-ended, Static random access memory, Read- write control circuit.

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具有改進寫入操作的雙埠 SRAM 晶胞

余建政*、蕭明椿

摘要

眾所周知，在配置有單端位元線的靜態隨機存取記憶體（SRAM）晶胞中，無論何時執行寫入操作，都可能發生寫入失敗。尤其是，如果記憶晶胞目前儲存邏輯“0”，則對晶胞寫入邏輯“1”是相對困難的。因此有必要提供一種解決記憶晶胞中的寫入失敗的方法。本論文提出一種結合輔助電路的新型雙埠 SRAM 晶胞。其中，輔助電路用於處理記憶晶胞的寫入失敗。在寫入操作期間，該輔助電路被啟動以將呈二極體連接的電晶體連接到位於寫入位元線附近的驅動電晶體的源極，如此可以提供一種解決寫入'1'問題的有效方案來改進寫入操作。本論文所提出的晶胞設計經過模擬結果證實，與傳統的雙埠 SRAM 晶胞相比具有顯著的改進，並且還可以實現快速寫入。

關鍵詞：雙埠、寫入操作、靜態隨機存取記憶體、讀寫控制電路。

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1. Introduction

Generally, a memory device is classified into a DRAM (dynamic random access memory) and a SRAM according its respective data storage capability. DRAM is advantageous for its small size, but requires periodic refresh to prevent data loss. However, SRAM is advantageous for its simple operations, but occupies a large chip area. SRAM circuits are frequently used in most digital integrated circuits to store representations of data bits. SRAM circuits may be single-port or multi-port. In the single-port SRAM, normally, either of read and write operation is performed in one access from one port circuit connected to a pair of bit lines to one memory cell. The two-port SRAM, although it can perform a read and a write every clock cycle, requires more circuitry to perform the read and write operations. Figure 1 shows a structure of a conventional six-transistor (6T) single-port SRAM [1]. The cross-coupled structure of inverters INV1 and INV2 ensures that logically opposite voltages are hold at storage nodes A and B, respectively.

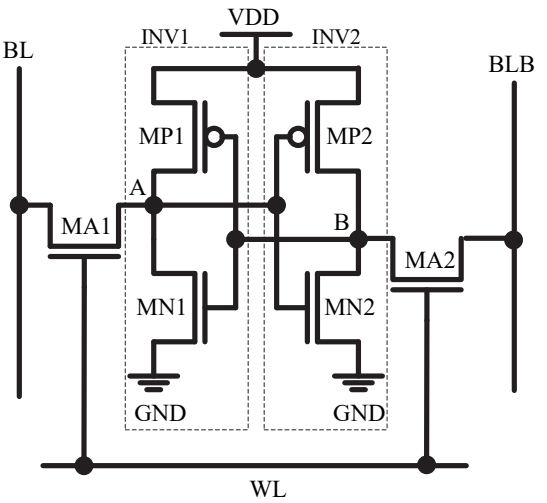

Figure 1. Circuit diagram of the conventional 6T SRAM cell.

One drawback of the conventional 6T SRAM cell is that its operation speed and cell size are strictly limited due to reliability concerns. Referring to Fig. 1, the drive transistor MN1 is made larger than the access transistor MA1 as such when both of these two transistors MN1 and MA1 are turned on, the drive transistor MN1 will have a lower resistance than the access transistor MA1. As a result, the drive transistor MN1 will more easily carry current when activated. However, for a successful write operation, it may be necessary that the access transistors should be very conductive to force the latch to change its equilibrium condition. Another drawback is that the data stored in the cells may be corrupted when the cells are read.

For example, when a logical ‘0’ is stored initially, the voltage rising in the cell may corrupt the data stored. Consequently, the access transistor should have a reduced conductivity for good stability in reading and standby operations. Therefore, the SRAM cell should provide less likely to be corrupted when the cell is read and more reliable when the cell is written [2]. These requirements impose contradicting requirements on transistor sizing. Recently, the cell ratio of the memory cell is reducing, this problem becomes more critical. One development is a two-port SRAM having dedicated read and write ports provides high speed read and write operations in place of the conventional single-port SRAMs [3]-[5].

The remainder of this paper is organized as follows. Section 2 presents a brief description of a conventional 6T and an 8T two-port SRAM cell topologies. The proposed 7T two-port SRAM cell incorporating an assist circuit is described in Section 3. The simulation results of the proposed 7T two-port SRAM cell are discussed in Section 4. Last section is a conclusion and summary for the paper.

2. Existing Technologies

The conventional 6T single-port SRAM cell can be modified to create a two-port SRAM cell. Figure 2 illustrates a conventional 6T two-port SRAM cell, which employs independent word lines (write word line WWL, read word line RWL) and bit lines (write bit line WBL, read bit line RBL) such that the opposite sides of the SRAM cell can be accessible by separate read and write ports [6]. The 6T two-port SRAM memory cell also includes an inverter INV1 mutually cross-coupled to an inverter INV2 to form a latch. The latch of the two-port SRAM itself has the same structure as that of the single-port SRAM, and therefore, the two-port SRAM has the same characteristics for read and write operations as the 6T single-port SRAM. In the write port, the write access transistor MA1 is dedicated exclusively to write operations. Moreover, in the read port, the read access transistor MA2 is devoted exclusively to read operations. In write operations, data is written into the SRAM cell by applying a logic high voltage signal to the write word line WWL, thereby turning the write access transistor MA1 on and coupling node A to the write bit line WBL. Alternately, data is read from the cell by applying a logic high voltage signal to the read word line RWL, thereby turning the read access transistor MA2 on and coupling node B to the read bit line RBL.

Although the 6T two-port SRAM cell can be processed in the same manner as a conventional 6T single-port SRAM cell in write operations, a concern associated with the write operation is that it is relatively difficult to write a logical ‘1’ to the cell if the cell currently stores a logical ‘0’. The difficulty with write operations lies in the fact that it is very difficult to

write a logical '1' into the storage node A using only a single-ended write bit line structure [7]-[8]. To provide full two-port memory functionality, several techniques have been developed [9]-[14]. These techniques usually increase or decrease a voltage applied to an individual memory cell. For example, boosting the voltage on a word line during a write cycle can improve the write margin of an SRAM memory cell. Lowering the voltage on a bit line below ground voltage during a write cycle can also improve the ability to write to a memory cell.

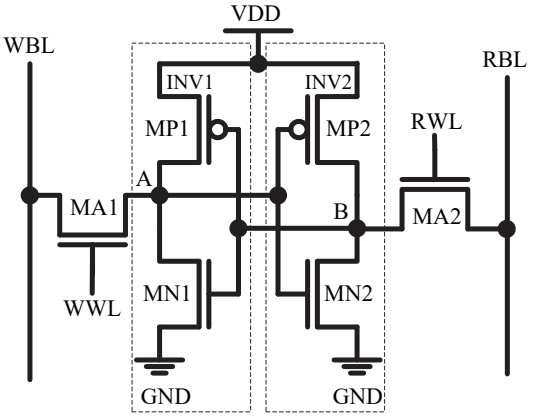

Figure 2. Circuit diagram of the conventional 6T two-port SRAM cell.

The conventional 6T single-port SRAM cell can also be made into an 8T two-port cell by inserting two additional transistors into the SRAM cell that implement a separate read port connected to a corresponding read bit line RBL and read word line RWL, as shown in Fig. 3 [9], [15]. The read port further comprises a read access transistor M14 and a read drive transistor M15 coupled in series to become a read stack. The reading of the data stored in SRAM cell is performed through the read access transistor M14 and the read drive transistor M15. The storage node A is coupled to the write bit line WBL through the write access transistor MA1, while the storage node B is coupled to the write bit line WBLB through the write access transistor MA2, wherein the storage nodes A and B are complementary nodes that are often at opposite voltage levels.

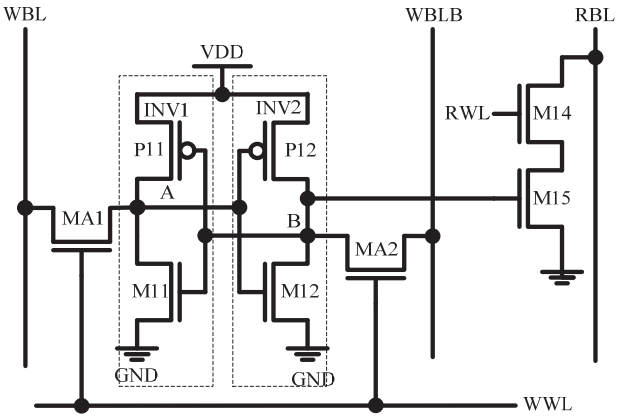

Figure 3. Circuit diagram of the conventional 8T two-port SRAM cell.

Before a write operation is performed, the write word line WWL is asserted. In write operations, the read access transistor M14 is turned off, and the write access transistors MA1 and MA2 are turned on. Accordingly, the data value is written into cell through the write bit lines WBL and WBLB. Finally, at the end of the write operation, the write word line WWL is de-asserted, allowing the latch to function normally and hold the data of the storage node. It's worth noting that, to guarantee a successful write operation, the storage node A must be pulled up (or down) above (or below) the trip-voltage of the inverter INV2 during the write word line WWL is asserted, otherwise a write failure will occur. Instead, when read operation is performed, the read bit line RBL is pre-charged during the read operation. Meanwhile, the write access transistors MA1 and MA2 are turned off, and the read access transistor M14 is turned on. If the storage node A is charged to a logic high, the read drive transistor M15 will be turned on and the voltage on the read bit line RBL will be pulled down to ground. On the contrary, if the storage node A is discharged to a logic low, the read drive transistor M15 will be turned off and the voltage on the read bit line RBL will be remained at its pre-charged level. Then, the sensing current on the read bit line RBL is detected by a sense amplifier (not shown) to determine the logic state of cell.

Advantageously, using the read-port of the 8T SRAM cell, the gate of the read drive transistor M15 receives the storage node voltage directly. Therefore, the data stored in the storage node B is not affected during the read operation through the read-port. Particularly, the read operation based on this read port has a characteristic in that this operation can be carried out completely independent of the write port, without destroying the data of the storage nodes A and B of the cell. However, the conventional 8T two-port SRAM cell has a large cell size due to eight transistors in total. As such, it is desirable to provide an SRAM cell that has the two-port

functionality while maintaining a relatively small cell size.

3. Proposed Technology

Recently, several techniques have been developed to resolve the write '1' issue of the SRAM cells configured with single-ended write bit line. Some of these techniques rely on boosted word line voltage [16]-[18], reducing the supply voltage VDD [19]-[21], sizing cell transistors [22]-[23], and raising the source voltage VSS [24]-[25]. However, each of these techniques may cause a reduction in the drive current of the transistors and in the operating speed of the cell, or may increase memory cell area. Other techniques require generation of a voltage above the operating voltage, or require a more complicated circuit design and more complicated device process. Therefore, there is a need for an effective technique to improve the write operation of the SRAM cells configured with single-ended write bit line, which suffer from inability to write '1'.

3.1 The Proposed 7T Two-Port SRAM Cell Structure

The proposed 7T two-port SRAM cell structure includes a write port and a read port as shown in Fig. 4. The write port is configured to connect the latch, similar to that of the above-mentioned cells, to the write bit line WBL in response to a write signal on the write word line WWL for writing a logical state to the memory cell. The gate of the transistor M13 is connected to a corresponding write word line WWL for conveying a write signal. The memory cell further comprises a read port configured to read the logic state of the latch in response to a read signal on the read word line RWL. The read port of the cell includes a pair of series-connected NMOS transistors M14 and M15, wherein the gate of transistor M14 is connected to the read word line RWL and the gate of transistor M15 is coupled to the storage node B.

It's worth noting that transistors P11 through P12 and M11 through M15 are appropriately sized to make the read and write states perform properly. Furthermore, the proposed cell structure also incorporates an assist circuit which consists of a read-write control circuit, a pre-charging circuit and a standby start-up circuit. Still referring to Fig. 4, the read-write control circuit is coupled to the source terminals corresponding to the drive transistors of each row memory cells. This configuration is aimed to control the source voltages of the drive transistors under different operating modes. That is, the read-write control circuit is configured to control the voltage levels of the nodes L1 and L2 (V_{L1} and V_{L2}, hereafter) in response to different operating modes. For example, during a read mode or during a standby mode, the read-write control circuit is configured to connect the voltage levels of the nodes L1 and L2 of the selected

cell to ground. Further, during a write operation, the read-write control circuit is configured to provide the voltage of the node L1 with a NMOS threshold voltage, and the voltage of the node L2 with a ground voltage. In addition, the pre-charging circuit is connected to the read bit line RBL in each column. The function of the pre-charging circuit is to pull up the read bit line RBL of a selected column to VDD before the read operation. Furthermore, the standby start-up circuit is to enable the SRAM cell to quickly switch to the standby mode, and thus effectively enhance the standby performance. In this manner, the memory cell has the advantages of having little or no adverse impact on cell stability or the write margin along with a relatively small cell size compared to the conventional two-port SRAM cells.

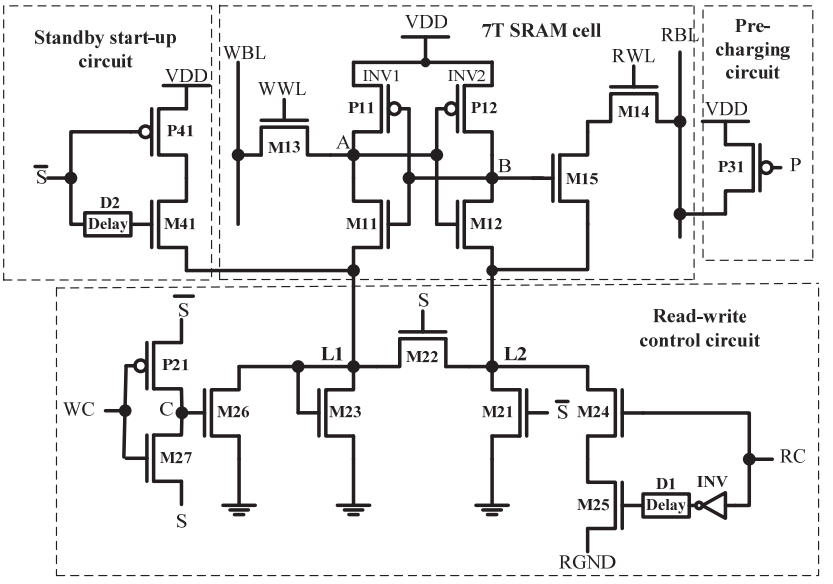

Figure 4. Circuit diagram of the proposed 7T SRAM cell.

3.2 Write Operation

Referring again to Fig. 4, prior to the write operation is performed, the write control signal WC is at logic low, the transistor P21 is turned on and the transistor M27 is turned off. Thereby, the node C is at logic high and thus to turn on the transistor M26, as such the voltage VL1 is pulled down to the ground voltage. However, during the write operation, the signal WC is at logic high, the transistor P21 is turned off and the transistor M27 is turned on. Subsequently, the node C is at logic low and thus to turn off the transistor M26, as such the voltage V_{L1} is set to $V_{GS(M23)}$. Thus, the writing '1' issue can be resolved. Figure 5 shows the simplified circuit diagram during the write operation.

Referring to Fig. 5, before a write operation is performed, the write bit line WBL is pre-charged to a logic high. The logic state on the write bit line WBL can be inversed

depending on the value to be written into the cell. And, the write word line WWL is then asserted to turn on the access transistor M13 allowing the data to be stored in the cell. When writing a logical '1', the write access transistor M13 and the drive transistor M11 that together act as a voltage divider. As such, the node A will be charged toward the following voltage level:

$$V_{DD} \times \frac{R_{M11} + R_{M23}}{R_{M11} + R_{M13} + R_{M23}} \tag{1}$$

where R_{M11}, R_{M13} and R_{M23} are the on-resistance of transistors M11, M13 and M23, respectively. At this moment, the transistor M13 is still in the saturation region and the transistor M11 in the triode region. Although R_{M13} may be greater than R_{M11}, the NMOS diode transistor M23 can provide a voltage $V_{GS\ (M23)}$ (i.e., the gate-source voltage of the transistor M23) at node L1. Consequently, to prevent the writing '1' issue during a write operation, the voltage V_{L1} of the selected cell is set to a predetermined voltage $V_{GS(M23)}$ which is higher than the ground voltage. Also, the voltage V_{L2} of the selected cell is set to the ground voltage.

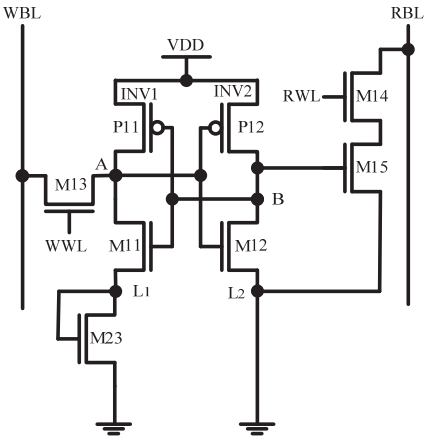

Figure 5. The simplified circuit diagram during the write operation.

4. Simulation Results

To evaluate performance, different SRAM cell structures discussed in this paper were simulated using a 0.18 um CMOS technology. All simulations were carried out at nominal conditions: VDD=1.8 V and at room temperature.

The transients associated with a writing operation are detailed described below. Firstly, consider the write '0' operation. Prior to the write '0' operation, the write word line WWL is at logic low. During the write '0' operation, if a logical '0' is stored previously, the write word line WWL transitions from a logic low to a logic high. As the voltage level of the write word line WWL (V_{WWL}) exceeds the threshold voltage of the transistor M13 (V_{TM13}), transistor M13 is turned on. Subsequently, owing to the fact that the voltage level of the write bit line WBL (V_{WBL}) is at logic low, the voltage V_A remains at the ground voltage. On the other hand, if a logical '1' is stored previously, when the write word line WWL transitions from a logic low to a logic high during the write '0' operation. As the voltage level of the write word line WWL (V_{WWL}) exceeds the threshold voltage V_{TM13}, transistor M13 is turned on. Subsequently, owing to the fact that the voltage level of the write bit line WBL (V_{WBL}) is at logic low, the node A and node L1 will be discharged to the ground until the end of the write '0' operation.

Secondly, consider the write '1' operation. Prior to the write '1' operation, the write word line WWL is at logic low. During the write '1' operation, if a logical '1' is stored previously, the write word line WWL transitions from a logic low to a logic high. As the voltage V_{WWL} exceeds the threshold voltage V_{TM13}, transistor M13 is turned on. Subsequently, owing to the fact that the voltage V_{WBL} is at logic high and transistor P11 still on, the voltage V_A remains at the power supply voltage V_{DD}. On the other hand, if a logical '0' is stored previously, the write word line WWL is at logic low and transistor M11 is turned on. It is to be noted that, since the transistor M11 is turned on, and therefore, when the write '1' operation is started, the write word line WWL transitions from a logic low to a logic high. The voltage at node A is slightly increased following the voltage of the write word line WWL due to the parasitic capacitance coupling effect. As the voltage V_{WWL} exceeds the threshold voltage V_{TM13}, transistor M13 is turned on. Subsequently, since the voltage V_{WBL} is at logic high and transistor M11 still on, and the voltage V_B remains at a voltage close to the power supply voltage V_{DD}, therefore, the transistor P11 remains off. As a result, the voltage at node A will rise up due to the voltage division along the drive and access transistors. When the voltage exceeds a threshold, it causes the bit to flip due to regenerative feedback. Hence, the write '1' operation is completed. It is worth noting that, when writing a logical '1' to a logical '0' is stored previously, the voltage V_{L1} is set to

$V_{GS(M23)}$. After the completing of the write '1' operation, the voltage V_{L1} will be discharged to the ground voltage via transistor M26. Thus, the issue concerning the difficulty of writing '1' can be resolved. The simulated waveform of a successful writing in the proposed 7T SRAM cell is shown in Fig. 6. Table 1 illustrates a comparison among different supply voltages for the traditional 6T SRAM cell and the proposed 7T SRAM cell are performed in a write operation. As it can be seen from Table 1, the proposed 7T SRAM cell provides an efficient solution to the writing '1' issue, that is, the proposed 7T SRAM cell enabling a logical '1' to be easily written to the SRAM cell, as compared to the standard 6T SRAM cell.

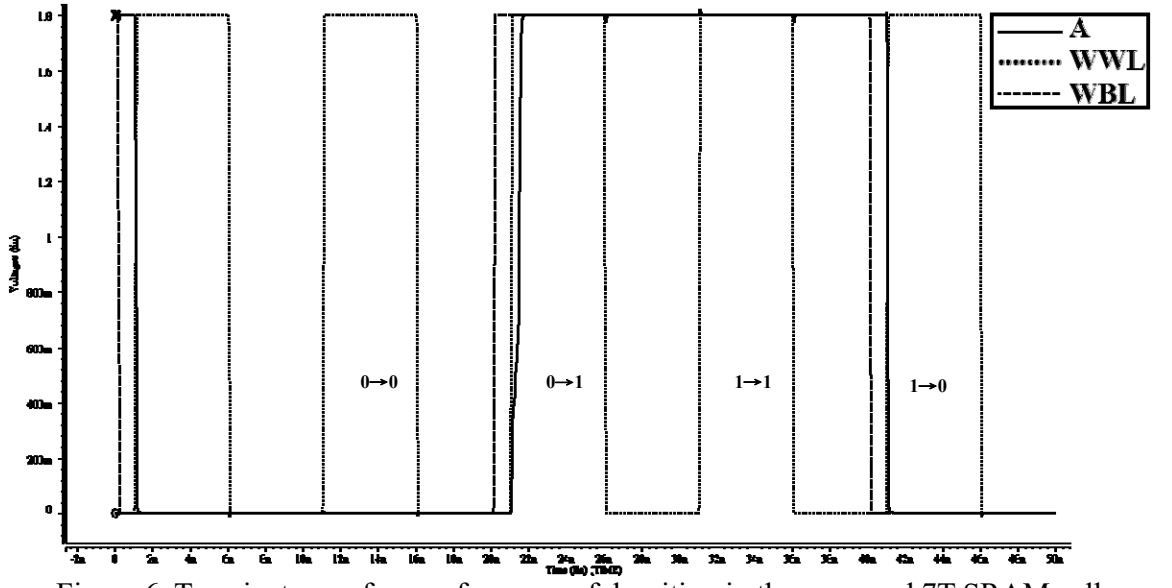

Figure 6. Transient waveforms of a successful writing in the proposed 7T SRAM cell.

Table 1: Write Time of writing a logical '1' comparison

Power supply voltage (V)	Standard 6T SRAM (ns)	Proposed 7T SRAM (ns)	Improvement (%)
1.75	0.7688747	0.7110508	7.5
1.70	0.256847	0.2547118	0.83
1.65	4.360183	4.358231	0.0448

5. Conclusion

This paper has addressed the disadvantages of the existing two-port SRAM cells and further drawbacks inherent to single-ended bit line cells, and has provided an assist circuit for resolving the writing ‘1’ issue. This assist circuit is activated to control the source voltages of the drive transistors in a different operating mode. In particular, in a write operation, the source terminal of the drive transistor located near to the write bit line is set to a positive threshold voltage. Meanwhile, the other drive transistor has its source terminal coupled to ground. Using this method, this design facilitates efficient writing of data into a single-ended write structure in an SRAM cell, particularly if a logical ‘0’ stored in the cell is to be overwritten by a logical ‘1’. Simulation results for the proposed cell design confirm that the proposed cell provides an efficient solution to the writing ‘1’ issue, that is, the proposed 7T SRAM cell enabling a logical ‘1’ to be easily written to the SRAM cell. In addition, the proposed cell design also having the advantage of faster write operations without reducing cell stability.

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文創品牌之策展設計與形象塑造：以「有情門」品牌為例

馮文君*

摘要

國內文創品牌的行銷，受限於台灣市場規模小、且實體通路成本高的狀況下，多數以網路作爲行銷通路。品牌為擴展知名度，趨向以展覽為平台與顧客互動，讓顧客真實接觸、體驗產品的文化特質或創意，期望顧客能對品牌留下良好的印象。

本研究係為文創品牌「有情門」進行策展設計，以擴展知名度、建立形象價值之策展實務研究。先以專家訪談法、內容分析法、紮根理論等研究方法，萃取「品牌策展設計構面」與「有情門產品屬性定位構面」後，依據「有情門產品屬性定位構面」歸納出「有情門」品牌核心價值，再依據「品牌策展設計構面」進行「有情門」之策展設計與品牌形象塑造，以策展設計實務建構文創品牌之策展設計模式；並將「有情門—就是愛線」展覽之品牌新識別與主視覺意象，轉化為門市之新展示識別，擴大與延伸展覽的效益。

「有情門—就是愛線」展覽雖已結束，由展覽延伸至門市的新展示識別，於 2011 年開始至 2017 年均穩定成長，從原有 6 家門市增加至 17 家門市，年平均營業額約成長 8% 以上，確是行銷之助益，亦驗證「有情門」品牌策展設計與形象塑造之效益。

關鍵詞：文創品牌、策展設計、文化創意產品。

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Curation Design and Image-Building of Cultural Creative Brands: Take the brand " TW.U.C.M" for Example

Wen-Chun Fong*

Abstract

In Taiwan, limited by the small market scale and high cost of physical marketing channels, most brands in the cultural and creative industry market their products through the internet. In order to increase its popularity, a brand would use an exhibition as a platform for interactions between its products and customers, so that customers can get to know the cultural features or creativity of the products through physical experiences, in hopes of leaving them a good impression on the brand. This study aimed to curate an exhibition for "TW.U.C.M.", a cultural and creative brand, with practices for increasing its popularity and building its image. First, this study applied the expert interview method, the content analysis method, and the grounded theory to extract the constructs “brand exhibition curation” and “TW.U.C.M. positioning according to product features”. Then, the core values of the brand “TW.U.C.M.” were summarized based on the construct “TW.U.C.M. positioning according to product features”. And a practical curation model was built for exhibition curation and image building for “TW.U.C.M.”. And then, the new identity and the main visual image of the brand were transformed into the new display identity for the physical stores to enhance and extend the effects of the exhibition.

Although the exhibition titled “TW.U.C.M.: the Love for Lines” was over, the new display identity was extended to the physical stores from the exhibition, and from 2011 to 2017, the number of physical stores had grown steadily from 6 to 17 and the average sales had increased by 8%. The credit should be given to the marketing. The effects of the exhibition curation and image building for "TW.U.C.M." were thus proven.

Keywords: Cultural and Creative Brand, Exhibition Curation, Cultural and Creative Pr- oduct.

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壹、前言

自 2002 年政府公布〈挑戰 2008：國家發展重點計畫〉的子計畫「發展文化創意產業計畫」以來，將居家用品、家具設計列為「創意生活」產業，也成為國家發展重點。根據文化部統計 2011 年至 2017 年之「創意生活」產業年平均營業額成長為 2.78%（文化部，2017）。本研究之實務個案品牌「有情門」即屬於「創意生活」產業之家具品牌；自 2006 年成立第一家門市開始，至 2010 年共有 6 家門市，平均每年開 1.2 家門市，年平均營業額成長僅在 2 %左右。2010 年「有情門」為拓展行銷與塑造新的形象，於華山文創園區舉辦「有情門」品牌策展以發表新的品牌識別，並將「有情門—就是愛線」展覽之主視覺意象，延伸為門市之新展示識別，擴大與延伸展覽的效益。根據「有情門」經營團隊表示，經過 2010 年之品牌策展與形象再塑造，並將策展設計之展示識別延伸為門市識別後，於 2011 年至 2017 年間，年平均營業額約成長 8%以上，高出全國「創意生活」產業平均成長之 2.78%許多；並於 2011 年至 2017 年 7 年內增加 12 家門市，全國北中南共分佈 17 家門市，平均每年加開 1.6 家門市；同時將舊門市改裝為新的門市識別。據此推知，對企業而自言，新門市開張或舊門市改裝，都是重大投資，必須有營業的獲利才能再投資以擴大經營規模。展覽雖已結束，但是，新的識別設計，以及策展主視覺延伸為門識別與形象塑造的效益還在持續進行，這是選擇此案作為研究案例之主因。

台灣家具居家用品產業，在顧客導向、消費者中心的設計趨勢下，人們喜歡具個性與差異化的產品，更尋求具有文化與美學之認同、表現具文化特色的產品（文建會，2005）。傳統的居家用品廠商，為因應產業轉型，多數廠商會將過去在世貿中心所辦的家具家用商展，轉至文化創意園區舉辦「創意生活」產業之品牌形象展覽，例如：「2015 台灣設計展．宜蘭中興文化園區．Boom 企業館」，家居家用品參展踴躍。展覽活動規模可因預算而調整高低，這趨勢成為國內許多新創文創品牌商機拓展選項之一（陳國政，2016）。品牌參展的現象，反映出文創品牌在成立初期，為拓展新的行銷市場，會藉由臨時性的快閃店或展覽和顧客互動。選擇展覽的原因，除了擴張知名度，也因實體通路經營成本高。當品牌處於品牌在開創階段，在沒有實體行銷通路的狀況下，展覽是與顧客互動的重要平台，可讓顧客實際觀察或體驗商品，藉由策展設計對品牌價值進行溝通，更讓消費者感知品牌所要表達的價值，進而形成對品牌對品牌的好感度、爭取新的消費者之感動與認同，進行網路消費或成為長期顧客，以形成忠誠度，建立品牌形象與增益品牌價值，因此，品牌策展成為新興文創品牌的重要行銷活動。

國外學者 Aaker（1996）指出，品牌形象可根據品牌產品屬性定位，以願景發展識別

形象策略，以識別形象來溝通品牌定位屬性、願景，且品牌形象的建立可以讓顧客得到利益。同樣地，國內學者也提出文創產業應先確立產品屬性與定位，優於文創產品的製造與量產（陳啟雄、陳兵誠，2015）。文創品牌形象的建立源於文創產品之文化特色與創意，與其品牌定位、品牌願景、品牌識別設計等，皆會影響品牌策展設計；陳殿禮、馮文君（2018）指出品牌策展屬於行銷活動，策展必須確切傳達文創品牌的願景、定位、文創產品的創意，並將文創品牌以文化意涵與創意為主的無形價值，藉由展覽活動來溝通、擴大品牌知名度與建立形象。此外，可將品牌展覽之展示道具，設計成品牌專屬之展示模組化系統，可於展覽後拆卸，於另一個展覽再次組裝使用，或延伸至品牌展店時使用，形成展示識別系統，進而達到形象識別，並符合環保與經濟效益。因而，如何有效提高展覽設計之效益，運用品牌之策展設計，擴展知名度與塑造品牌形象的的策展設計實務研究，極顯重要。

本研究之目的分為三項：（一）建構屬於產業策展設計之「品牌策展設計構面」，其可運用於不同產業之品牌策展，期望對策展實務有所建樹。（二）建構「有情門品牌產品屬性定位構面」，亦可作為其他文創品牌定位之參考。（三）以設計實務完成「有情門」之策展設計與品牌形象塑造，並以此策展設計實務，建構「文創品牌之策展設計模式」，作為文創產業展設計之參考。

貳、文獻探討

一、展覽設計與品牌策展

展覽設計運用了展覽計畫、視覺傳達、建築、室內、空間設計等，不同領域之專業知識整合。因此，相關的理論與技術也是展示設計專業的重要依據。包括，視覺意象的傳達、在空間與室內設計領域的人體工學知識、美術館空間尺度與視覺距離的關係、視覺機能、照明之數據研究等（耿鳳英，2001）。展覽視覺呈現與空間設計之與執行，息息相關。為讓策展模式的研究具落實性，將策展之模式分為策展理念的形成與策展理念的落實之兩項程序，內容包括：策展理念的形成、展覽定調、展覽設計及展覽布置等四個部分，且於策展之後將這展覽形式延伸成為實體店鋪，是一種創新的經濟模式（陳璽敬、陳俊良、林志隆，2014）。林榮泰、林伯賢、陳俊良（2015）提出策展策略的研究，以及策略策展的執行程序，關鍵因素包括視覺文化之故事點、場域語彙之感動點、持續記憶之共鳴點、品牌平台之魅力點，這些重點可協助展覽更多元性的創新開發。Harvey（1989）指出展覽的敘述、呈現方式，需要考慮給予不同觀眾，不同面向的體驗，都需以詳盡的企劃為起點。從品牌策展的觀點，在於將品牌核心價值透過概念化，經由視覺化的設計，

再以展示化的創意，達到能引起觀眾的感動化，最終形成品牌的價值化（林榮泰，2013）。

歸納學者的論述，策展的重要的因素主要分爲：展覽理念企劃、主題故事與文化視覺的感動，以及展覽設計的落實與佈置。因而，品牌策展需關注於企劃溝通，再以具文化性的主題故事、場域的視覺設計來感動顧客，且完善空間設計與執行，才能吸引觀眾，留下對品牌的記憶，才能形塑品牌形象、創造展覽的效益。然而，上述文獻所提及的展覽，多屬於博物館、美術館、財團法人或大企業品牌等，針對產業型態的品牌策展設計，尚未見策展設計實務之討論，因而，本研究以「有情門」之策展設計，致力於產業之文創品牌策展設計與形象塑造探討，極為重要。

二、品牌產品屬性定位與識別形象價值

Aaker & Keller（1990）指出品牌形象是品牌呈現給外在世界的綜合與概括的形象。品牌雖然非常重視品牌識別的呈現，但品牌不僅僅在於識別標誌，品牌必須包括願景、產品、定位、標誌、標語、商譽，以及整體行銷的管理而累積的品牌價值（Blair & Chiou，2014）。好的品牌定位（Brand position）所具備特徵是顧客可以知覺其獨特性、強度（Aaker，1991）。Nike 即是以簡單的標誌與標語「Just Do It」展現獨特個性的品牌定位。Aaker & Shansby（1982）論述品牌的定位策略是影響顧客認知及購買決策的重要因素。Kotler（2002）提出七大品牌定位的策略，分為（一）屬性定位：以產品的某些特質與特色定位、（二）價格與品質、（三）使用或應用、（四）使用者、（五）產品類型、（六）競爭者、（七）利益定位。Park & Deborah（1986）指出企業透過品牌定位的過程，可以使品牌在競爭者的差異中，發展出期望的品牌形象。品牌定位功能包含品牌差異化、特定利益構面建立及形象創造。欲打造文創品牌的企業，須先在品牌中置入與文化相關的元素，增進該品牌的文化意義與價值（黃秀英、侯勝宗、林安鴻，2015）。由於文創品牌是以產品之內涵文化創意為訴求，以產品屬性定位，會讓顧客比較容易留下對品牌的印象（廖啟順、李正文，2009）。例如，國立故宮博物院所推出的文創商品，是以文化創意禮品產品定位，以清代雍正皇帝的奏摺批文「朕知道了」作貼紙設計，即是因產品屬性定位明確而熱賣的商品。定位步驟是決定識別設計的關鍵（侯純純、林品章，2008）。品牌識別是建立定位與品牌價值的工具，可達成強化品牌知名度與塑造具獨特個性的品牌（Keller，1998）。林磐聳（1995）強調識別系統是將經營理念與精神文化，運用整體識別傳達系統，傳達給企業內部、合作廠商者、消費者，並掌握使其對企業文化產生一致性的認同感和與價值觀。必須結合現代設計觀念與管理理論的整體性運作，以突顯的願景、定位，使消費者產生深刻的認同感，而達成促銷目的之設計系統。由於品牌識別是用於推動所有的品

牌建立活動，因此他具有深度與豐富性，並且透過品牌識別所創造出來的價值利益，包括功能性、情感性、自我表達等價值，可建立品牌與顧客之間的關係（Aaker & Joachimsthaler，2000／高登第譯）。例如，Apple 品牌，無論其被咬了一口的蘋果標誌、無彩色（黑白）色系的識別系統、賦予時尚美感且符合黃金比例的商品造型，創新功能且獨特的品牌自我表達價值，使消費者者認同「Think Different」。因此，品牌識別可以符號來象徵品牌與競爭者的差異化。品牌品牌識別是品牌策略管理者所渴望創造出，或維持一組品牌聯想性，這些聯想性意味著品牌對顧客的承諾（Aaker，2014/陳倩譯）。

綜合上述，品牌形象包括顧客對品牌名稱、標誌、或顧客在消費過程中的回應，也是產品品質的象徵。品牌定位是為了在消費者心目中創造出品牌獨特的價值，管理者透過產品屬性的定位，再運用品牌識別凸顯其願景與定位，可以使品牌差異化與形象營造的效果達到良好。本研究以「有情門」品牌策展設計，傳達新的品牌識別設計，需能對「有情門」產品所賦有具文化意涵或創意，以策展設計傳達，並將新的識別運用於各種文宣、廣告、視覺、展示等，來塑造品牌一致性的形象與價值。

三、文化創意產品之意義與形式

學者林榮泰（2009）定義文化創意產品是文化的，以日常生活文化為原點的創作；是精選的，從文物中精選出具有代表性的文化特色元素，以設計轉化創作之生活用品；是愉悅的、是賞心悅目、心曠神怡的；是創意的。文化創意產品即是以人們生活文化為內涵，以創意轉化為日常活用品，可以是實用又有創意的。文毛連塭、郭有遹、陳龍安、林幸台（2003）提出產品創意可以從功能、形式、內容等三方面的變化來運作。日本傳統工藝的「漆器」，由日本許多品牌研發應用運用於碗、筷、湯匙等食器，即是以日常生活文化為原點的創作。文創產品是以文化特色之象徵符號，並以設計轉化為產品設計之創意，設計者可運用自己國家自有的傳統文化與生活型態，因為每個國家都具有獨特的識別性，可在全球化競爭化市場中運用文化特色研發的產品設計，亦可提升產品獨特性並增進消費體驗（Handa，1999）。「琉璃工房」就是運用華人文化獨有的十二生肖與人的關係來創作，成功地拓展國內外市場；亦符合在講求形象與意象的當前社會，強化產品的附加價值以吸引顧客下，已經不能僅依賴產品功能，更需應用心靈層次的進化策略（李亞傑、何明泉，2011）。

Krippendorff（1996）論述產品設計是以產品語意作詮釋，指出人們創造的事物具有意義（meaning）及形式（form）兩項層面。使用者可經由人造物的意義與形式，得以理解產品的用途，故設計者更要關心、並考慮使用者在使用產品時的涵構（鄧建國、莊明

振，2008）。產品設計的特徵由兩項重點組成，一是形式上的造形特徵，亦即產品的表現形態，如外觀造型、材質、色彩等屬於造形結構的特性，可以被清晰地識別；另外是感受、感覺的表現特徵，是造形所傳達的情感特質；產品造形給予顧客視覺感受，能影響顧客的購買決策，亦即產品的造形可傳遞出顧客對於該產品的心理感覺（張文智、林旻樺，2004）。

綜合上述，文創品牌乃以產品語意來呈現產品之設計意象（意義與形式），吸引顧客選擇此品牌，並在設計中融入在地文化特色或創意以吸引顧客產生情感或意識的認同而購買，且在可於日常生活中使用，具有功能或機能的價值外，顧客更於使用該產品時融入自己生活中再體現其文化特色與創意之意義與形式。

本研究之「有情門」品牌策展設計，需解析「有情門」的產品語意，其產品設計之意象（意義與形式）所被賦予文化意涵或創意，才能達成策展目的。

參、研究設計

一、研究方法與研究工具

本研究以內容分析法（content analysis）作資料分析與歸納。以訪談法（Interview Method）之專家深度訪談法（in-depth interviewing）進行專家訪談。也以紮根理論法（Grounded theory）作為研究方法，並使用 Winmax 軟體作為研究工具。

內容分析法，乃對過去已存在的事或物進行探究與了解，在設計領域或社會學研究領域中，常常必須透過文獻分析以獲得資料，所以內容分析具有其價值性。（盧麗淑，2012）。訪談法之專家深度訪談法，其深度訪談並不是訪問者去挖掘受訪者既有的情感與想法，乃是透過雙方互動的過程，就某些主題經過交談，情緒的互相感染，選擇、決定、建構的過程，而歸結的意見（阮綠茵，2012）。紮根理論法是屬於質性研究的方法，在應用的過程中，理論會從資料當中萌發出來，其目的是從實際之研究中統整出理論（陳昺麟，譯 2001，Pandit，1996）。本研究使用 Winmax 軟體作為研究工具，應用時首先將文件載入軟體，即進行編碼；其次，過程中依照觀察紀錄之筆記或訪談稿文字段落所浮現之概念，持續編碼(coding)，此過程在紮根理論研究法終被稱為「開放性編碼（open coding）」，然後是對每一個譯碼（概念）之複製、移動與整併，這面向牽涉到編碼動作的修改與合併，這是為了進行「主軸編碼」（axial coding）；最終，再選擇一個核心範疇，將編碼系統性地和其它範疇加以串聯，以「選擇性譯碼」（selective coding）驗證其間之關係。本研究運用上述研究方法與工具作為本研究之研究方法，實施內容敘述於下。

（一）專家深度訪談法與紮根理論方法

本研究透過文獻探討品牌策展、展覽設計與展示設計等論述，作為訪談專家前之先備知識，再經過邀約說明訪談內容後，實地訪談 20 年以上經營品牌與展覽設計之跨領域專家。深度訪談內容以品牌策展設計為焦點，再將訪談錄音內容，打成逐字稿；以質性研究之三角驗證，文獻探討、研究省思、專家訪談逐字稿寄給專家確認。經此效度的驗證後，以紮根理論研究方法與質性研究資料分析軟體 Winmax 工具，萃取「品牌策展設計構面」。

（二）內容分析法與紮根理論方法

本研究將文獻歸納、彙整，作為文創品牌產品屬性定位之先備知識，再進行「有情門」品牌展覽之二十八系列產品與文本資料，作整理歸納後，打成逐字稿；以質性研究之三角驗證，文獻探討、研究省思、產品逐字稿寄給客戶確認。經此效度的驗證後，再以紮根理論研究方法與質性研究資料分析軟體 Winmax 工具，萃取「有情門產品屬性定位構面」。

二、研究個案介紹

本研究之實務個案，乃六十年的永進木器廠股份有限公司，由傳統產業起家。第三代經營者，於 1988 年起致力於轉型，自創「STRAUSS」家具品牌，再於 2006 年成立「有情門」門市。本研究之策展設計實務為「有情門—就是愛現」展覽。展覽時間：2010 年 8 月 28 日至 9 月 28 日。地點：華山 1914 創意文化園區．中四 B 米酒作業場．生活美學館。選擇此案例的原因，乃因當時「有情門」期望藉此品牌策展設計展示新的形象識別，以及塑造新形象。展覽雖已結束，由展覽延伸至門市的新展示識別，至今仍在進行，亦驗證此次品牌策展設計與形象塑造之效益。

肆、有情門品牌之策展設計

文創品牌是以產品之文化特色與創意為訴求，以產品屬性定位，可讓消費者比較容易留下對品牌的印象。展覽屬於行銷活動之一，因此，策展者與策展團隊，必須瞭解先了解品牌策展設計、「有情門」品牌產品屬性定位，才能將品牌產品所要傳達的文化特色與創意，讓顧客能感知，體驗品牌所欲傳達的形象與價值。因此，本研究在進行策展實務之前，先以紮根理論方法進行下述探討與理論建構。

一、品牌策展設計構面

（一）專家深度訪談

本研究經探討品牌策展、展覽設計與展示設計之相關文獻，作為訪談專家前之先備知識，經過邀約說明訪談內容後，實地訪談 20 年以上經營品牌與展覽設計之跨領域專家，專家訪談內容，如表 1 所示。

表 1 專家訪談之內容表

編號	專家	年資	訪談綱要	專家背景
01	Li 先生	23	品牌策展設計、展覽空間、展示設計、展覽執行要點	23 年以空間設計主管、企業設計部主管、經營空間設計公司 8 年。
02	Chaing 先生	28		28 年以上家具研發、展覽設計、自有家具工廠、品牌經營者、空間設計公司之經營者。
03	JIANG 女士	25		25 年以上建築、國際品牌策展、國立美術館策展、建築策展、建築師事務所經營者。
04	Chen 先生	23		23 年以上品牌形象策展、國際品牌與本土品牌經營策略專家、廣告設計公司經營者。
05	GONG 先生	25		25 年以上國際建築設計策展、品牌策展、國立大學建築研究所所長與副教授、建築師。

（資料來源：陳殿禮、馮文君，2017）

深度訪談內容以品牌策展設計為焦點，並如前文所述之以質性研究之三角驗證方法驗證後，再以紮根理論之質性研究資料分析軟體 Winmax 逐步編碼而得「專家訪談編碼表」，詳列於表格中並請專家確認（請見附錄：一）。由於「專家訪談編碼表」內容頗長，於此僅舉例「品牌策展設計」之「溝通企劃」構面之顧客關係要項之編碼表，如表 2 所示。

表 2 專家訪談編碼表之「溝通企劃」

選擇性編碼	主軸編碼	概念開放性編碼	〔次數:段落〕	編碼訪談稿
品牌策展設計	展覽溝通企劃	─顧客關係服務	01.Li 先生〔1:1〕	─董事長是把它當作商業探試，這樣的產品、組件、工法，是否能被市場接受，變成商品(126/126)
			02.Chaing 先生〔1:1〕	─展覽不能當成正常廣宣，僅類似事件(12/12)
			03.Jiang 女士〔1:3〕	─不過因應不同的狀況，例如企業或品牌，經常要到處去展覽，有時去國外、有時國內展，事實上就該為這家公司、品牌去設計他的展件，這是設計師可以為顧客做的，也是算顧客服務，讓顧客容易找到你的展區。(25/27)
			04.Chen 先生〔6:10〕	─上面室會議室下面是 showroom 加上招待的地方。(7/7) ─重要還有軟體是人的服務，導覽人員怎樣引導、你的規劃、你的展出、介紹產品特色(101/102) ─展覽要軟硬兼顧才能達到好的展出效果。(103/103) ─展覽前的規劃、展覽中的參與、展覽律的追蹤(104/104) ─追蹤是什麼？不外乎曝光，顧客留下名單怎麼去追蹤，如用 e-mail 往返去詢問展出的需求，展完後是否需提供樣本？有沒有合作機會？有沒有建立一套 CRM，所謂的顧客管理系統。(106/109) ─你就有許多好的客心資料累積在企業內部，這些受需要去考慮的。(112/112)
			05.Gong 先生〔1:2〕	─但是 branding 的展不一樣，其實有點像公關企劃，一定要先建構一個公關企劃(13/14)

（二）品牌策展設計構面

專家訪談以質性研究之三角驗證效度後，再紮根理論研究方法與質性研究資料分析軟體 Winmax98 pro 工具，發展出描述性的架構以逐步編碼程序，萃取得出「品牌策展設計構面」之 4 構面與 13 要項。如表 3 所示。

表 3 品牌策展設計之構面與要項表

核心範疇（選擇編碼）	構面（主軸編碼）	要項（開放性編碼、概念）	要項統計 共 13 要項
品牌策展設計	溝通企劃	1. 顧客關係服務；2. 展覽執行企劃；3. 品牌價值溝通；4. 品牌形象傳達。	4 個要項
	主題故事	1. 主題故事敘述；2. 展覽目標；3. 溝通對象。	3 個要項
	主視覺設計	1. 新的設計表現；2. 空間主視覺策略；3. 設計的質感；4. 形成量感。	4 個要項
	空間設計與執行	1. 事先評估考量；2. 空間設計（空間配置、色彩、照明計劃、動線規劃、展示設計、預製模組化展具）。	2 個要項

（資料來源：陳殿禮、馮文君，2017）

（三）品牌策展設計構面

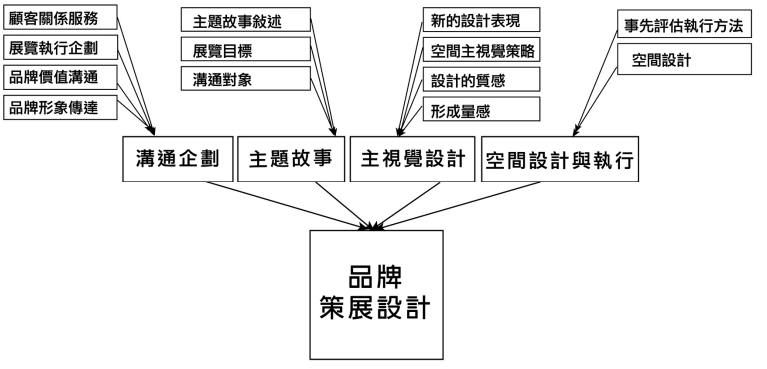

圖 1 品牌策展設計構面圖（資料來源：陳殿禮、馮文君，2017）

本研究依照訪談法、紮根理論之譯碼、歸納後，所得之「品牌策展設計構面」之 4 大構面與 13 要項繪製成圖示，如圖 1 所示，說明如下。

1. 「溝通企劃」要項，包括：顧客關係服務、展覽執行企劃、品牌價值溝通、
2. 品牌形象傳達等要項。
3. 「主題故事」要項，包括：主題故事敘述、展覽目標、溝通對象等要項。

4. 「主視覺設計」要項，包括：新的設計表現、空間主視覺策略、設計的質
5. 感、形成量感等要項。
6. 「空間設計與執行」要項，包括：事先評估執行方法、空間設計等要項。

「有情門」之品牌策展設計將根據此 4 大構面與 13 要項進行策展設計，並將實際執行內容詳述於後。

二、有情門產品屬性定位構面

（一）有情門展覽產品意象編碼

以內容分析法，將有情門參展的二十八系列產品，與其所提供的原始文件、產品樣本、官方網站、FB 等資料之內容後，經彙整為逐字稿，以質性研究之三角驗證，文獻探討、研究省思、產品逐字稿寄給客戶確認。經此效度的驗證後，再以紮根理論研究方法與質性研究資料分析軟體 Winmax 工具，萃取「有情門」產品意象之「意義、形式」的編碼，以建構「有情門品牌產品屬性定位構面」之要項。有情門展覽之產品，共二十八項之編碼內容，詳細列於「有情門展覽產品編碼表」中並經顧客確認。（請見附錄：二）。展覽二十八系列產品資料列於「有情門品牌展覽之產品表」中表格中並經顧客確認。（請見附錄：三）。

本文限於篇幅僅舉例有情門參展產品意象之「意義」部分編碼，如表 4 所示。

表 4 有情門產品意象之「意義」中關於「體驗性／文化意涵」之部分編碼表

選擇性編碼	主軸編碼	概念開放性編碼	〔次數:段落〕	展覽產品經確認之逐字稿編碼
意義	體驗性	─文化意涵	01.結祥雲〔1:3〕	─以華人文化「空、有」的對比，在空間中凝結出靜思的磐石。或兩腳落地正襟危坐，或盤腿趺跏，瞬間，人與椅身影合一，仿若凝結成一團祥瑞的雲氣。諸佛菩薩所到之處就是吉祥地，香煙處處結雲，所以稱為「隨處結祥雲」。(3/5)
			03.流韻茶几、邊几、沙發〔1:3〕	─桲木山形紋的飽滿氣韻，疊上竹林的悠閒，幻化出華人文化鳳凰自信的羽翼─豐厚，蓄勢，設計茶几、邊几、布沙發沙發。沙發昂頭的背靠，厚實實用的座墊，等待著有緣人跨坐騎乘，一起叱吒天際。典雅端莊的方正結構，以傳統工藝環繞的扶手依著手掌心與無名指指尖的球面。(6/8)
			04.謙謙餐椅〔1:1〕	─流露出謙謙君子般的內斂氣質，雍容大器。(5/5)

			06.樑柱線架構系列〔1:1〕	ㄧ富有禪意、深具東方古典氣質的線條，展現主人的居家品味。樑柱的方正線條結構，穩固不易侵犯，展現設計人善於架構的智慧結晶。(3/4)
			07.泊荷系列 1:1〕	ㄧ如一塘荷葉舞春風，如齊白石的畫中荷芰，或單枝，或成群，錯落有致，停泊暫歇。(2/2)

（二）有情門展覽產品之意象編碼歸納

有情門產品意象之「意義」可歸納為：創意應用於日常生活、機能方便、文化意涵、意識覺知、傳承工藝、技術創新等。產品「形式」可歸納為：對稱形、非對稱形、單一色相配色、調和色系、木質、土質、金屬、織品、其他（塑、矽、皮）、創新材料，共十六個概念要項。再連結概念和概念間的關係，整合歸納出：實用性、體驗性、技術性、造型、色彩、材質等六項主軸編碼，再將主軸編碼間的關係，歸納整併出選擇性編碼，分別為「意義」與「形式」之意象構面，其「●」標示表示「重要」之要項並整理為「有情門參展產品之產品意象表」，如表 5 所示。

表 5 有情門參展產品之產品意象表

有情門品牌參展產品	產品意象															
編號、名稱	意義						形式									
	實用性		體驗性		技術性		造型		色彩		材質					
											屬性分類					
	創意應用於日常生活	機能方便	文化意涵	意識覺知	傳承工藝	創新技術	對稱形／強調線條	非對稱形／強調線條	單一色相配色	調和的配色	木質	土質	金屬	織品	其它．塑、矽、皮	創新材質
01.結祥雲	●		●			●	●			●	●					
02.清池邊几	●	●				●	●			●	●	●				
03.流韻茶邊几、沙發	●	●	●		●		●			●	●			●	●	●

04.謙謙餐椅	●		●		●		●			●	●					
05.倚天茶几、邊几	●	●					●			●	●	●				●
06.樑柱線架構	●		●	●		●	●			●	●					
07.泊荷系列			●		●	●	●			●	●					●
08.雨窪系列凳几	●			●	●	●	●			●	●					
09.宜家系列	●			●		●	●			●	●					
10.一縷輕煙立鏡	●	●				●	●			●	●	●				
11.舞魟立鏡檯	●	●	●		●	●	●			●	●					
12.雀頂立鏡檯	●	●	●			●	●			●	●					
13.百合立鏡檯	●	●	●			●	●			●	●					
14.楊朵系列	●		●		●		●			●	●					
15.雅憩系列	●		●			●	●			●	●			●		
16.滑翔短、長凳	●	●	●	●		●	●			●	●					
17.追風吧椅、長板凳	●	●	●			●	●			●	●					
18.六面體凳几	●					●	●			●	●					
19.吉祥杉衣帽架	●	●				●	●			●	●					
20.千年松衣帽架	●	●				●	●			●	●					
21.紅珊瑚衣帽架	●	●				●		●		●	●		●			
22.桱口擱衣架	●	●				●	●			●	●					
23.寶瓶座系列			●			●	●			●	●					
24.桲木單元櫃	●	●					●			●	●					
25.磐石茶几	●	●	●			●	●			●	●					
26.遊方哈欠邊几	●	●		●		●	●			●	●					
27.考工記			●	●	●		●		●							●
28.OSA系列			●		●			●	●				●		●	
要項統計	24	16	16	6	8	21	26	2	2	26	26	3	2	2	2	4

●標示為：編碼符合要項／重要，可複選。 （本研究繪製）

（三）有情門產品屬性定位構面

將「有情門」參展之 28 項系列產品意象之「意義」與「形式」構面之要項，歸納為文創品牌「有情門產品屬性定位構面」並無分權重，策展者可視之為應用面，作為策展設計時之檢視要項，如圖 2 所示。

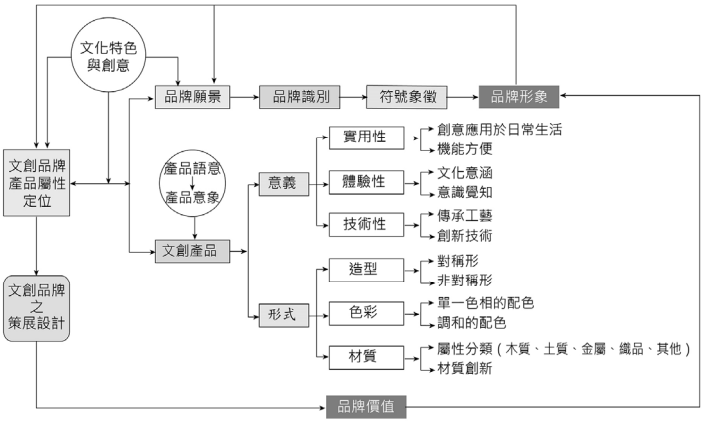

圖 2 有情門產品屬性定位構面圖（本研究繪製）

三、有情門之核心價值歸納

本研究之「有情門、產品屬性定位構面」乃依照「有情門參展產品之產品意象表」作品牌定位之歸納，呼應文獻（Aaker & Keller，1990；Aaker，1996；陳啟雄、陳兵誠，2015；鄧建國、莊明振，2008）等指出文品牌定位乃核心價值之呈現，核心價值可以產品之「意義」與「形式」顯示。因此，「有情門產品屬性定位構面」，也是核心價值之歸納。統整「有情門」產品核心價值於表 6 中，其排序如下：第 1 名分別為「形式」：造型之對稱形（強調線條）（92.86%）、色彩之調和的配色（92.86%）、重視木質（92.86%）。第 2、3、4、5、6 名，分別為「意義」之實用性之創意應用於日常生活（85.71%），為技術性之技術創新（75%），實用性之機能方便（57.14%）、體驗性之注重文化意涵（57.14%），技術性之傳承工藝（28.57%）、體驗性之意識覺知（21.42%）。由上述要項之順序，顯示「有情門」產品意象之「意義」價值還算均衡。但是，「形式」之第 1 名的造型之對稱形、色彩之調和的配色、重視木質（92.86%）之顯示，其與第 8、9 名統計之材質之創新材質（14.28%）、材質之土質（10.71%）、非對稱形/強調線條（7.14%），色彩之單一色相配色（7.14%），材質之金屬（7.14%）、織（7.14%）、其它（塑、矽、皮）（7.14%））等差異則極大。由於第 7 名之後，未達 20%（1/5）者，顯示有情門在現階段還未著力之處，可視為非目前有情門核心價值之要項。但是，造型之非對稱形，也非常強調線條，可得知有

情門品牌產品意象中，線條是重要的價值。其歸納的結果，如表 6 所示。

表 6 有情門產品意象之核心價值排序表

有情門二十八系列之產品屬性定位要項			統計	價值排序	百分比統計
意義	實用性	創意應用於日常生活	24	2●	85.71%
		機能方便	16	4●	57.14%
	體驗性	文化意涵、	16	4●	57.14%
		意識覺知	6	6●	21.42%
	技術性	傳承工藝	8	5●	28.57%
		創新技術	21	3●	75.00%
形式	造型	對稱形／強調線條	26	1●	92.86%
		非對稱形／強調線條	2	9●	7.14%
	色彩	單一色相配色	2	9●	7.14%
		調和的配色	26	1●	92.86%
	材質（屬性分類）	木質	26	1●	92.86%
		土質	3	8●	10.71%
		金屬	2	9●	7.14%
		織品	2	9●	7.14%
		其它：塑、矽、皮等	2	9●	7.14%
		創新材質	4	7●	14.28%

（百分比以 4 捨 5 入進位） （部分資料來源：陳殿禮、馮文君，2018）

四、核心價值作為策展策略並作策展策略之轉化

由上述「有情門產品意象之核心價值排序表」之歸納，核心價值包括：「形式」與「意義」之要項排序；策展策略必須將這些核心價值，轉化為策展設計詳述於下。

（一）策展提案

1. 木質線條為主之展示設計：展示設計以非對稱形木質線條來呈現對稱形產品，以單一木質色彩來襯托調和配色產品，呈現排序 1~5 之品牌核心價值。
2. 運用策展設計呈核心價值：考量木材料是珍貴的材質，將以家具製作所剩的邊材，製作展示道具，亦可提升核心價值排序 6：體驗性之意識覺知（符合環保意識）。且為了符合佈展的時間限制，策展式設計以預製方式製作展覽道具，佈展時作現場組裝，以減少展示裝修的污染，展後可卸下後，到門市重新組裝，作為展示設計，亦可成為展示識別，呈現核心價值之排序。

（二）策展策略：文化特色與展示識別兼具之目標

策展策略將依據「有情門之核心價值」排序，以木質線條運用鑲嵌技術之創新「技術性」，創造符合「形式」之造型、色彩、材質要項，呈現「意義」之「體驗性」發揮「實用性」要項，達成「文化特色與展示識別兼具」之策展策略，展現有情門以木質家具為主的獨特性。然而，為達成符合核心價值之策展策略，以及品牌審美觀與線之關聯，策展者之創意思考過程，包括：線的特質、家具與線的關係、家具之在地省思、華人文化之審美觀與線的關聯等；其思維過程敘述於下文。

1. 線的特質

線包涵直線、曲線、長線、短線、粗線、細線、曲線、弧線…，可呈現水平、垂直、相承、相錯、相交、相離……，可交錯、承載，構成平面、立體。

2. 家具與線的關係

點、線、面是形成器物形體的基本要素，家具的製作也不例外，「有情門」與「STRAUSS」家具設計，融合現代主義的人本精神，以及後現代主義重視傳統工藝，並重新以木器新工藝之詮釋；提出更符合顧客實用、實惠的設計。

3. 家具之在地省思

台灣在全球資本流動的地理座標上，雖歷經殖民宿命，卻也因外來文化的匯聚，讓島嶼上的人文風貌更多樣。國內在 70～80 年代經濟成長後，進口家具的引進，更提供消費者國際化的新選擇。然而全球化後市場的變革，迫使國內家具代工工廠外移。但永進木器仍然堅守著台灣家具，致力轉型讓家具在台灣設計、台灣製造。台灣家具產業雖經過不同時期的更迭，然而這些豐富的面貌，都真實地反映於「STRAUSS」、「有情門」品牌，對台灣歷史變遷間的文化積累與編織；這些省思更協助策展者關注於華人文化的傳承，尤其是傳統審美觀，「覺有情．意無盡／儒釋道之華人文化」更成為「有情門」品牌重要核心願景之一。

4. 華人文化之審美觀與線之關聯

有別於西方主客二元論的思想，漢民族儒釋道傳統的審美觀，主張人要謙虛地向自然之「道」學習。古人體察宇宙，對其生生不息地律動，對「道」的觀照，是人對自然的體會與想像。加上自身情感的融入，將客觀的外在自然，與主觀的內在情感融合為一，將情融於理，因而闡釋出「情景交融、物我同一」之虛實相生的審美意境（李澤厚，1996）。華人傳統文化依循此審美意識，創作文學、書法、繪畫、建築、園林、廟宇，也所製作出人們的生活器物、家具、工藝等。例如，廟宇拜殿正脊飾之雙龍翻騰

狀、鳳凰回眸、瑞獸馱負（韓興興，1990）。又如，形容傳統的書法筆勢生動活潑稱「龍飛鳳舞」、「龍蛇筆勢」，形容筆勢的伸縮、騰轉，恰如乍現之龍般耀眼奪神稱「矯若驚龍」、「矯若遊龍」（柯亞先，2016）；於是華人文化中的書法、林園迴廊、廟宇屋簷、文人畫之筆墨、明式家具……等，呈現出如飛龍穿越般「線」性地、情感地連繫與虛實變化……。

（三）策展策略之轉化

根據上述「文化特色與展示識別兼具」策展策略，再作展策略之轉化，以木線條為創意之語意（意義與形式），詮釋有情門品牌願景與核心價值，說明於下。

1. 「龍」是台灣民間信仰的祥瑞象徵

無論社會如何的進步，民間信仰在台灣一直扮演著相當重要的角色，它傳遞了先人的智慧與經驗，也是古老藝術的傳承（熊碧梧，1996）。廟宇藝術在過去以木構造為主，現在更是各種材質協調組織而成的複雜藝術型態，更憑藉的信仰的力量將台灣的移民凝聚起來，形成精神的寄託以及生活的保障（林以珞，2014），如圖 3 所示。寺廟建築中除了木材、石材龍柱外，還有龍堵表現「龍上天成了雨神，潛淵成了水神龍王」；民間百姓以「龍」之特性、威嚴和靈氣來祈求風調雨順、平安健康和避邪（賴沛君，2012），如圖 4。

圖 3 大龍峒保安宮正殿之雙龍柱圖
（資料來源：林以珞，2014）

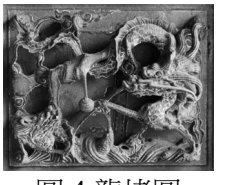

圖 4 龍堵圖
（資料來源：賴沛君，2012）

2. 華人文化中龍的精神

西方藝術權威理論家貢布里希（Gombrich, E.H.，1950，雨云譯，2015）提到，沒有哪個藝術傳統以其巨大力量在強調性靈自主上超過了中華文化。在華人心目中「龍」佔有很重要的地位，數千年來華人早已將龍圖騰與其精神融入生活中。「龍」被視為通天之能的神獸，有祥瑞與尊貴等象徵，是古代皇帝的圖騰（董芳武，2011）。龍的象徵性，形成非常特殊的「龍」文化，其精神屬「包容」，而「龍」圖騰具形式美，混沌美、朦朧美，飛動美、力象美、充實美。且有關龍的「正向」詞彙甚眾， 如龍翰鳳翼、龍章鳳姿、龍入大海、蛟龍得水、龍躍天衢等（柯亞先，2016）。「龍」文化的精神，以及應用於民間生活的各種主題形式，亦是體現華人文化之「情景交融、物我同一」審美

意識；台灣的民間信仰中仍蘊含著「龍」文化的演繹，並聯繫內在對真實生活的感受。

（四）策展策略以「龍飛格柵」詮釋「有情門品牌之核心價值」

策展策略以「龍飛格柵」之「形式」包涵「造型、色彩、材質」與「意義」的「技術性」，來詮釋「意義」之「實用性」與「體驗性」要項，以符合「文化特色與展示識別兼具」之策展策略，說明如下：

1. 設計線形構成大片曲面之「龍飛格柵」主視覺意象，也以線的形式，創作天花板、承載產品的展示台，形成上下交互對應的龍騰意象，呈現出相應、相和、陰陽、虛實、相讓、相離、剛柔、動靜相生等表現的形式與審美秩序，闡釋華人文化中「情景交融」的審美意識。「龍」則符合台灣人對吉祥與精進的期望，傳達品牌蘊涵文化特色之美感與創意；品牌策展以「形式」中最重要的「造型」（線條）、「材質」之木質材料、「色彩」之單一色系，來詮釋「意義」之「實用性」的展示效果，與「體驗性」之「龍躍天衢」文化意涵。
2. 「龍飛格柵」乃以家具製作裁切後的線形木條，運用木條鑲嵌技術之創新，展現技術之創新性，以傳統編織法展現木條編織之工藝性。再以預製模組化的方法，將木線條編織為展示設計，符合環保意識，展覽後可拆卸下，再重新組裝，轉化為有情門之門市（天花板）之線形展示識別設計；運用「技術性」之創新技術、工藝傳承，創造符合「形式」之造型、色彩、材質要項，「意義」呈現「體驗性」之環保意識覺知，發揮「實用性」之機能方便要項。
3. 策展策略依據模式所歸納之「有情門品牌之核心價值」，以木質線條運用「技術性」，創造符合「形式」之造型、色彩、材質要項，呈現「意義」之「體驗性」發揮「實用性」要項，達成「文化特色與展示識別兼具」之策展策略，展現有情門以木質家具為主的獨特性。如圖 5、圖 6、圖 7、圖 8 所示。

圖 5 台中市萬和宮之「龍躍天衢」

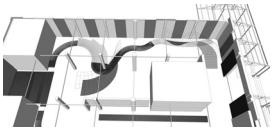

圖 6 以「龍飛格柵」隱喻「龍躍天衢」

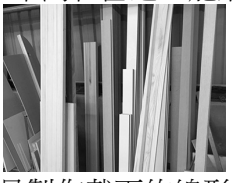

圖 7 家具製作裁下的線形木條圖

圖 8 門市之線形展示識別設計圖

4. 「龍飛格柵」詮釋有情門品牌之核心價值，本研究以列表，檢視其對照關係，表 8 所

示。再以「有情門品牌產品屬性定位構面」，檢視實務設計圖並終整為「有情門產品屬性定位應用於品牌展之成果關係圖」，說明文創品牌產品屬性定位構面之要項，以「龍飛格柵」對應於「有情門—就是愛線」實務圖例，其所轉化與呈現之文化特色與創意，如圖 9 所示。

表 8 策展策略以「龍飛格柵」詮釋有情門品牌之核心價值表

有情門 品牌之核心價值			「龍躍天衢」之意象 如**圖**3，**圖**4所示	以「龍飛格柵」策展設計**詮釋核心價值與文化創意之轉化**	圖例編號
意義	實用性	(1)創意應用於日常生活	「龍生九子」傳說讓庶民百姓也可採用龍為裝飾題材（董芳武，2011）。	「龍飛格柵」以線形構成之大片曲面天花板與展示牆，以寬線形木條構成展示台，承載產品。	圖14,圖15, 圖23,圖25, 圖28,圖30
		(2)機能方便	以「龍」之特性，祈求順利、平安健康（賴沛君，2012）。	設計隱藏結構，衍伸可掛燈光的掛架，也可掛各區之主題海報。	圖14,圖16, 圖21,圖26,
	體驗性	(1)文化意涵	「龍」的精神屬「包容」具形式美，飛動美、力象美、充實美。（柯亞先，2016）。	「龍飛格柵」，隱喻「龍躍天衢」之步步高升意象，傳達品牌蘊含文化意特色與創意。	圖14,圖15, 圖16,圖21, 圖25,圖28
		(2)意識覺知（情感認同、環保意識）	民間以「龍」之特性、威嚴和靈氣來祈求風調雨順、平安健康和避邪。（賴沛君，2012）	「龍飛格柵」以預製方法，將廢木設計為展示設計，具環保意識，展覽後可拆卸，再重新組裝。	圖21,圖22, 圖23,圖24, 圖26,圖30
	技術性	(1)傳承工藝	龍柱藝術在過去以木構造為主。（林以珞，2014）	「龍飛格柵」木線條結合tj傳統編織工藝技術。	圖15,圖21, 圖25,圖28
		(2)創新技術	廟宇藝術過去以木構造為主，現在結合各種材質協調組織而成（林以珞，2014）。	「龍飛格柵」以創新鑲嵌木條技術，製作成大片可曲線迴轉之木質線牆、天花板、同心圓放射線。	圖16,圖21, 圖25,圖26, 圖27,圖28.
形式	造型	(1)對稱形	大龍峒保安宮之雙龍柱呈現對稱形式（柯亞先，2016）。	展出的二十八系列產品，只有少數屬於有機形式，均是對稱形。	圖16,圖23, 圖29,圖30
		(2)非對稱形	「龍」圖騰具形式美，混沌美、朦朧美，飛動美、力象美、充實美（柯亞先，2016）。	「龍飛格柵」是非對稱、曲線迴轉牆與天花板、圓形線形放射、線形曲面蜿蜒、折疊之有機空間。	圖15,圖21, 圖25,圖26, 圖27,圖28
	色彩	(1)單一色相的配色	木質龍柱或石材龍柱。（資料引用：林以珞，2014）	展示設計以原木色，呈現單一色相的配色。	圖23,圖25, 圖26,圖27
		(2)調和的配色	龍堵之配色。（資料引用：林以珞，2014）	展示牆台屬原木色。產品屬自然、柚木、深胡桃木色織調和色。	圖26,圖27, 圖28,圖30

	材料	(1)屬性分類	(a)木質	木質、石材、泥塑、銅環、織品、現代建築材料。	以木線條為材料，運用「龍」的精神象徵，詮釋品牌核心價值。	圖16,圖21,圖25,圖28
			(b)土質		展出產品：一縷輕煙立鏡	圖28
			(c)金屬		OSA、鑲嵌金屬構件	圖25
			(d)織品		樑柱線架構義烈沙發	圖30
			(e)其他		展出產品：OSA系列	圖25
		(2)創新材質			展出產品：考工記	圖16

（本研究繪製）

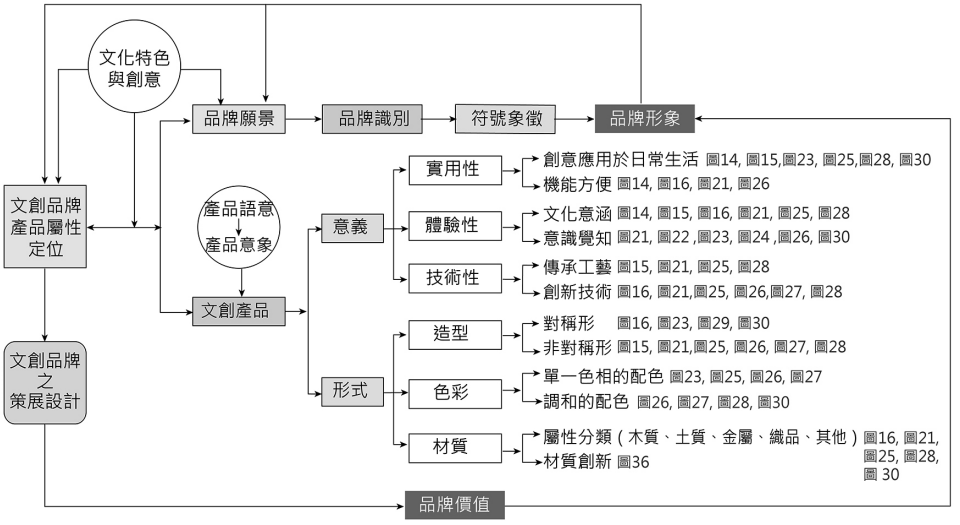

圖 9 文創品牌有情門產品屬性定位應用於品牌展之成果關係圖

（資料來源：本研究繪製）

五、依據策展策略創作文創品牌之策展設計：龍飛格柵

本研究依據策展策略創作成文創品牌之策展設計：龍幡格柵。再且依照專家訪談與紮根理論所得之「品牌策展設計構面」要項進行策展設計，詳細地依照步驟敘述於下文。

（一）溝通企劃

1. 顧客關係服務

由於展區位置於位於華山 1914 創意文化園區・中四 B 米酒作業場・生活美學館，如圖 10 所示。顧客不熟悉華山的展區位置時比較難找到地點，為了吸引顧客來參觀，製作一系列戶外形象海報，依照園區的動線導引顧客至展區，如圖 11、圖 12 所示。並配合各種雜誌文宣，設計品牌廣告以傳達訊息，如圖 13 所示。展覽設計除了考量吸引

人潮外，更須注意安全地疏散人潮，因而需有流暢的展區配置規劃，還須考慮便於顧客服務與休憩區。從入口延著場地ㄈ形的動線觀賞，策展將展區規劃分為「入口區」、「龍飛格柵展示 A 區」、「結祥雲展示區」、「顧客休憩區（休息暨觀賞影片區）」、「多媒體影片區」、「龍飛格柵展示 B 區」、「顧客服務區」、「疏散區」等，如圖 14 所示之展區規劃圖。

圖 10 展區位置圖

圖 11 戶外形象海報圖

圖 12 戶外形象海報圖

圖 13 品牌展覽告知廣告圖

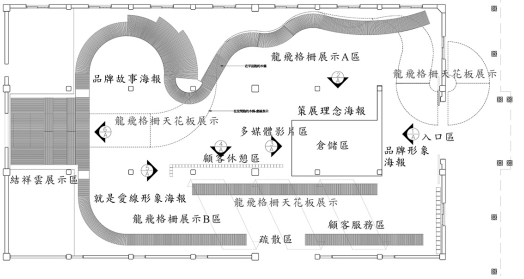

圖 14「有情門—就是愛線」之展區規劃圖

圖 151 動線與展示符合顧客舒適度圖

圖 16 顧客服務區之展覽前訓練圖

（以上圖片資料來源：有情門提供）

2. 展覽執行企劃

策展者應考慮顧客觀看展覽時，有舒適的參觀整體展覽動線、場地配置、展示照明、展場規劃，都須考量人因尺度，以便於顧客參觀。二十八系列的產品展示設計，則考慮產品特質，可採半開放性展示、開放性展示，以提供顧客可以觀賞、觸摸，或

坐下體驗，提供顧客各種與產品互動的方式。

企劃以預製模組化方式設計品牌展覽之展示道具，設計成品牌專屬之展示模組化系統，可於展覽後拆卸，於另一個展覽再次組裝使用，或延伸至品牌展店時使用，形成展示識別系統，進而達到形象識別，並符合環保與經濟效益。

(1) 展場觀察與瞭解主辦單位的規定

展覽執行企劃前，策展團隊需至現場觀察入口區與周邊環境，實際勘查場地所在的狀況。現場丈量包括樑柱、天、地、壁、尺寸與空間結構、樣態、配電系統、可使用的區域、不可使用的限制、緊急疏散區。並瞭解華山 1914 文創園之「進撤場施工管理要點」，整體環境與其他展區間的關係或對應。快速整合不同的訊息後，盤點與了解參展物件特質，依據展覽空間的位置、空間尺度等，規劃品牌產品展出的分配區域與展示方式。

(2) 展示企劃

學者陳慧娟、何明泉（2012）將博物館展示整理三大向度，分別為：「真實向度」的展示手法，以呈現現實物質世界或科學家所解釋的真實世界。「人造物向度」包括媒體（media），以及發展人造物以支撐或協助闡述真實向度外，包括參觀環境裝修設施及展櫃展架、設施等。「體驗向度」著重顧客感官的刺激、感官體驗展品或是活體展示，真人及擬人形的演示或展示等。

由於「溝通企劃」構面之「展覽執行企劃」，以及「空間設計與執行」構面之展示企劃與展示設計要項，內容互相牽涉深廣，本研究引用學者陳慧娟、何明泉之三大向度展示方法，應用於「有情門—就是愛線」實務個案，呈現於實務中，敘述於下，如表 9 所示。

甲、 「真實向度」的展示

以真實的產品與影片介紹，有情門品牌展之二十八系列產品，包括：沙發、茶几、書架、書椅、邊几、餐椅、套式茶几、衣帽架、立鏡、立鏡檯、坐具、長凳、短凳、吧椅、各式凳几、單元櫃，以及立燈、桌燈等。展示設計不僅展示產品實用功能，還要能展示產品的文化創意，宜採半開放與開放性展示。

乙、 「人造物向度」的展示

符合消費者舒適觀看的燈光照明，以「龍飛格柵」作天花板、以及承載產品的展示台，線流暢的展場設計，以及休憩家具等的設施，屬於「人造物向度」的展示，是為了將「真實向度」的商品作完善的展示。

丙、 「體驗向度」的展示

以「龍飛格柵」展覽的各種視覺展示配合著台灣當代年輕創作者的輕音樂，讓現場感覺輕鬆歡樂，提供長凳坐下欣賞多媒體影片，影片中傳達創意應用於日常、融入生活美學。並提供坐具讓顧客休息、觀看、觸碰產品的質感，讓顧客體驗不同區域的展覽情境。除了設置顧客服務區外，展場各區均設置服務導覽解說。以上三向度如表 9 所示。

表 9 有情門品牌展覽之展示企劃與向度表

向度	真實向度		人造物向度		體驗向度	
展示方法	真實器物	影片媒體	展場設施	互動設施	感官組合	真人演示
素材	家用品、家具、展示器物。	影片媒體介紹有情門品牌與家具。	燈光、指示牌、展示道具、休憩家具、裝修。	觸控燈具、家具體驗區。	視覺展品、觸覺展品、聽覺展演。	導覽解說、接待服務。
圖例	圖 15, 圖 21, 圖 23, 圖 27, 圖 29, 圖 30		圖 14, 圖 16, 圖 18, 圖 26, 圖 29, 圖 30		圖 15, 圖 18, 圖 20, 圖 26, 圖 28, 圖 29	

（本研究整理）

3. 品牌價值溝通

策展設計，以線形構成大片曲面之「龍飛格柵」，隱喻「龍躍天衢」之意，隱喻台灣人對吉祥與精進的期望，傳達品牌所蘊涵之文化特色與創意。

4. 品牌形象傳達

以愛現之諧音「有情門—就是愛線」為標題，敘述品牌的熱情與勇於創新。展覽形象傳達，以新的品牌識別標誌進行各種文宣，包括戶外海報、形象海報、展覽之網路文宣等等，傳達「有情門—就是愛線」之主題意象，如圖 17、圖 18 所示。「有情門」之新識別與展覽產品的筆記書、DM 文宣設計，獲得國內 2011 年視覺傳達類之金點獎，也榮獲國際 2011 reddot Communication Award / winner，2012 IF Communication Award / winner 等國際大獎肯定，如圖 19、圖 20 所示。

圖 17 入口區之形象海報圖

圖 18 展場入口之新品牌識別圖

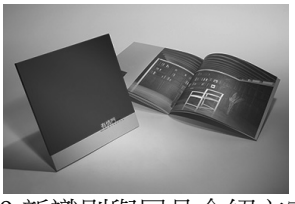
圖 19 新識別與展品介紹文宣圖


圖 20 新識別與展品介紹文宣圖

（以上圖片資料來源：有情門提供）

（二）主題故事

1. 主題故事敘述

在華人心目中「龍」文化的精神屬「包容」與祥瑞象徵。品牌策展設計以線的形式創作「龍飛格柵」，隱喻台灣民間信仰中，「龍躍天衢」之步步高升意象。主題名稱「有情門—就是愛線」，以口語化之諧音「就是愛線（愛現）」，詮釋台灣人勇於表達、熱情、積極的態度，也展現台灣人所具有的多元性、包容性。

2. 展覽目標

「有情門」以木器新工藝製作符合日常生活機能，又能融入當下台灣生活美學之家具，展現品牌蘊含之文化特色。顧客休息區的影片中「有情門」不同品產品系列，互相搭配使用於居家生活中，體現實用性與美感情境。「龍飛格柵」詮釋「文化特色與展示識別兼」之策展策略。展覽後再將預製之木質線條拆卸、重組為有情門之門市（天花板），延續展覽的線形展示設計，成為品牌展示識別設計，亦符合環保意識，如圖 21、圖 22、圖 23、圖 24 所示。


圖 21「入口區」之圓弧線形天花板


圖 22 展示識別延伸為門市之天花板


圖 23 線的形式創作龍飛格柵圖


圖 24 展示識別成為門市線形天花板

3. 溝通對象

文創園區的遊客來自不同年齡層，需深入淺出地溝通，因而聽覺上配合著國內年輕創

作者的輕音樂，讓現場輕鬆歡樂，提供長凳坐下欣賞影片，並以冷杉精油讓空氣中充滿森林的清新氣味，讓感官都能有舒適的感受，如圖 29 所示。

（三）主視覺設計

1. 新的設計表現

設計策略以「龍飛格柵」作為展覽主視覺，讓顧客產生驚奇感，對品牌展覽留下感動與創意的記憶。原木色木條結合創新鑲嵌與編織工藝技術，製作成大片可曲線迴轉之木質線牆；並設計隱藏結構，衍伸可掛燈光的掛架，也可掛各展區之主題海報，（遵守園區規定，牆面不可釘掛），如圖 14、圖 21、圖 23、圖 25、圖 27、圖 28 所示。

2. 空間主視覺策略

以在地台灣民間信仰、廟宇「龍」之形式為創意來源，並萃取華人文化中「龍」的精神，再運用家具製作裁切後的線形木條，研發鑲嵌技術來編織展示牆與展台，表現「文化特色與展示識別兼具」之策展策略，創作「龍飛格柵」，隱喻「龍躍天衢」之步步高升意象，傳達台灣人對吉祥與精進的期望，傳達品牌蘊含文化意特色與創意，符合品牌核心價值與願景。

3. 設計的質感

以原木色木質線條，設計成非對稱、大片可曲線迴轉之線牆與天花板，創造出圓形線形放射、或環狀盤旋、或線形曲面蜿蜒、或折疊的空間。並以較寬、線形、蜿蜒、構成離地二十公分的展示台，承載二十多項對稱形系列產品，形成上下交互對應的雙龍騰雲意象。地板設計若蓮池掩映著水中植物，與線形光影交映，形成騰龍駕霧之迷離感，闡釋華人文化中「情景交融、物我同一」的審美意識，呈現出相應、相和、虛實、剛柔、動靜相生等表現的形式與審美秩序。

4. 形成量感

「龍飛格柵」以原木色線形，構成之大片曲面天花板與展示牆，從入口處順延著「ㄈ形」展現木質編織線條，與蜿蜒的展示台形成上下交互對應的龍騰意象；創造出巨形圓弧線形放射、環狀盤旋或線形曲面蜿蜒、線形折疊的空間；同時呼應著展示台上的各式產品，形成對稱形產品與不對稱形之木線展示牆的對話，呈現木質、線影、光影迷離之感質語境，空間層次量感無限地延展，如圖 23、圖 25、圖 26、圖 28、圖 30 所示。

圖 25「入口區」空間設計寬敞圖

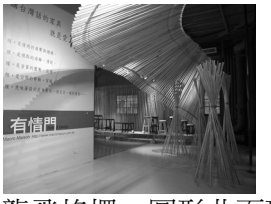

圖 26「龍飛格柵」圓形曲面環繞圖

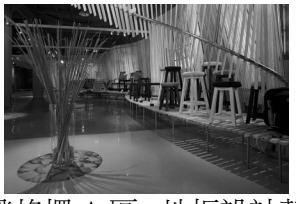

圖 27「龍飛格柵 A 區」地板設計若蓮池掩映著著水中植物圖

圖 28「龍飛格柵 A 區」以線形構成之大片曲面天花板與展示牆圖

圖 29「顧客休息區」圖

圖 30「多媒體影片區」圖

（以上圖片資料來源：有情門提供）

（四）空間設計與執行

文創品牌多屬中小企業規模，策展經費有限，因此，空間設計與執行，更要作事前評估考量之後，才能進行空間設計、動線規劃、展示設計、或計劃以預製展具設計展覽。均需事先考產品數量、預算配比、展覽空間配比、展示關係搭配、展品運輸等，佈展之產品陳列、撤展時產品之收納歸類方式、展覽與展品保險、防火、防雨、防災等應變方式。

1. 事先評估執行方法

展覽的場地共 171 坪，為製作「龍飛格柵」，先繪製各種結構轉折、結合方式。在工廠預製好結構後，再作構成組裝評估，設計組合的連接結構、檢討改進方式後，預先在工廠演練組裝方式，佈展時再將預先準備好的展示道具運至現場組裝，可減少現地裝修施工的汙染，再由於佈展時間短暫，須將組裝、拆卸，設計為一套標準化的操作模式。「龍飛格柵」展示道具拆卸後可運輸至新的門市，將圓形線狀放射天花板作為品牌展示識別，也可組合為線形天花板的展示識別，均符合再使用的環保性與經濟性，也延伸展覽的效益。如圖 8、圖 22、圖 24 所示。

2. 空間設計

展覽空間設計中，視覺張力的強化是最重要的項目，由於展覽空間設計的要項均是相互關聯，交織互動思考，主要考量參觀動線、安全疏散、參觀者舒適度、顧客服務、視覺溝通、主題故事展現、空間主視覺設計、空間配置、產品配置、色彩計劃、照明計劃|、動線規劃、展示設計、預製模組化展具組裝、安全考量等，均以策展設計之創意融合於空間設計實務之中。

伍、結論

本研究係為文創品牌「有情門」之策展設計實務與形象塑造，以專家訪談法、內容分析法、紮根理論等研究方法進行。本研究之目的分為三項：（一）建構屬於產業策展設計之「品牌策展設計構面」，其可運用於不同產業之品牌策展，期望對策展實務能盡綿薄之力。（二）本研究之個案「有情門」屬於屬於「創意生活」產業之文創品牌，文牌品牌之特色在於其產品與服務須具有文化特質或創意，適宜以產品屬性為定位，故建構「有情門產品屬性定位構面」，亦可作為其他文創品牌定位之參考。（三）首先，依據參展產品進行「有情門產品屬性定位構面」建構。其次，以產品定位所分析與歸納之產品意象，作為文創品牌「有情門」之核心價值。再其次，將核心價值作為為策展策略，再作策展策略之轉化。最後，依據策展策略創作策展設計，並依照「品牌策展設計構面」進行「有情門」之策展設計與品牌形象塑造。根據上述之策展設計實務程序，完成「文創品牌之策展設計模式」建構，可作為文創產業策展設計之參考。

本研究以策展設計實務完成上述三項目的外，再將「有情門—就是愛線」策展之品牌新識別與主視覺意象，轉化為門市之新展示識別，延伸展覽的形象效益。

一、品牌策展設計構面之應用價值

未來之策展者可依照本研究之策展實務分析與說明，進行品牌定位分析，再歸納出品牌核心價值、轉化為策展策略後，依照「品牌策展設計構面」，進行「溝通企劃」、「主題故事」、「主視覺設計」、「空間設計與執行」等 4 構面與 13 要項，完成品牌策展設計。「有情門—就是愛線」展覽，實證「品牌策展設計構面」之有效性，亦呼應（耿鳳英，2001；陳璽敬、陳俊良、林志隆，2014；林榮泰、林伯賢、陳俊良，2015；Harvey，1989）等文獻觀點，可提供未來策展者應用。

二、文創品牌產品屬性定位構面之應用

（一）文創品牌「有情門產品屬性定位構面」可協助策展者分析參展品牌

策展者欲進行品牌策展時，可先彙整展覽要展出的產品，以本研究所提出之文創品牌「有情門品牌產品屬性定位構面」之要項，作為分析工具，檢視參展品牌產品的屬性，以得出品牌產品屬性定位，再根據定位分析得出品牌之核心價值，作為策展策略，創作策展設計，達成品牌展覽之目標。策展者或品牌管理者，可將「有情門產品屬性定位構面」視為「文創品牌產品屬性定位構面」，作為品牌策展或品牌管理之分析與應用工具。

（二）文創品牌「有情門產品屬性定位構面」可協助品牌管理者管理品牌

文創品牌「有情門產品屬性定位構面」，可讓品牌管理者參考此構面作品牌定位管理，將品牌定位賦予在地文化特色與創意的產品屬性定位，以創造品牌形象與價值，協助品牌市場行銷，與競爭品牌形成差異化；呼應文獻（Aaker & Shansby，1982；Aaker，2014／陳倩譯；陳啟雄、陳兵誠，2015；廖啟順、李正文，2009；黃秀英、侯勝宗、林安鴻，2015；林榮泰，2013）等學者之研究。

品牌管理者須將文化特色與創意作為文創產品核心價值，品牌管理者可應用「文創品牌產品屬性定位構面」去定義文創品牌產品屬性定位、設計產品，將文化特色與創意成為品牌願景要素，去發展品牌識別、符號象徵等要項，讓各品牌要項彼此有所關聯，並且互相融滲，作策略性分工與融合，深化文創產品的文化特色與創意，讓顧客認同並記憶品牌，才能達到品牌形象塑造與增進品牌價值的效果。

三、文創品牌之策展設計模式之應用價值

（一）文創品牌之策展設計模式之建構

「文創品牌之策展設計模式」之建構，首先，依據參展產品作文創品牌「有情門產品屬性定位構面」分析。其次，以產品定位所分析與歸納之產品意象，作為品牌之核心價值。再其次，將核心價值作為為策展策略，再作策展策略之轉化。最後，依據策展策略創作策展設計，並依照「品牌策展設計構面」進行品牌策展設計與品牌形象塑造。根據上述之策展設計實務程序，完成「文創品牌之策展設計模式」建構，可作為文創產業策展設計之參考。

本研究以「有情門—就是愛線」策展設計實務，並驗證「文創品牌之策展設計模式」之有效性與可行行性，此外，更將「有情門」策展之主視覺意象，轉化為門市之展示識別，延伸展覽的形象效益。

（二）文創品牌之策展設計模式應用價值

文創品牌策展，乃將品牌願景、識別符號、及產品的文化特色與創意，以策展設計去塑造品牌的形象、擴展知名度，訴求品牌理念願景、強調品牌產品的美學與特色，敘

述品牌故事、以展場主視覺設計創造感性、感質之體驗，讓展覽成為品牌與顧客互動的平台，使原本的目標顧客感到品牌的優質性並有認同感，也讓新的顧客產生興趣與記憶。呼應文獻（Aaker，1996；Kotler，2002 ；耿鳳英，2001；林榮泰、林伯賢、陳俊良，2015；林榮泰，2013；林磐聳，1995；Blair & Chiou，2014）。

「文創品牌之策展設計模式」對品牌管理者而言，文創品牌策展可增益其品牌形象；對顧客而言，展覽中所創造的文化意涵或創意，能讓顧客有愉悅的美感、體驗感，產生認同感性價值。因此，策展者可依循此模式，瞭解品牌的產品屬性定位、品牌願景、品牌識別、文創產品，彙整出其品牌核心價值，才能設計出能符合行銷目標的品牌策展，向顧客溝通品牌價值，形塑品牌形象，增加認同感。此外，可將品牌展覽之展示道具，設計成品牌專屬之展示模組化系統，可於展覽後拆卸，於另一個展覽再次組裝使用，或延伸至品牌展店時使用，形成展示識別系統，進而達到形象識別，並符合環保與經濟效益。在未來接軌國際市場時，品牌策展設計更是開拓市場知名度、塑造形象、增益顧客聯想的重要的行銷活動。亦呼應（陳殿禮、馮文君，2018；陳璽敬、陳俊良、林志隆，2014）所言。

1. 「有情門—就是愛線」之策展設計效益

   本研究先以專家訪談法、內容分析法、紮根理論等研究方法，萃取「品牌策展設計構面」與「有情門品牌產品屬性定位構面」，再依據所歸納之「有情門」品牌核心價值，進行「有情門—就是愛線」之策展設計與品牌形象塑造，再將策展設計之程序，建構為「文創品牌之策展設計模式」等，可協助策展者做策展設計之參考。本研究亦將「有情門—就是愛線」展覽之新識別與主視覺意象，轉化為門市之新展示識別效果，如圖 22、圖 24 所示。新的展示識別對「有情門」於國內市場行銷有極大助益，於 2011 年至 2017 年均有成長，從原有 6 家門市增加至 17 家門市，業績也每年增長 8%以上。雖然，展覽已經結束，但展覽延伸的效益，仍持續在國內進行中，並企圖推向國際市場。

2. 「有情門」願景與識別設計的效益

   展覽形象傳達，以新的品牌識別標誌進行各種文宣，包括戶外海報、形象海報、展覽之網路文宣等等，傳達「有情門—就是愛線」之主題意象，如圖 17、圖 18 所示。「有情門」之新識別與展覽產品的筆記書、DM 文宣設計，獲得國內 2011 年視覺傳達類之金點獎，也榮獲國際 2011 reddot Communication Award / winner，2012 IF Communication Award / winner 等國際大獎肯定，如圖 19、圖 20 所示。（請參見附錄：四、策展設計實務參加國際競賽成果表）。係對本研究個案之品牌識別符號與形象傳達之肯定，也是

展覽延伸的效果。

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附錄

一、專家訪談編碼表

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	編碼訪談稿
品牌策展設計	展覽溝通企劃	－顧客關係服務	01.Li 先生〔1:1〕	－董事長是把它當作商業探試，這樣的產品、組件、工法，是否能被市場接受，變成商品(126/126)
			02.Chaing 先生〔1:1〕	－展覽不能當成正常廣宣，僅類似事件(12/12)
			03.Jiang 女士〔1:3〕	－不過因應不同的狀況，例如企業或品牌，經常要到處去展覽，有時去國外、有時國內展，事實上就該為這家公司、品牌去設計他的展件，這是設計師可以為顧客做的，也是算顧客服務，讓顧客容易找到你的展區。(25/27)
			04.Chen 先生〔6:10〕	－上面室會議室下面是 showroom 加上招待的地方。(7/7) －重要還有軟體是人的服務，導覽人員怎樣引導、你的規劃、你的展出、介紹產品特色(101/102) －展覽要軟硬兼顧才能達到好的展出效果。(103/103) －展覽前的規劃、展覽中的參與、展覽律的追蹤(104/104) －追蹤是什麼？不外乎曝光，顧客留下名單怎麼去追蹤，如用 e-mail 往返去詢問展出的需求，展完後是否需提供樣本？有沒有合作機會？有沒有建立一套 CRM，所謂的顧客管理系統。（106/109） －你就有許多好的客心資料累積在企業內部，這些受需要去考慮的。(112/112)
			05.Gong 先生〔1:2〕	－但是 branding 的展不一樣，其實有點像公關企劃，一定要先建構一個公關企劃(13/14)
		－展覽執行企劃	01.Li 先生〔1:1〕	－董事長，並希望將此視覺印象，成為商業導向（品牌展覽的延伸）(124/124)
			02.Chaing 先生〔1:3〕	－妥善做這兩個制作單位的工作分配，指揮他們合作，所以要像樂團指揮家一樣，要對所有樂器有所體會，不見得你很會每個樂器，但一定要有所體會(87/89)
			03.Jiang 女士〔2:2〕	－而且他們對流行是敏感的，最精緻的是珠寶、錶店。(72/72) －就是他有專門做設計。(120/120)
			04.陳先生	－展覽計劃要做好才會有好的效果，展出形象的效

			〔1:1〕	果是很重要的。(113/113)
			05.Gong 先生〔3:3〕	─沒辦法真的敘述到品牌的特質(5/5) ─對這時代有一些 image,這時代不一定它的產品，是他背後的 philosophy(43/43) ─因為他的品牌性，他的美學的形式、價值，和其他的有什麼不一樣(44/44)
		─品牌價值溝通	01.Li 先生〔3:4〕	─設計師也常無法檢討到非常多的細節，很多東西都在現場遇到問題，就在現場處理(103/103) ─所以找到可以製作的廠商律，需要設計師有耐性去做進一步溝通。你可以做到什麼程度？什麼是你可以的？什麼事你不可以的？這是設計師要用功。(150/151) ─董事長，並希望將此視覺印象，成為商業導向（品牌展覽的延伸）(124/124)
			02.Chaing 先生〔1:1〕	─台灣現在創新力我覺得還不差，只是設計跟產業永遠脫鉤，無法表達品牌真正的深度。(9/9)
			03.Jiang 女士〔4:5〕	─尤其是名品店，他們有自己專屬設計師，這些設計師是最 Top 的，而且是世界級的!在世界各國都有較一致的風格。(73/74) ─整個展示的架子，我覺得非常棒!那他可能一陣子就換但全世界都依樣是那種架子。(85/86) ─就是他有專門做設計。(120/120)
			04.陳先生〔2:2〕	─溝通什麼訊息？讓人看到什麼(93/93) ─展覽通常是在短時間可以鎖定你要溝通的對象(95/95)
			05.Gong 先生〔4:6〕	─他還是非常強調他們的時代性、美學性、品牌體驗性(40/40) ─對這時代有一些 image,這時代不一定它的產品，是他背後的 philosophy，(43/43) ─因為他的品牌性，他的美學的形式、價值，和其他的有什麼不一樣，那是他展場最重要的重點，那就有別於商展，那是設計展(44/45) ─他還是非常強調他們的時代性、美學性、品牌性…像米蘭來看的人是設計的上面那一塊(63/64)
		─品牌形象傳達	01.Li 先生〔1:1〕	其實觀眾繞一圈律，並不記得你展覽了什麼商品，但要會對這品牌有印象。(89/89)
			02.Chaing 先生〔1:2〕	─然後他的細緻度能不能滿足你的設計需求。有些東西其實做出來也會很粗糙啊！(45/46)
			03.Jiang 女士〔3:5〕	─因為商品單價價值昂貴，所以展示櫃也很貴，而且他們對流行是敏感的(71/71) ─尤其是名品店，他們有自己專屬設計師，這些設

				計師是最 Top 的，而且是世界級的!在世界各國都有較一致的風格。(73/74) ─那你可以發現 IKEA 的東西，他的包裝，也很方便拿也摺得很好。就是他有專門做設計。(119/120)
			04.陳先生〔6:12〕	─重要還有軟體是人的服務，導覽人員怎樣引導、你的規劃、你的展出、介紹產品特色，(101/102) ─展覽要軟硬兼顧才能達到好的展出效果。(103/103) ─展覽前的規劃、展覽中的參與、展覽後的追蹤，才能把展覽串成有效益的價值。(104/105) ─追蹤是什麼？不外乎曝光，客心留下名單怎麼去追蹤，如用 e-mail 往返去詢問展出的需求，展完後是否需提供樣本？有沒有合作機會？有沒有建立一套 CRM，所謂的顧客管理系統。(106/109) ─管理系統越積越多，每年只要展覽一次、兩次，展覽幾年下來，你就有許多好的客心資料累積在企業內部，這些受需要去考慮的。(110/112) ─展覽計劃要做好才會有好的效果，展出形象的效果是很重要的。(113/113)
			05.Gong 先生〔3:6〕	─有情門是商展慢慢轉到藝術文化展(13/14) ─如果以家具品牌展來說，最主要的 model 就是米蘭家具展，他就是結合品牌展和設計展，他還不是商展(37/38) ─或我們的工業設計或設計展開始拉到一個整體性，接近 branding 的品牌展(71/72)
	展覽主題故事	─主題故事敘述	01.Li 先生〔3:4〕	─這案結合中部地區的手工藝藝術家及工藝作品作一個展覽。(9/9) ─這次「手工藝展」是一天組裝，一天佈置。(25/25) ─我們就直接以「砌岩」櫥櫃家具來構築主視覺，再把同樣的圓樓意象，移植至桃園店。(132/133)
			02.Chaing 先生〔1:1〕	─主要是那次我們第一次玩龍飛格柵，第一次玩比較刺激(50/50)
			03.Jiang 女士〔1:3〕	─珠寶也不一定就是用最昂貴的東西去展覽，有時候他故意做個對比，可能用最便宜的稻草去呈現鑽石，因為展覽這件事，是有時候用什麼去襯托什麼這件事了。(75/77)
			04.Chen 先生〔6:7〕	─如果以你的展出屬性，會先了解預算考量(8/8) ─最主要是產品才是主角嘛，所以產品的部分就可以是主要訴求。(21/21) ─之前有一年，有個廠商我們整個是用稻穀，我們主題叫「豐收」，所以整個的展場十幾個攤位，我們

				很概念式的嘗試(24/25) ㄧ溝通什麼訊息？讓人看到什麼(92/92) ㄧ像設計展，或設計人他需要看設計或要推廣設計(93/93) ㄧ每個展覽有他的議題性是什麼？(97/97)
			05.Gong 先生〔3:9〕	ㄧ我其實比較清楚的是那專門的展覽，必須要故事的、背律要有一個清楚的 story line(28/29) 在博物館的展覽，其實講的是 story(32/32) ㄧ你的敘述性、故事性到底是怎麼樣，story fall 到底要底要怎麼整個文化概念敘述出來(33/34) ㄧ真的要談就是要去看這三年，米蘭家具展的風格，他用的 model/marginal，做燈的人他怎麼樣把燈做成他的展覽基礎，做木頭的他怎樣去 represent(49/52)
		ㄧ展覽目標	01.Li 先生〔1:2〕	ㄧ是展場，其實是需要比較有質感的設計，這種質感，是觀眾第一眼看到的真正感受(85/86)
			02.Chaing 先生〔2:3〕	ㄧ執行起來的震撼度，完成度不太一樣，但設計還是最根本。(57/57) ㄧ要看設計想達到什麼狀態，成本要控制在什麼狀態，妥善做這兩個制作單位的工作分配(86/87)
			03.Jiang 女士〔1:3〕	ㄧ如果用同樣的東西，就 show 不出來，有時候就是運用經費的比例，厲害的是用同樣的經費，他可以設計出很好的效果。考慮：經費控制、速度、最律是不要浪費、不要產生很多垃圾。(126/128)
			04.Chen 先生〔1:1〕	ㄧ達成目標是什麼？再用什麼策略來達成你的目標。(98/98)
			05.Gong 先生〔3:3〕	ㄧ台灣是要把設計平民化，所以他要很熱鬧、包括公仔、包括什麼都要很熱鬧(64/64) ㄧ現在的展覽有點是設計展，加上嘉年華展，加上世貿的商展加上類似世貿的商展，他並沒有把設計展真正應有的高度拉起來。(66/68) ㄧ設計展應該要有個基本高度，包括你剛講的構材啊、工法啊這些都沒有(69/69)
		ㄧ溝通對象	01.Li 先生〔3:3〕	ㄧ空間執行計劃，這件事常無法執行，其實是因為台灣人以業主為至上，業主常要改就改(102/102) ㄧ設計師要再省思與自覺，要去溝通，否則容易有意外，然律無法收拾。預製展具，要能執行，人的養成非常重要(160/161) ㄧ以現在台灣環境，其實是有困難的，包涵人員的養成、周圍廠商的配合(169/169)
			02.Chaing 先生	ㄧ台灣現在創新力我覺得還不差，只是他跟產業永

			〔2:4〕	遠脫鉤。(9/9) ㄧ這個產業低屏障，就是做一件事情有很多種做法，很難，同一個觀念，不同設計師，不同的執行單位，執行起來的震撼度，完成度不太一樣，但設計還是最根本。(55/57)
			03.Jiang 女士〔3:3〕	ㄧ其實那是在做這個的設計，設計者當初要想好(41/41) ㄧ所以這件事情是，究竟展場是工業設計師來作還是建築師來作? (68/68) ㄧ尤其是名品店，他們有自己專屬設計師，這些設計師是最 Top 的(73/73)
			04.Chen 先生〔1:1〕	ㄧ展覽通常是在短時間可以鎖定你要溝通的對象(95/95)
			05.Gong 先生〔1:2〕	ㄧ就是覺得這些展覽都太媚俗，媚俗是因為台灣的狀況，台灣的平均水準都不高，他又要回應這種老少咸宜的關係。(61/62)
	展覽主視覺設計	ㄧ新的設計表現	01.Li 先生〔2:4〕	ㄧ所以要發展新的設計表現，必須思考在一個被限定的時間與空間內，如何去組構完成。(17/18) ㄧ當要做不一樣的設計時，作預製是唯一選擇，否則無法在很短時間內，讓工班在展覽現場做特殊施作。(119/120)
			02.Chaing 先生〔1:1〕	ㄧ主要是那次我們第一次玩龍飛格柵，第一次玩比較刺激(49/49)
			03.Jiang 女士〔3:3〕	ㄧ其實那是在做這個的設計，設計者當初要想好(41/41) ㄧ所以這件事情是，究竟展場是工業設計師來作還是建築師來作？(68/68) ㄧ尤其是名品店，他們有自己專屬設計師，這些設計師是最 Top 的(73/73)
			04.Chen 先生〔3:4〕	ㄧ通常我們會考慮到預算，因為 3C 產業或 IT 產業他們的市場很大，他們來的客戶都是國際的，相對的他們的展出的攤位和預算(4/5) ㄧ如果以你的展出屬性，會先了解預算考量(8/8) ㄧ其實所有展覽先評估檔期，展覽我會先考量展出時間和規模(88/88)
			05.Gong 先生〔3:4〕	ㄧ另一種專門作 branding，專門作 BMW、Mercedes-Benz、作進口汽車的等，不同體系啊(8/9) ㄧ因為每個都各自為政，連基本工法都不一樣。(60/60) ㄧ設計展應該要有個基本高度，包括你剛講的構材啊、工法啊這些都沒有(69/69)

		ー主視覺策略	01.Li 先生〔3:3〕	ー其實我們是以預製工法來構築空間主視覺，這是家具品牌對空間的對話。(123/123) ー我們就直接以「砌岩」櫥櫃家具來構築主視覺，再把同樣的圓樓意象，移植至桃園店。(132/132) ー當這弧格不放層板時，也是很好的造型。如果要做視覺宣傳，也可掛上面板(59/59)
			02.Chaing 先生〔2:3〕	ー什麼都現地作，工法、機具、材料都受限(18/18) ー要看設計想達到什麼狀態，成本要控制在什麼狀態，妥善做這兩個制作單位的工作分配(86/87)
			03.Jiang 女士〔3:8〕	ー就是我今天去執行一個展覽，一定有些用租的，有些用一次的，如果全部用租的，那就會太一樣，因為展覽有些東西是必須要 show 出來(124/125) ー如果用同樣的東西，就 show 不出來，有時候就是運用經費的比例，厲害的是用同樣的經費，他可以設計出很好的效果。(126/127) ー所以是種策略，還要考慮隔壁攤位展什麼，隔壁如果穿黑色或紅色，那你要穿什麼色？隔壁是胖是瘦？所以我們要強壯呢？還是什麼姿態？有時候展覽是怎麼跳出來的策略和選擇！(136/139)
			04.Chen 先生〔3:8〕	ー至於怎麼樣把大的視覺做出來，就是看你整體的概念以及要給予他形象的是什麼。(22/23) ー如果以你的展出屬性，會先了解預算考量，能不能動用到一些木作木工的部分，如果比較大場可以嘗試性一些類似裝置藝術的方式來做，那會比較吸睛。(8/11) ー至於怎麼樣把大的視覺做出來，就是看你整體的概念以及要給予他形象的是什麼。(22/23)
			05.Gong 先生〔1: 1〕	ー那做商展的人比較沒有 story line，商展基本上講的是一個 display & image (31/31)
		ー設計的質感	01.Li 先生〔2:8〕	ー其實好的設計，並不需要很多言語去說明，尤其是展場，其實是需要比較有質感的設計，這種質感，是觀眾第一眼看到的真正感受(84/86) ー所以設計師必須更深入瞭解每一個設計，被執行的可能性。這與現在普遍上空間設計施的養成不一樣，現在設計師往往畫完圖，交給廠商，然律監督做到好。但事情是否該再倒過來？！應該是畫完圖律，去瞭解這圖被執行的可能性，再來討論如何執行完成，而不是單向思考，不是再以設計者為主體的一個思考。(154/158)
			02.Chaing 先生〔4:6〕	ー什麼都現地作，工法、機具、材料都受限(18/18) ー然後他的細緻度能不能滿足你的設計需求。有些

				東西其實做出來也會很粗糙啊！(45/46) ─品質、成本、交期。(61/61) 要看設計想達到什麼狀態，成本要控制在什麼狀態，妥善做這兩個制作單位的工作分配(86/87)
			03.Jiang 女士〔4:6〕	─因為在地施工所產生的現地物染和速度都不好(4/4) ─就是品質速度會受影響，其實展覽應該是在工廠生產(5/5) ─然後材質其實有非常非常多種，你塑膠、金屬、各種各種的材料都可以塑造設計的質感。(29/30) ─例如；紙、竹子或木， 但鎖件可能是金屬的，就是會有不同的材料，像夾紙和夾竹子的可能元件就不同，就有不同質感(60/61)
			04.Chen 先生〔4:6〕	─為確保品質，申請時要把配電圖一起送到，跟你原來的用量是否符合(43/43) ─國外很複雜，因為他有工會的限制，所以不能自己施工。要展覽前要先提出，藉由他們公會施工，才能確保設計的質感。(55/56) ─發包要經由展覽單位找合法有執照的施工單位來執行。(62/62) ─如果短期，則避免使用一次性材料，如果長期，還是考慮長期展覽的適用性(89/90)
			05.Gong 先生〔1:2〕	─再來，就是覺得這些展覽都太媚俗，媚俗是因為台灣的狀況，台灣的平均水準都不高，缺乏質感，他又要回應這種老少咸宜的關係。(61/62)
		─形成量感	01.Li 先生〔3:3〕	─量體雖大，空間構組只有兩天時間(23/23) ─這案子量體大，但展場半天就必須組構起來(48/48) ─在台灣的環境中，通常預算與時間都被限制住(159/159)
			02.Chaing 先生〔3:4〕	─一定要夠深入瞭解，才能在很短的時間內集結力量(16/16) ─它的量點大，這副模組才好分攤(77/77) ─注意數量、品質、成本、交期(80/80)
			03.Jiang 女士〔2:5〕	─它也可以疊疊疊，疊起來，疊出某種量感，然律在外面加上一些燈或外面再包起來，或鎖一些膜啊什麼的，其實它就可以成為一個很好的塊體。(32/34) ─也可用展覽物件的量，形成一種效果，用堆積形成很有意思的視覺和效果(133/135)
			04.Chen 先生〔1:2〕	─然律鋪滿整地，稻穀去堆疊時好像山巒，非常漂亮，然律有個走道，中間 monitor 在稻穀中間展現，

				這視覺就非常強。(27/28) ㄧ量體大時，那就要依照展覽場地和限制，先提出申請。(42/42)
			05.龔先生〔1:7〕	ㄧ由於目前世貿這類展覽公司現有的展覽陳列方式，對於 branding 的敘述我覺得不強，沒辦法真的敘述到品牌的特質，尤其是品牌反映到空間的特質，無法形成質感、量感，很多商業展還分專門做世貿和外貿協會的，另一種專門作 branding，專門作 BMW、Mercedes-Benz、作進口汽車的等，不同體系啊(3/9)
	空間設計與執行	ㄧ事先評估考量	01.Li 先生〔2:2〕	ㄧ執行效率，在設計中是必須被思考的 (71/71) ㄧ我們做設計時，不能依賴廠商，這些廠商有基本的原始技術，願意接應用題，但不願意接變化球，不願意去配合一些突如其來的想法。所以找到可以製作的廠商律，需要設計師有耐性去做進一步溝通。(147/150)
			02 江先生〔2:4〕	ㄧ只是他們出來的成本，鐵定至少我的兩倍。成本一定高，但還是可以達成(40/41) ㄧ還是妥協回來我的成本。如果換算成工班，大概有 500~600 萬的價值，一坪要五六萬才合理(59/60)
			03.Jiang 女士〔2:3〕	ㄧ所以這件事是，你可以去製作展具，但是你收回來要放哪裡的問題。而且放也是否是一個可以疊絡的方式，是否可以讓面積縮到很小(35/36) ㄧ考慮：經費控制、速度、最後是不要浪費、不要產生很多垃圾。(128/128)
			04.Chen 先生〔3:7〕	ㄧ因為空間越大，你可變動性的、可表現的就越多，這些都是先評估的考量。(16/17) ㄧ通常會先判斷展出時間、規模，再思考用什麼材料？什麼樣的表現？溝通什麼訊息？讓人看到什麼(91/93) ㄧ展覽前的規劃、展覽中的參與、展覽律的追蹤，才能把展覽串成有效益的價值。(104/105)
			05.Gong 先生〔2: 6〕	ㄧ所以：藝術文化、品牌、商業商展，基本是展覽的三大塊，這三大塊基本上所建立的體系完全不一樣，會做的公司也都完全不一樣(15/17) ㄧ台創也還不完全是藝術文化，台創還是工業設計啊什麼，所以他們部會會藉重商展，可是他們又希望藉重展之前，還是能有一些藝術、設計展(22/24)
		ㄧ空間設計 空間配置 色彩計劃	01.Li 先生〔9:18〕	ㄧ跟阿姜的配合是她有一個想法，我把它做出來。(10/10) ㄧ姜的設計是展場設計是用兩根柱子將薄膜撐起

		照明計劃 動線規劃 展示設計		來，薄膜是塑膠材質。(11/11) ㄧ所以要發展新的設計表現，必須思考在一個被限定的時間與空間內，如何去組構完成。（17/18） ㄧ作「台灣獨立書店展」，委托藝術家策展，空間設計則由我主導(47/47) ㄧ我在做展場設計時，空間炫不炫？或空間賠予它什麼意義？(65/65) ㄧ類似建築計劃，經過事先確認，則現場執行可以很快、準確。同樣地，建築計劃，在日本執行會更精確，因為，相對照來說，日本是會對各專業、工種，有相對的尊重、理解、協調或讓步，以取得共識，所以他們可以作出非常精細的清水模，日本的建築思考、計劃做得非常準確。(95/98) ㄧ空間計劃的管理，例如：木作、燈具、鐵件、水電、佈置、輸出、展示品、盆栽?等等，如果沒有事先規劃，到時會很亂。所以，我覺得如果要談預製，則第一要件，就是 1.空間執行計劃，這件事常無法執行，其實是因為台灣人以業主為至上，業主常要改就敢，而設計師也常無法檢討到非常多的細節，很多東西都在現場遇到問題，就在現場處理，當現場處理成為習慣之律，建築或空間計劃一定做得不好，這是目前台願到最大的問題。(100/104) ㄧ應用至展覽的空間執行計劃，才能順利完成。才能做更多實驗(109/109) ㄧ以「就是愛線」來說，空間角度是室內看出，從內而外，以姜樂靜建築師的「手工藝展」來說，是用建築角度看，空間角度是從外而內(144/145)
			02.Chaing 先生〔1:3〕	ㄧ如果能夠把台灣這些的創作能量，不管學生的也好、老師的也好，能夠集結在這樣的一個生活空間裡面的話，那會很可觀(6/8)
			03.Jiang 女士〔1:3〕	ㄧ例如：氣球也可以作展覽，但現在大氣球都好醜，一樣的問題，氣球也可以一下子變成很豐富的效果，那美也是。還有很多讓他豐富的手段，讓他突然變得色彩很絢麗的手段(129/131)
			04.Chen 先生〔4:6〕	ㄧ那氛圍要重要，色彩、光線、氛圍是可能整個開放沒有打底，沒有打底和隔牆，是整個開放空間(19/20) ㄧ我們的強項就是把很多原本制式的空間配置，變成開放空間，藉由開放空間塑造，你要展出的主題和訴求的概念。(29/30) ㄧ硬體除了空間表現、動線規劃、展出產品陳列方式外(100/100)

				─導覽人員怎樣引導、你的動線規劃、你的展出、介紹產品特色方式(102/102)
			05. Gong 先生〔1:7〕	─由於目前世貿這類展覽公司現有的展覽陳列方式，對於 branding 的敘述我覺得不強，沒辦法真的敘述到品牌的特質，尤其是品牌反映到空間的特質，很多商業展還分專門做世貿和外貿協會的，另一種專門作 branding，專門作 BMW、Mercedes-Benz、作進口汽車的等，不同體系啊(3/9)
		─預製模組化展具	01.Li 先生〔5:12〕	─預製是一個必然結果，也就是展場需要一個快速的組裝、拆卸，展場給的時間非常少，以前一般都是制式的展板，所以要發展新的設計表現，必須思考在一個被限定的時間與空間內，如何去組構完成(14/17) ─用此思考時，其實設計也會展開：設計才不會放大到天馬行空(81/81) ─我認為是優點，當然是秉除一般制式組合展架外，當要做不一樣的設計時，作預製是唯一選擇，否則無法在很短時間內，讓工班在展覽現場做特殊施作。(118/120) ─並作商業探試，這樣的組件、工法、產品，是否能被市場接受，變成商品，覺得他在測試，喜歡的人也還蠻多(126/127) ─董事長，思考是多層面的，不是展覽炫過而已。向我們做的空間案，森林牆（一條一條寬窄不一，深淺厚度不一，也是可以將它商品化。）(133/134)
			02.Chaing 先生〔13:21〕	─預製的話，木、火、土、金、水都嘛可以預製。(19/19) ─作展覽的預製難是如果對製造不夠深入(20/20) ─難度比較高的是去策動工廠，並不是預製有多難。(32/32) ─預製如果先叫木工班做，先找個小地方做好再抬進來，那沒變啊！那就是沒有抓到製造的精髓與精神。以建築人的預製來說，先叫木工班做好，拆一拆解一解，到現地組，也叫預製。(33/36) ─他們不知道工廠，不會深入工廠，有木工班服務，不須深入，對他們來說要拆解就拆解(38/39) ─只是他們出來的成本，鐵定至少我的兩倍。成本一定高，但還是可以達成(40/41) ─品質如何，就要看他找的工班(42/42) ─就像陸希傑也喜歡玩，可是他們一定是找裝修工班去找金屬，或找建築結構，比較不會去找家具廠的設備，這是他們慣性的問題。(53/54) ─還是妥協回來我的成本。如果換算成工班，大概

				有 500~600 萬的價值，一坪要五六萬才合理(59/60) ─預製如果只做一次，如果遇到金屬，遇到火型材料，木火土金水等不同材質，做一件的成本很高(70/71) ─要做預製的人，要對工廠要有瞭解(82/82) ─所以目前我會合併現地工班、工廠，兩邊都有存在價值(85/85) ─不然站在台前就會哩哩拉拉。不過，我一定會用預製，這是我的理想。(90/90)
			03.Jiang 女士〔16:27〕	─然後到現地去組裝起來，這應該是最對的事。(6/6) ─什麼都現地作，工法、機具、材料都受限(18/18) ─只能靠木工班做類似預製，還是木工。(21/21) ─所以大概就會用租，有一專門的展覽公司有展板等，可以租，展完後他還可以拆回去繼續用。應該說有大部分比例用這租來的展板(21/23) ─不過因應不同的狀況，例如企業或品牌，經常要到處去展覽，有時去國外、有時國內展，事實上就該為這家公司、品牌去設計他的展件(展覽組裝模件)。(25/27) ─落那麼多書架和書架繞成圓弧，只是我們化成比較小的單位，他們是木工工班做成比較大的單位去繞弧，這樣而已。現地施做的工班，他們的施作能力較強(28/30) ─所以目前我會合併現地工班、工廠，兩邊都有存在價值(85/85) ─就像陸希傑也喜歡玩，可是他們一定是找裝修工班去找金屬，或找建築結構，比較不會去找家具廠的設備，這是他們慣性的問題。(53/54) ─例如；百貨公司的皮包、珠寶店，因為商品單價價值昂貴，所以展示櫃也很貴，而且他們對流行是敏感的，最精緻的是珠寶、錶店。(71/72) ─很多年前，Body Shop 整個展示的架子，我覺得非常棒!那他可能一陣子就換但全世界都依樣是那種架子。(85/86) ─事實上我覺得預製，有二城市的建築繁殖場再用的系統，呂理煌，也可去訪問他。或者是威尼斯雙年展，台灣曾經做過的方式，也是可以看的。(111/112) ─Swatch，他的手錶用箱子可以乘載和展示。(121/121) ─例如一個西班牙的皮鞋，有陣子她用瓦楞紙一直疊疊疊，疊成它的空間，把鞋放在上面，事實上那

				瓦愣紙算不算展架或用磚頭疊一疊，算不算展架?(79/80) ─那萬物都是啦!也可以用凳子堆一堆，擺個板子也是展啦所以要去看最常見的(82/82) ─就是我今天去執行一個展覽，一定有些用租的，有些用一次的(124/124) ─考慮：經費控制、速度、最律是不要浪費、不要產生很多垃圾。(128/128)
			04.Chen 先生〔11:19〕	─其實有一種 Truss 的搭建方法，可以很有氣勢，就是 Truss 搭好然後拉帆布，看你的展覽空間啦，一般 Truss 還是有很多變化(29/31) ─他們會用現有的東西加上木作較多較整體，有些會搭兩層鋼架(6/6) ─還有一種考量預算，就是用現成的一般展場公司有可搭建樣式(13/13) ─其實有一種 Truss 的搭建方法，可以很有氣勢，就是 Truss 搭好然律拉帆布，看你的展覽空間啦，一般 Truss 還是有很多變化,可是你要找對廠商(33/35) ─有些你可以用它現成的東西，有些部分可能要訂做的(50/50) ─因為有的 Truss 要大的空間才能使用,小空間並不適用，這是我覺得比較可惜(70/71) ─可能在材質和應用上還可以更多一點(73/73) ─因為本身骨架比較粗，所以小空間比較不適合。前比較小的空間不好搭。(76/77) ─這算是預製展覽元件，在大型空間利用、使用時，可以變化出不同搭配的方式，不管橫式 直式 立體圓形 半圓形都可以，所以塑性還蠻高的。(78/80) ─木作展覽完會浪費,但是 Truss 是可以回收(85/85) ─展覽前的規劃、展覽中的參與、展覽律的追蹤，才能把展覽串成有效益的價值。(104/105)

二、有情門展覽產品編碼表

本研究使用 Winmax98 pro 軟體作為質性研究工具，將有情門品牌展覽之產品，共二十八項之編碼內容，分為六項編碼表，包括：(A)意義／實用性、(B)意義／體驗性、(C)意義／技術性、(D)形式／造型、(E)形式／色彩、(F)形式／材質。詳細列於表格中。

(A)意義／實用性

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	展覽產品經確認之逐字稿編碼
意義	實用性	─創意應用於	01.結祥雲〔1:1〕	─或兩腳落地正襟危坐，或盤腿趺跏，瞬間，

		日常生活		人與椅身影合一，仿若凝結成一團祥瑞的雲氣。(4/4)
			02.清池邊几〔1:2〕	─透明玻璃減輕了空間壓力，如同空間中的一泉清池；木頭親人的特性，為居家空間添增溫暖的氣氛。玻璃和木質的技術結合，直線造型典雅易搭配沙發。(2/3)
			03.流韻茶几、邊几、沙發〔1:1〕	─雕映出流暢優雅的線條，讓人可以把玩，也可以久坐。有別於以往傳統的沙發。(9/9)
			04.謙謙餐椅〔1:1〕	─椅背與座面微微內縮，舒適地包覆人體；椅身選用木質堅硬的山毛櫸，展現優雅與堅韌的線條。(2/3)
			05.倚天茶几、倚天邊几〔1:1〕	─將玻璃與木紋巧妙結合。除了茶几外還有邊几及大小置物盤，高低大小的搭配可延伸出更多的風情。(2/2)
			06.樑柱線架構系列〔1:1〕	─靈感來自於中式建築樑柱的線條，以創新技術工法將樑柱線條轉換為實體架構。富有禪意、深具東方古典氣質的線條，展現主人的居家品味。樑柱的方正線條結構，穩固不易侵犯，展現設計人善於架構的智慧結晶。(3/3)
			08.雨窪系列凳几〔1:1〕	─設計靈感來自雨滴打落地面濺起之水窪。新技術工法切出美麗的弧度線條坐面，佐以斜切而下的椅腳，完全榫接工法將實木運用出美妙平衡的形體比例。
			09.宜家系列〔1:2〕	─新技術工法製作一個簡約不佔空間的架子，簡單線條結構或可擱著幾本閒書，以或展示著旅行的回憶，或蒔著芟草的縮影，隨性自在，好不愜意。(2/3)
			10.一縷輕煙立鏡〔1:1〕	─除了增強穩定不易掀動外，還具有牆面裝飾效果，對應於空間中既是一面鏡子也是一幅畫作。(5/5)
			11.舞缸立鏡檯〔1:1〕	─新技術工法製作，傾斜角度經過精密計算，能恰好托住鏡子。(3/3)
			12.雀頂立鏡檯〔1:1〕	─除了可以日常生活置放鏡子之外，機能多元，也能用來陳列畫作作品。(5/5)
			13.百合立鏡檯〔1:2〕	─新技術工法製作百合盛開的樣貌，以極簡的線條轉化成鏡臺，便利收納穿衣鏡，或陳列心愛的畫作，讓空間增添東方的風味意境。(2/3)
			14.楊朵系列〔1:2〕	─以傳統的榫接方式和自然的實木質感，展現了小巧趣味的圓滿線條，表現在坐具上的除了獨特的台灣風格還有細緻的質感和工法。(2/3)

			15.雅憩系列凳几〔1:2〕	─古老的凳几概念，新技術工法製作與俐落直線搭配上現代的軟坐墊，一改凳几久坐不舒服的問題。親友來訪，以充滿色彩的凳子相迎。(2/3)
			16.滑翔短鄧、長凳〔1:2〕	以飛機羽翼為設計發想及新技術工法製作，跳脫傳統木質凳几的形式，兩木板斜放的椅面設計，更符合人因工學，椅面線條傾斜，富趣味性。(2/3)
			17.追風吧椅、長板凳〔1:3〕	─增加了與身體接觸的面積，並在轉折處以圓角處理，緩和乘坐時椅背的銳利感，搭配座面本身的斜面設計，貼合包覆身體線條，以傳統的板凳意象，延伸現代使用機能，創造新的生活體驗。(3/5)
			18.六面體凳几〔1:1〕	─是凳几也是藝術品，六面體系列置放於空間中。(6/6)
			19.吉祥杉衣帽架〔1:2〕	─擺脫傳統的形式，讓衣帽架在空間中優雅的收納吊掛衣物，展現主人獨特品味和美感追求。(3/4)
			20.千年松衣帽架〔1:2〕	─新技術工法製作松樹造型，簡潔有力，為空間帶進自然簡單的線性風格，也是空間最好的裝飾品。(2/3)
			21.紅珊瑚衣帽架〔1:1〕	─讓衣帽架不再只有機能性，而是賠予更多的造型設計美感。(4/4)
			22.椪口擱衣架〔1:1〕	─精簡且優雅地進入空間中，兼具品味與實用的生活單品。(3/3)
			24.栲木單元櫃架〔1:1〕	─讓衣帽架不再只有機能性，而是賠予更多的造型設計美感。(4/4)
			25.磐石茶几〔1:2〕	─能符合桌面使用上的承重需求；木紋明顯的材質特性，在普普風的現代造型中還能流露出自然木紋的溫潤感。(5/6)
			26.遊方哈欠邊几〔1:3〕	─微傾身軀添上栲木圓潤質感。暫擱幾本閒書，啜飲幾口香茶，好不瀟灑。(3/3)
意義	實用性	─機能方便	02.清池邊几〔1:1〕	─新技術工法製作四層收納機能，是生活實用空間的最佳收納手。(4/4)
			03.流韻茶几、邊几、沙發〔1:2〕	─設計茶几、邊几、布沙發沙發。沙發昂頭的背靠，厚實實用的座墊，等待著有緣人跨坐騎乘。(7/8)
			05.倚天茶几、倚天邊几〔1:2〕	─將玻璃與木紋巧妙結合。除了茶几外還有邊几及大小置物盤，高低大小的搭配可延伸出更多的風情。(3/4)
			10.一縷輕煙立	─特選栲木實木材質製成框架與木桿掛件，增

			鏡〔1:1〕	加鏡身承重力與耐用性。(3/3)
			11.舞魟立鏡檯〔1:1〕	─以魟魚為設計發想，基座猶如魟魚菱形的身軀，魟魚細長的尾巴成了鏡臺的支架。(2/2)
			12.雀頂立鏡檯.〔1:1〕	─除了可以日常生活置放鏡子之外，機能多元，也能用來陳列畫作作品。(5/5)
			13.百合立鏡檯〔1:2〕	─新技術工法製作百合盛開的樣貌，以極簡的線條轉化成鏡臺，便利收納穿衣鏡，或陳列心愛的畫作，讓空間增添東方的風味意境。(2/3)
			16.滑翔短凳、長凳〔1:1〕	─以傳統的板凳意象，延伸現代使用機能，創造新的生活體驗。(5/5)
			17.追風吧椅、長板凳〔1:3〕	─增加了與身體接觸的面積，並在轉折處以圓角處理，緩和乘坐時椅背的銳利感，搭配座面本身的斜面設計，貼合包覆身體線條，以傳統的板凳意象，延伸現代使用機能，創造新的生活體驗。(3/5)
			19.吉祥杉衣帽架〔1:1〕	─擺脫傳統的形式，讓衣帽架在空間中優雅的收納吊掛衣物。(3/3)
			20.千年松衣帽架〔1:1〕	─新技術工法製作松樹造型，簡潔有力，為空間帶進自然簡單的線性風格，也是空間最好的裝飾品。(2/3)
			21.紅珊瑚衣帽架〔1:1〕	─讓衣帽架不再只有機能性，而是賠予更多的造型設計美感。(4/4)
			22.椏口擱衣架〔1:1〕	─精簡且優雅地進入空間中，兼具品味與實用的生活單品。(3/3)
			24.栲木單元櫃〔1:3〕	─利用轉角弧形線條的收斂感、形體和顏色不同的特點，隨性堆疊，能呈現個性化的風格。可單放或當書櫃收納書籍、擺放裝飾品，亦可當邊几或坐椅使用。(3/5)
			25.磐石茶几〔1:1〕	─能符合桌面使用上的承重需求；木紋明顯的材質特性，在普普風的現代造型中還能流露出自然木紋的溫潤感。(5/6)
			26.遊方哈欠邊几〔1:1〕	暫擱幾本閒書，啜飲幾口香茶，好不瀟灑。(2/2)

（B）意義／體驗性

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	展覽產品經確認之逐字稿編碼
意義	體驗性	─文化意涵	01.結祥雲〔1:3〕	─以華人文化「空、有」的對比，在空間中凝結出靜思的磐石。或兩腳落地正襟危坐，或盤腿趺跏，瞬間，人與椅身影合一，仿若凝結成一團祥瑞的雲氣。諸佛菩薩所到之處就是吉祥地，香煙處處結雲，所以稱為「隨處結祥雲」。(3/5)
			03.流韻茶几、邊几、沙發〔1:3〕	─栲木山形紋的飽滿氣韻，疊上竹林的悠閒，幻化出華人文化鳳凰自信的羽翼─豐厚，蓄勢，設計茶几、邊几、布沙發沙發。沙發昂頭的背靠，厚實實用的座墊，等待著有緣人跨坐騎乘，一起叱吒天際。典雅端莊的方正結構，以傳統工藝環繞的扶手依著手掌心與無名指指尖的球面。(6/8)
			04.謙謙餐椅〔1:1〕	─流露出謙謙君子般的內斂氣質，雍容大器。(5/5)
			06.樑柱線架構系列〔1:1〕	─富有禪意、深具東方古典氣質的線條，展現主人的居家品味。樑柱的方正線條結構，穩固不易侵犯，展現設計人善於架構的智慧結晶。(3/4)
			07.泊荷系列〔1:1〕	─如一塘荷葉舞春風，如齊白石的畫中荷芰，或單枝，或成群，錯落有致，停泊暫歇。(2/2)
			11.舞魟立鏡檯〔1:4〕	以魟魚為設計發想，基座猶如魟魚菱形的身軀，魟魚細長的尾巴成了鏡臺的支架，新技術工法製作，傾斜角度經過精密計算，能恰好托住鏡子，以獨特榫接工法製作支架的轉折姿態。基座翹起的設計，除了托住鏡面的功能考量外，造型就像魟魚游動時頭部向上揚起的姿態，加上 U 型的開口模擬魟魚的嘴巴，更讓鏡台整體造型多了分會心一笑的逗趣。(2/5)
			12.雀頂立鏡檯〔1:2〕	─外型的設計概念從美麗的孔雀而來，微張的線猶如孔雀開屏一般。新技術工法製作「雀頂」，「雀頂」也是清代士子頭冠頂飾，將傳統文化元素融入到現代家居用品設計中。(2/4)
			13.百合立鏡檯〔2:2〕	─新技術工法製作百合盛開的樣貌。(2/2) ─讓空間增添東方的風味意境。(3/3)
			14.楊朵系列	─表現在坐具上的除了獨特的台灣風格還有

			〔1:1〕	細緻的質感和工法。(3/3)
			15.雅憩系列凳几〔1:1〕	─古老的凳几概念，新技術工法製作與俐落直線搭配上現代的軟坐墊。(2/2)
			16.滑翔短鄧、長凳〔1:1〕	─保留傳統的木榫工法，承續先民對條凳的需求。(5/5)
			17.追風吧椅、長板凳〔1:2〕	─以傳統的板凳意象，延伸現代使用機能，創造新的生活體驗，創造新的生活體驗。(4/5)
			23.寶瓶座系列〔1:3〕	─師法荷蘭風格派（De Stijl）建築大師 Gerrit Rietvel 的“Zig Zag Chair”完全用天然木製成，一整塊木板分成五段，依著木紋的肌理，由左而右接續轉折線；也微微地透著折紙工藝的趣味，是一“紙”折，也是一“板”折。(3/5)
			25.磐石茶几〔1:2〕	─能符合桌面使用上的承重需求；木紋明顯的材質特性，在普普風的現代造型中還能流露出自然木紋的溫潤感。(3/4)
			27.考工記〔1:1〕	─傳統手工榫接的概念，椅面凹的弧面一方面是符合人體工學，(3/3)
			28.OSA 系列〔1:1〕	─挖掘器物背律蘊藏的文化與美感意涵。致力傳達出原創、簡單、真誠的品牌價值與精神。風螺、桐芟雪皆是倣生的有機線條。由設計展現台灣在地的人文、地方特色及自然生態、工藝之美，融入生活美學之中，細細品味。(2/6)
		─意識覺知	06.樑柱線架構系列〔1:1〕	─樑柱的方正線條結構，穩固不易侵犯，展現設計人善於架構的智慧結晶。(4/4)
			08.雨窪系列凳几〔1:1〕	─設計靈感來自雨滴打落地面濺起之水窪。新技術工法切出美麗的弧度線條坐面。(2/2)
			09.宜家系列〔1:1〕	─或展示著旅行的回憶，或蒔著芟草的縮影，隨性自在，好不愜意。(3/3)
			16.滑翔短鄧、長凳〔1:1〕	─以飛機羽翼為設計發想及新技術工法製作，跳脫傳統木質凳几的形式，兩木板斜放的椅面設計，更符合人因工學，椅面線條傾斜，富趣味性。(2/4)
			26.遊方哈欠邊几〔1:1〕	─小巧輕便，如浮雲悠遊四方；新技術工法製作，側面曲線傾斜化哈欠為形體。(2/2)
			27.考工記〔1:4〕	─順應人體的曲線，另一方面是藉由弧面的成型中，加入更多的手工成分。造型有著內斂的弧線，建構出如同微化律的建築外型，保留了原木厚重的量感與質感，同時也代表了一個符合生態與永續的方向。(4/7)

（C）意義／技術性

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	展覽產品經確認之逐字稿編碼
意義	技術性.	─傳承工藝	─03.流韻茶几、邊几、沙〔1:1〕	發(一起叱吒天際。典雅端莊的方正結構，以傳統工藝環繞的扶手依著手掌心與無名指指尖的球面。(8/8)
			04.謙謙餐椅〔1:1〕	─椅腳橫桿設計搭配金屬裝飾，讓整體形態的比例，展現勻稱而協調的工藝之美。(4/4)
			07. 泊 荷 系 列〔1:1〕	─檯面引用蘇格蘭划槳的芟式拼板工藝。(3/3)
			08.雨窪系列凳几〔1:1〕	─佐以斜切而下的椅腳，完全榫接工法將實木運用出美妙平衡的形體比例。(3/3)
			11.舞缸立鏡檯〔1:1〕	─以獨特榫接工法製作支架的轉折姿態。(4/4)
			14. 楊 朵 系 列 .〔1:2〕	─以傳統的榫接方式和自然的實木質感，展現了小巧趣味的圓滿線條。(2/2)
			27.考工記〔1:1〕	─由設計展現台灣在地的人文、地方特色及自然生態、工藝之美。(3/3)
			28.OSA 系列〔1:1〕	─由設計展現台灣在地的人文、地方特色及自然生態、工藝之美。(5/5)
		─創新技術	01.結祥雲〔1:1〕	─新技術工法製作四層收納機能，是生活實用空間的最佳收納手。(2/2)
			02.清池邊几〔1:2〕	─為居家空間添增溫暖的氣氛。玻璃和木質的技術結合，直線造型典雅易搭配沙發，新技術工法製作四層收納機能，是生活實用空間的最佳收納手。(3/4)
			06. 樑 柱 線 架 構系列〔1:2〕	─靈感來自於中式建築樑柱的線條，以創新技術工法將樑柱線條轉換為實體架構。(2/2)
			07.泊荷系列〔1:1〕	─以創新技術工法引領木紋的線條迴旋相依，如漣漪般在風中綻開。(4/4)
			08. 雨 窪 系 列 凳几〔1:1〕	─設計靈感來自雨滴打落地面濺起之水窪。新技術工法切出美麗的弧度線條坐面。(2/2)
			09. 宜 家 系 列 .〔1:1〕	─新技術工法製作一個簡約不佔空間的架子，簡單線條結構或可擱著幾本閒書。(5/5)
			10. 一 縷 輕 煙 立鏡〔1:1〕	─新技術工法製作隱藏式懸掛設計，木桿掛件的斜角，使立鏡與牆面更能緊密貼齊於牆面。(4/4)
			11. 舞 缸 立 鏡 檯 .〔1:1〕	─新技術工法製作，傾斜角度經過精密計算，能恰好托住鏡子。(3/3)
			12. 雀 頂 立 鏡 檯〔1:1〕	─新技術工法製作「雀頂」,「雀頂」也是清代士子頭冠頂飾，。(3/3)

			13.百合立鏡檯〔1:1〕	─新技術工法製作百合盛開的樣貌，以極簡的線條轉化成鏡臺，便利收納穿衣鏡。(2/2)
			15.雅憩系列凳几.〔1:1〕	─古老的凳几概念，新技術工法製作與俐落直線搭配上現代的軟坐墊。(4/4)
			16.滑翔短凳、長凳架〔1:1〕	─以飛機羽翼為設計發想及新技術工法製作。(2/2)
			17.追風吧椅、長板凳〔1:3〕	─延續滑翔系列凳几的設計概念，新技術工法製作，增加椅背向律延伸的線條設計。(2/2)
			18.六面體凳几〔2:2〕	─新技術工法製作三種六面體凳几，運用簡單、圓潤的線條設計圖形。(3/3) ─利用隱藏式的創新結合工法，破除了傳統工法的限制。(5/5)
			19.吉祥杉衣帽架〔1:2〕	─新技術工法製作，植物的造型以上揚的線條、意象轉化成衣帽架。(2/2)
			20.千年松衣帽架〔1:2〕	─新技術工法製作松樹造型，簡潔有力，為空間帶進自然簡單的線性風格。(2/2)
			21.紅珊瑚衣帽架〔1:1〕	─鏡面烤漆結構珊瑚實體，新技術工法製作佐以紅色金屬勾勒外在曲折線條。(2/2)
			22.桠口擱衣架〔1:1〕	─新技術工法製作，模擬植物生長的姿態，讓實木自然的紋理與細膩的質感。(2/2)
			23.寶瓶座系列〔1:1〕	─新技術工法製作剪影西園山牆的寶瓶穿口，隱寓聚寶的官府貴氣。(2/2)
			24.桲木單元櫃〔1:1〕	新技術工法製作五種尺寸、三種色彩，利用轉角弧形線條的收斂感、形體和顏色不同的特點，隨性堆疊。(2/2)
			25.磐石茶几〔1:2〕	─新技術工法製作帶點普普風味的圓弧線條之造型，在材質選擇上，特別採用桲木實木拼接製成。(2/3)
			26.遊方哈欠邊几〔1:2〕	─小巧輕便，如浮雲悠遊四方；新技術工法製作，側面曲線傾斜化哈欠為形體。(2/2)

（D）形式／造型

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	展覽產品經確認之逐字稿編碼
形式	造型	─對稱形線條	01.結祥雲〔2:3〕	─以創新技術工法製作簡潔的線形框架結構，搭配厚實的實木座板，以華人文化「空、有」的對比，在空間中凝結出靜思的磐石。(2/3) ─對稱形。(6/6)
			02.清池邊几〔2:2〕	為居家空間添增溫暖的氣氛。玻璃和木質的技術結合，直線造型典雅易搭配沙發。(3/3) ─對稱形。(5/5)
			03.流韻茶几、邊几、沙發〔2:2〕	─雕映出流暢優雅的線條，讓人可以把玩，也可以久坐。有別於以往傳統的沙發。(9/9) ─對稱形。(11/11)
			04.謙謙餐椅〔2:2〕	─展現優雅與堅韌的線條。(3/3) ─對稱形。(6/6)
			05.倚天茶几、倚天邊几〔2:2〕	─將玻璃與木紋巧妙結合。(3/3) ─對稱形。(5/5)
			06.樑柱線架構系列〔2:3〕	─樑柱的方正線條結構，穩固不易侵犯，展現設計人善於架構的智慧結晶。(4/5) ─對稱形。(5/5)
			07.泊荷系列〔2:2〕	─以創新技術工法引領木紋的線條迴旋相依，如漣漪般在風中綻開。(4/4) ─仿生三角對稱形。(5/5)
			08.雨窪系列凳几〔2:2〕	─設計靈感來自雨滴打落地面濺起之水窪。新技術工法切出美麗的弧度線條坐面。(2/2) ─仿生對稱形。(4/4)
			09.宜家系列〔2:2〕	─新技術工法製作一個簡約不佔空間的架子，簡單線條結構或可擱著幾本閒書。(2/2) ─對稱形。(4/4)
			10.一縷輕煙立鏡〔2:2〕	─鏡身造型如同山中的一縷清煙，線條簡單卻帶有淡雅的氛圍、文人雅士的氣息。(2/2) ─對稱形。(6/6)
			11.舞魟立鏡檯〔2:5〕	─以魟魚為設計發想，基座猶如魟魚菱形的身軀，魟魚細長的尾巴成了鏡臺的支架，新技術工法製作，傾斜角度經過精密計算，能恰好托住鏡子，以獨特榫接工法製作支架的轉折姿態。基座翹起的設計，除了托住鏡面的功能考量外，造型就像魟魚游動時頭部向上揚起的姿態，加上 U 型的開口模擬魟魚

				的嘴巴。(2/5) ㄧ仿生對稱形。(8/8)
			12.雀頂立鏡檯〔2:4〕	ㄧ外型的設計概念從美麗的孔雀而來，微張的線猶如孔雀開屏一般。新技術工法製作「雀頂」,「雀頂」也是清代士子頭冠頂飾，將傳統文化元素融入到現代家居用品設計中。(2/4) ㄧ對稱形。(7/7)
			13.百合立鏡檯〔2:2〕	ㄧ新技術工法製作百合盛開的樣貌，以極簡的線條轉化成鏡臺，便利收納穿衣鏡。(2/2) ㄧ對稱形。(6/6)
			14.楊朵系列〔2:2〕	ㄧ以傳統的榫接方式和自然的實木質感，展現了小巧趣味的圓滿線條。(2/2) ㄧ對稱形。(4/4)
			15.雅憩系列凳几〔2:2〕	ㄧ老的凳几概念，新技術工法製作與俐落直線搭配上現代的軟坐墊。(2/2) ㄧ對稱形。(5/5)
			16.滑翔短鄧、長凳〔2:4〕	ㄧ以飛機羽翼為設計發想及新技術工法製作，跳脫傳統木質凳几的形式，兩木板斜放的椅面設計，更符合人因工學，椅面線條傾斜，富趣味性。(2/4) ㄧ對稱形。(6/6)
			17.追風吧椅、長板凳〔2:2〕	ㄧ延續滑翔系列凳几的設計概念，新技術工法製作，增加椅背向律延伸的線條設計。(2/2) ㄧ對稱形。(6/6)
			18.六面體凳几〔2:3〕	ㄧ新技術工法製作三種六面體凳几，運用簡單、圓潤的線條設計圖形，並以幾何對稱圖型排列與重疊的立體穿透變化，形成強列的視覺刺激。(3/4) ㄧ幾何對稱形。(8/8)
			19.吉祥杉衣帽架〔2:2〕	ㄧ新技術工法製作，植物的造型以上揚的線條、意象轉化成衣帽架。(2/2) ㄧ對稱形。(5/5)
			20.千年松衣帽架〔2:2〕	ㄧ新技術工法製作松樹造型，簡潔有力，為空間帶進自然簡單的線性風格。(2/2) ㄧ對稱形。(4/4)
			22.椏口擱衣架〔1:1〕	ㄧ新技術工法製作，模擬植物生長的姿態，讓實木自然的紋理與細膩的質感。(2/2) ㄧ對稱形。(4/4)
			23.寶瓶座系列	ㄧ完全用天然木製成，一整塊木板分成五

			〔2:3〕	段，依著木紋的肌理，由左而右接續轉折線；也微微地透著折紙工藝的趣味，是一“紙”折，也是一“板”折。(4/5) ㄧ對稱形。(6/6)
			24.栲木單元櫃架〔2:2〕	ㄧ利用轉角弧形線條的收斂感、形體和顏色不同的特點，隨性堆疊。(3/3) ㄧ對稱形。(6/6)
			25.磐石茶几〔2:2〕	ㄧ在普普風的現代造型中還能流露出自然木紋的溫潤感。(6/6) ㄧ對稱形。(7/7)
			26.遊方哈欠邊几〔2:2〕	ㄧ小巧輕便，如浮雲悠遊四方；新技術工法製作，側面曲線傾斜化哈欠為形體。(2/2) ㄧ對稱形。(7/7)
			27.考工記〔2:3〕	ㄧ與傳統手工榫接的概念，椅面凹的弧面一方面是符合人體工學，順應人體的曲線，另一方面是藉由弧面的成型中。(3/4) ㄧ對稱形。(8/8)
		ㄧ非對稱形線條	21.紅珊瑚衣帽架〔2:2〕	ㄧ鏡面烤漆結構珊瑚實體，新技術工法製作佐以紅色金屬勾勒外在曲折線條。(2/2) ㄧ不對稱形、仿生有機。(5/5)
			28.OSA 系列〔1:2〕	ㄧ致力傳達出原創、簡單、真誠的品牌價值與精神。風螺、桐芟雪皆是仿生的有機線條。 ㄧ仿生有機形。(7/7)

（E）形式／色彩

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	展覽產品經確認之逐字稿編碼
形式	色彩	─單一色相的配色	27.考工記〔1:1〕	─自然色。(10/10)
			28.OSA 系列〔1:2〕	─單一色相的配色。(9/9)
		─調和色系	01.結祥雲〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色、磚紅色、雁鴨色。(8/8)
			02.清池邊几〔1:2〕	─洗白色、自然色、柚木色、深胡桃木色、磚紅色、雁鴨色。(7/7)
			03.流韻茶几、邊几、沙發〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(13/13)
			04.謙謙餐椅〔1:2〕	─洗白色、自然色、柚木色、深胡桃木色。(13/13)
			05.倚天茶几、倚天邊几〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(7/7)
			06.樑柱線架構系列〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(7/7)
			07.泊荷系列〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(7/7)
			08.雨窪系列凳几〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(6/6)
			09.宜家系列〔1:2〕	─洗白色、自然色、柚木色、深胡桃木色。(6/6)
			10.一縷輕煙立鏡〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(8/8)
			11.舞魟立鏡檯〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(9/9)
			12.雀頂立鏡檯〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(9/9)
			13.百合立鏡檯〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(5/5)
			15.雅憩系列凳几〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(3/3)
			16.滑翔短凳、長凳〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(8/8)
			17.追風吧椅、長板凳〔1:1〕	─洗白色、自然色、柚木色、深胡桃木色。(8/8)
			18.六面體凳几〔1:1〕	──洗白色、自然色、柚木色、深胡桃木色。(10/10)
			19.吉祥杉衣帽	─洗白色、自然色、柚木色、深胡桃木色。

			架〔1:2〕	(7/7)
			20.千年松衣帽架〔1:1〕	ㄧ洗白色、自然色、柚木色、深胡桃木色。(6/6)
			21.紅珊瑚衣帽架〔1:1〕	ㄧ色彩：白色、黑色、紅色。(7/7)
			22.椏口擱衣架〔1:1〕	ㄧ洗白色、自然色、柚木色、深胡桃木色。(6/6)
			23.寶瓶座系列〔1:1〕	ㄧ洗白色、自然色、柚木色、深胡桃木色。(8/8)
			24.栲木單元櫃架〔1:1〕	ㄧ洗白色、自然色、柚木色、深胡桃木色。(8/8)
			25.磐石茶几〔1:1〕	ㄧ洗白色、自然色、柚木色、深胡桃木色。(9/9)
			26.遊方哈欠邊几〔1:3〕	ㄧ微傾身軀添上栲木圓潤質感。暫擱幾本閒書，啜飲幾口香茶，好不瀟灑。(3/3)

（F）形式／材質

選擇性編碼	主軸編碼	概念開放性編碼	〔次數：段落〕	展覽產品經確認之逐字稿編碼
形式	材質	─木質	01.結祥雲〔1:1〕	─楞木實木。(8/8)
			02.清池邊几〔1:1〕	─楞木實木、樺木積層板（抽屜內盒）、強化玻璃（桌面）。(6/6)
			03.流韻茶几、邊几、沙發〔1:1〕	─楞木實木。(12/12)
			04.謙謙餐椅〔1:2〕	─楞木實木。(7/7)
			05.倚天茶几、倚天邊几〔1:1〕	─楞木邊框導斜角設計，增加整體的細緻度，暗茶色玻璃中間放置木薄片。(2/2)
			06.樑柱線架構系列〔1:1〕	─楞木實木。(6/6)
			07.泊荷系列〔1:1〕	─楞木實木。(6/6)
			08.雨窪系列凳几〔1:1〕	─楞木實木。(5/5)
			09.宜家系列〔1:2〕	─楞木實木。(5/5)
			10.一縷輕煙立鏡〔1:1〕	─楞木實木。(7/7)
			11. 舞 缸 立 鏡 檯〔1:1〕	─楞木實木。(8/8)
			12. 雀 頂 立 鏡 檯〔1:1〕	─楞木實木。(8/8)
			13. 百 合 立 鏡 檯〔1:1〕	─楞木實木。(4/4)
			14.楊朵系列〔1:1〕	─楞木實木。(5/5)
			15.雅憩系列凳几〔1:1〕	─楞木實木。(6/6)
			16.滑翔短凳、長凳〔1:1〕	─楞木實木。(7/7)
			17.追風吧椅、長板凳〔1:1〕	─楞木實木。(7/7)
			18. 六 面 體 凳 几〔1:1〕	─楞木實木。(9/9)
			19.吉祥杉衣帽架〔1:2〕	─楞木實木。(6/6)
			20.千年松衣帽架〔1:1〕	─楞木實木。(5/5)
			21.紅珊瑚衣帽架〔1:1〕	─楞木實木、鋼管。(6/6)
			22. 桱 口 擱 衣 架	─楞木實木。(5/5)

			〔1:1〕	
			23. 寶瓶座系列〔1:1〕	─楞木實木。(7/7)
			24.楞木單元櫃架〔1:1〕	─楞木實木。(7/7)
			25.磐石茶几〔1:1〕	─在材質選擇上，特別採用楞木實木拼接製成。 楞木實木有著較其他木種更為堅硬的材質特性。(3/4))
			26.遊方哈欠邊几〔1:1〕	─楞木實木。(4/4)
		─土質	02.清池邊几〔1:1〕	─強化玻璃（桌面）。(6/6)
			05.倚天茶几、倚天邊几〔1:1〕	─暗茶色玻璃中間放置木薄片。(2/2)
			10.一縷輕煙立鏡〔1:1〕	─鏡身造型如同山中的一縷清煙。(2/2)
		─金屬	21.紅珊瑚衣帽架〔1:1〕	─楞木實木、鋼管。(6/6)
			28.OSA 系列〔1:1〕	─塑膠、鋼管。(8/8))
		─織品	03.流韻茶几、邊几、沙發〔1:1〕	─流韻布沙發。(3/3)
			15.雅憩系列凳几〔1:1〕	─一改凳几久坐不舒服的問題。親友來訪，以充滿色彩的布軟墊凳子相迎。(3/3)
		─其他：塑、矽、皮	03.流韻茶几、邊几、沙發〔1:1〕	─靜靜的綴滿了鳳凰的羽衣，檯面上鋪了一層堅韌的牛皮。(3/3)
			28.OSA 系列〔1:1〕	─塑膠、鋼管。(3/3)
		─材質創新	27.考工記〔1:1〕	─採用人工林中的木材，以建築工法中的膠合樑製成技術。(2/2)

三、有情門品牌展覽之二十八系列產品表

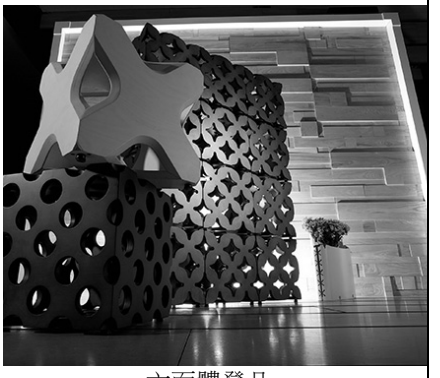
編號名稱	產品編號、名稱、說明	產品圖像
01.結祥雲書椅	以創新技術工法製作簡潔的線形框架結構，搭配厚實的實木座板，以華人文化「空、有」的對比，在空間中凝結出靜思的磐石。或兩腳落地正襟危坐，或盤腿趺跏，瞬間，人與椅身影合一，仿若凝結成一團祥瑞的雲氣。諸佛菩薩所到之處就是吉祥地，香煙處處結雲，所以稱為「隨處結祥雲」。 造型：對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色、磚紅色、雁鴨色	 結祥雲書椅
02.清池邊几	透明玻璃減輕了空間壓力，如同空間中的一泉清池；木頭親人的特性，為居家空間添增溫暖的氣氛。玻璃和木質的技術結合，直線造型典雅易搭配沙發，新技術工法製作四層收納機能，是生活實用空間的最佳收納手。 造型：對稱形 材質：桉木實木、樺木積層板（抽屜內盒）、強化玻璃（桌面） 色彩：洗白色、自然色、柚木色、深胡桃木色、磚紅色、雁鴨色	 清池邊几
03.流韻茶几、邊几、沙發	靜靜的綴滿了鳳凰的羽衣，檯面上鋪了一層堅韌的牛皮，迎接著品茗時溢出的汁液，落款時滑動的筆尖，甚或滿滿盛開的線形洋桔梗，默默的，堅定的，吟唱著人間永恆不變的愛。流韻布沙發桉木山形紋的飽滿氣韻，疊上竹林的悠閒，幻化出華人文化鳳凰自信的羽翼─豐厚，蓄勢，設計茶几、邊几、布沙發沙發。沙發昂頭的背靠，厚實實用的座墊，等待著有緣人跨坐騎乘，一起叱吒天際。典雅端莊的方正結構，以傳統工藝環繞的扶手依著手掌心與無名指指尖的球面，雕映出流暢優雅的線條，讓人可以把玩，也可以久坐。有別於以往傳統的沙發，賦予了嶄新的面貌與生命力。 造型：對稱形、有機紋理線條	 茶几  邊几

	材質：楮木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 流韻沙發、邊几
04.謙謙餐椅	椅背與座面微微內縮，舒適地包覆人體；椅身選用木質堅硬的山毛櫸，展現優雅與堅韌的線條；椅腳橫桿設計搭配金屬裝飾，讓整體形態的比例，展現勻稱而協調的工藝之美，流露出謙謙君子般的內斂氣質，雍容大器。 造型：對稱形 材質：楮木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 謙謙餐椅
05.倚天茶几、邊几	楮木邊框導斜角設計，增加整體的細緻度，暗茶色玻璃中間放置木薄片，將玻璃與木紋巧妙結合。除了茶几外還有邊几及大小置物盤，高低大小的搭配可延伸出更多的風情。 造型：對稱形 材質：楮木實木、深色強化玻璃 色彩：洗白色、自然色、柚木色、深胡桃木色	 倚天茶几  倚天邊几
06.樑柱線架構系列	靈感來自於中式建築樑柱的線條，以創新技術工法將樑柱線條轉換為實體架構。富有禪意、深具東方古典氣質的線條，展現主人的居家品味。樑柱的方正線條結構，穩固不易侵犯，展現設計人善於架構的智慧結晶。 造型：對稱形 材質：楮木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 樑柱線架構系

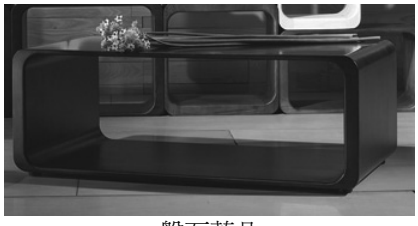
07.泊荷系列	一塘荷葉舞春風，如齊白石的畫中荷花，或單枝，或成群，錯落有致，停泊暫歇。檯面引用蘇格蘭划槳的花式拼板工藝，以創新技術工法引領木紋的線條迴旋相依，如漣漪般在風中綻開。 造型：仿生非對稱形 材質：楸木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 泊荷系列
08.雨窪系列凳几	設計靈感來自雨滴打落地面濺起之水窪。新技術工法切出美麗的弧度線條坐面，佐以斜切而下的椅腳，完全榫接工法將實木運用出美妙平衡的形體比例。 造型：仿生對稱形 材質：楸木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	  雨窪系列凳几
09.宜家系列	新技術工法製作一個簡約不佔空間的架子，簡單線條結構或可擱著幾本閒書，以或展示著旅行的回憶，或蒔著花草的縮影，隨性自在，好不愜意。 造型：對稱形 材質：楸木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 宜家系列

10.一縷輕煙立鏡	鏡身造型如同山中的一縷清煙，線條簡單卻帶有淡雅的氛圍、文人雅士的氣息。特選楸木實木材質製成框架與木桿掛件，增加鏡身承重力與耐用性。 新技術工法製作隱藏式懸掛設計，木桿掛件的斜角，使立鏡與牆面更能緊密貼齊於牆面。除了增強穩定不易掀動外，還具有牆面裝飾效果，對應於空間中既是一面鏡子也是一幅畫作。 造型：對稱形 材質：楸木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 一縷輕煙立鏡
11.舞魟立鏡檯	以魟魚為設計發想，基座猶如魟魚菱形的身軀，魟魚細長的尾巴成了鏡臺的支架，新技術工法製作，傾斜角度經過精密計算，能恰好托住鏡子，以獨特榫接工法製作支架的轉折姿態。基座翹起的設計，除了托住鏡面的功能考量外，造型就像魟魚游動時頭部向上揚起的姿態，加上 U 型的開口模擬魟魚的嘴巴，更讓鏡台整體造型多了分會心一笑的逗趣。 造型：對稱形 材質：楸木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 舞魟立鏡檯
12.雀頂立鏡檯	外型的設計概念從美麗的孔雀而來，微張的線猶如孔雀開屏一般。新技術工法製作「雀頂」,「雀頂」也是清代士子頭冠頂飾，將傳統文化元素融入到現代家居用品設計中。除了可以日常生活置放鏡子之外，機能多元，也能用來陳列畫作作品，讓空間增添東方風味。 造型：對稱形 材質：楸木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 雀頂立鏡檯

13.百合立鏡檯	新技術工法製作百合盛開的樣貌，以極簡的線條轉化成鏡臺，便利收納穿衣鏡，或陳列心愛的畫作，讓空間增添東方的風味意境。 材質：栲木實木 色彩：洗白色、自然色、柚木色、深胡桃木色 造型：對稱形	 百合立鏡檯
14.楊朵系列	以傳統的榫接方式和自然的實木質感，展現了小巧趣味的圓滿線條，表現在坐具上的除了獨特的台灣風格還有細緻的質感和工法。 造型：對稱形 材質：栲木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 楊朵系列
15.雅憩系列凳几	古老的凳几概念，新技術工法製作與俐落直線搭配上現代的軟坐墊，一改凳几久坐不舒服的問題。親友來訪，以充滿色彩的布軟墊凳子相迎，可以讓親友留下愉快的回憶。 造型：對稱形 材質：栲木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 雅憩系列凳几
16 滑翔短鄧、長凳	以飛機羽翼為設計發想及新技術工法製作，跳脫傳統木質凳几的形式，兩木板斜放的椅面設計，更符合人因工學，椅面線條傾斜，富趣味性。保留傳統的木榫工法，承續先民對條凳的需求。 造型：對稱形 材質：栲木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 滑翔短鄧、長凳

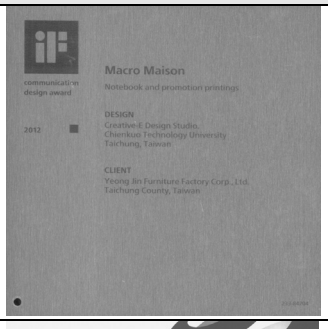
17.追風吧椅、長板凳	延續滑翔系列凳几的設計概念，新技術工法製作，增加椅背向後延伸的線條設計，增加了與身體接觸的面積，並在轉折處以圓角處理，緩和乘坐時椅背的銳利感，搭配座面本身的斜面設計，貼合包覆身體線條，以傳統的板凳意象，延伸現代使用機能，創造新的生活體驗。 造型：對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 追風吧椅、追風長板凳
18.六面體凳几	酪米花六面體凳几、桐花雨六面體凳几、阿快六面體凳几新技術工法製作三種六面體凳几，運用簡單、圓潤的線條設計圖形，並以幾何對稱圖型排列與重疊的立體穿透變化，形成強列的視覺刺激。利用隱藏式的創新結合工法，破除了傳統工法的限制。是凳几也是藝術品，六面體系列置放於空間中，以不同的不僅能輕易地吸引目光，豐富了空間的表情，更能表現空間的獨特性。 造型：幾何對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 六面體凳几
19.吉祥杉衣帽架	新技術工法製作，植物的造型以上揚的線條、意象轉化成衣帽架，擺脫傳統的形式，讓衣帽架在空間中優雅的收納吊掛衣物，展現主人獨特品味和美感追求。 造型：對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 吉祥杉衣帽架

20.千年松衣帽架	新技術工法製作松樹造型，簡潔有力，為空間帶進自然簡單的線性風格，也是空間最好的裝飾品。 造型：對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 千年松衣帽架
21.紅珊瑚衣帽架	鏡面烤漆結構珊瑚實體，新技術工法製作佐以紅色金屬勾勒外在曲折線條，表現虛實陰陽的生命動感。設計概念顛覆了傳統的形式，讓衣帽架不再只有機能性，而是賦予更多的造型設計美感。 造型：不對稱形、仿生有機 材質：桉木實木、鋼管 色彩：白色、黑色、紅色	 紅珊瑚衣帽架
22.桭口擱衣架	新技術工法製作，模擬植物生長的姿態，讓實木自然的紋理與細膩的質感，精簡且優雅地進入空間中，兼具品味與實用的生活單品。 造型：對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 桭口擱衣架
23.寶瓶座系列	新技術工法製作剪影西園山牆的寶瓶穿口，隱寓聚寶的官府貴氣。師法荷蘭風格派（De Stijl）建築大師 Gerrit Rietvel 的“Zig Zag Chair”，完全用天然木製成，一整塊木板分成五段，依著木紋的肌理，由左而右接續轉折線；也微微地透著折紙工藝的趣味，是一“紙”折，也是一“板”折。 造型：對稱形 材質：桉木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 寶瓶座系列

24.楮木單元櫃	新技術工法製作五種尺寸、三種色彩，利用轉角弧形線條的收斂感、形體和顏色不同的特點，隨性堆疊，能呈現個性化的風格。可單放或當書櫃收納書籍、擺放裝飾品，亦可當邊几或坐椅使用。 造型：對稱形 材質：楮木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 楮木單元櫃
25.磐石茶几	新技術工法製作帶點普普風味的圓弧線條之造型，在材質選擇上，特別採用楮木實木拼接製成。 楮木實木有著較其他木種更為堅硬的材質特性，能符合桌面使用上的承重需求；木紋明顯的材質特性，在普普風的現代造型中還能流露出自然木紋的溫潤感。 造型：對稱形 材質：楮木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 磐石茶几
26.遊方哈欠邊几	小巧輕便，如浮雲悠遊四方；新技術工法製作，側面曲線傾斜化哈欠為形體，微傾身軀添上楮木圓潤質感。暫擱幾本閒書，啜飲幾口香茶，好不瀟灑。 造型：對稱形 材質：楮木實木 色彩：洗白色、自然色、柚木色、深胡桃木色	 遊方哈欠邊几
27.考工記	採用人工林中的木材，以建築工法中的膠合樑製成技術，與傳統手工榫接的概念，椅面凹的弧面一方面是符合人體工學，順應人體的曲線，另一方面是藉由弧面的成型中，加入更多的手工成分。造型有著內斂的弧線，建構出如同微化後的建築外型，保留了原木厚重的量感與質感，同時也代表了一個符合生態與永續的方向。 造型：對稱形 材質：加拿大（SPF）積成材 色彩：自然色	 考工記

28.OSA	風螺燈具、桐花雪燈具 Original·Simple·Authentic. OSA 從台灣的角度發聲，挖掘器物背後蘊藏的文化與美感意涵。致力傳達出原創、簡單、真誠的品牌價值與精神。風螺、桐花雪皆是倣生的有機線條。由設計展現台灣在地的人文、地方特色及自然生態、工藝之美，融入生活美學之中，細細品味。 造型：有機形 材質：塑膠、鋼管 色彩：洗白色、自然色、柚木色、深胡桃木色	 OSA

四、策展設計實務參加國際競賽成果表

年度	競賽名稱	獲獎名稱	活動主辦單位	活動類別
2012	IF Communication design award2012	2012 IF Communication Design Award winner		國際性 專業組競賽
2011	2011 reddot Design Award	2011 reddot Communication design award winner		國際性 專業組競賽
2011	有情門 —就是愛線（品牌展覽文宣設計）	台灣金點設計獎 視覺傳達設計類	行政院經濟部工業局 主辦 台灣創意設計中心 協辦 Taiwan Design Center	全國性 專業組競賽

			 Golden Pin DESIGN AWARD 金點設計獎 金點設計產品認定證書 Identification Certificate of Golden Pin Design Product 產品類別：經營傳達類 永進木業纖股份有限公司 申請 金點設計評選，符合評選作業要點之評審標準，認定為「金點設計產品」特頒本證書，以資表彰。 茲摘錄評定事項如下： 產品名稱：有情門，講台風語的家具-就是愛候（筆記書） 產品廠商：永進木業纖股份有限公司 設計者：馮文君 Category / Communication Design Yeong Jin Furniture Factory Corp.,Ltd Having participated in the Golden Pin Design Selection and conformed to the evaluation standards thereof, is hereby granted the following in recognition of its efforts: Product Name: Speaking Taiwanese furniture- is love line(Notebook) Company Name: Yeong Jin Furniture Factory Corp.,Ltd Designer: Wen Chun Fong 財團法人台灣創意設計中心 執行長 Chief, ICA, ITRI Taiwan Design Center 中華民國 100 年 / 2011	

Effect of Biochar on Growth, Yield and Quality of *Ocimum basilicum L.* and Improve the Quality of The Acid sulfate Soil in Sen Viet Farm

Vu Thi Quyen*

Abstract

The fertilizer formulations namely, CM - the composted chicken manure (a local formulation commonly used by farmers) were evaluated in combination with seven levels of biochar (0, 5, 10, 15, 20, 25 and 30%) and plant in the pots to enhance growth, yield and quality of the Ocimum basilicum in the acid soil (pH= 3,8-4,2) that located on the Sen Viet Farm, Binh Thanh District, Ho Chi Minh city, Viet Nam. The increase of 30% biochar some time makes the plant die and was not progressing of the *Ocimum basilicum* yield. At the concentration of twenty (20%) and twenty five percent (25%) biochar increased the growth and yield of the Ocimum basilicum plant, the yield increase 80% compared to the control and increased 120% compared to the local formulation. These combinations between biochar and CM at the suitable rates significantly improve the plant growth, the leaf weight (biomass) and the quality of leaf. Besides, the soil quality become better (pH=6,0–6,5). Hence the local compost formulation of in combination with 20% of biochar is recommended for better yield of Ocimum basilicum.

Keywords: Acid Soil, Biochar, Biomass, Growth, Yield.

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生物炭對羅勒生長、產量和品質的影響及提高森越農場酸性土壤硫酸鹽質量的研究

Vu Thi Quyen*

摘要

本文針對肥料配方（堆肥雞糞，農民常用的當地配方）與七種生物炭（0%, 5%, 10%, 15%, 20%, 25%和 30%）的組合進行評估，並研究針對位於越南胡志明市 Binh Thanh 區 Sen Viet 農場的酸性土壤（pH = 3, 8-4, 2），如何在盆栽技術中提高羅勒的產質量。當生物炭增加 30%會使植物死亡，而控制在濃度為 20%和 25%的生物炭可以增加羅勒的產量。與對照相比，產量增加了 80%，同時局部製劑相比增加了 120%。藉由生物炭和堆肥雞糞之間組合，可以顯著改善了植物葉部的重量和品質。此外，土質可以改變得更好（pH = 6.0-6, 5）。最後本文結論建議使用與 20%生物炭組合的局部堆肥配方，可以獲得較佳的羅勒產量。

關鍵詞：酸性土壤、生物炭、生物量、生長、產量。

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Introduction

Ocimum basilicum L. (sweet basil), a member of the Lamiaceae family, is native throughout the world and cultivated for religious and medicinal purposes. The leaves and flowers of basil are used in folk medicine as a tonic and vermifuge. Basil tea is good for treating nausea, flatulence and dysentery. The oil of the plant has been found to be beneficial for the alleviation of mental fatigue, colds, spasm, rhinitis, and as a first aid treatment for wasp stings and snake bites. Studies showed that basil possesses central nervous system depressant, anticancer, cardiac stimulant, hepatoprotective, hypoglycemic, hypolipidemic, immunomodulator, analgesic, anti-inflammatory, antimicrobial, antioxidant, antiulcerogenic, chemomodulatory and larvicidal activities.

The genus *Ocimum* is characterized by great species diversity in terms of morphological traits and chemical composition. At present, *Ocimum basilicum* L. is widely cultivated in tropical countries. Green and aromatic leaved varieties are mainly cultivated. Herb and essential oil that has anti-depressive, anti-microbial, and anti-oxidative properties are raw material (Muralidharan & Dhananjayan, 2004). *Ocimum basilicum* L. is an open and insect pollinated plant. It blooms nearly full year, from June to September and its flowers secrete significant amounts of nectar (Renata Nurzyńska-Wierdak, 2007).

Biochar is a product that made when organic materials (wood, bamboo and other biomass) are burned in a rare atmosphere or without oxygen (ie, it is pyrolysed or altered through working of heat) to result in an arrangement of molecules in biomass that contain stable carbon in different quantities.

Today, biochar is known as a new generation fertilizer with many important features: improving soil properties, increasing soil fertility and keeping soil moisture, ect. This research uses biochar from cane-trash (bagasse) and cassava bagasse which are produced by Ky Quang Company. The bagasse are mixed, pelleted and pyrolysed under rare oxygen conditions at a temperature of 350°C. The results of analyzing some indicators of biochar from cassava bagasse are presented in table 1 below:

Table 1. Content of some compounds and elements in biochar

Compounds and elements	Nos.	Content	Applied method
pH		9,81	4.11USCC:dil.Rąkovich
Organic Carbon	%	84,3	TOC-V Analyzer User's Manual
Moisture	%	5,2	ASTM D1762-84 (105c)
Bulk Density	lb/cu ft	6,0	
Ca	Mg/kg	16.063	Ref.AOAC 957.02
Cu	Mg/kg	10,7	Ref.AOAC 957.02
K_2O	%	1,58	Ref.AOAC 957.02
Mg	Mg/kg	3.774	Ref.AOAC 957.02
P_2O_5	%	0,1	AOAC 957.02 (*)
Zn	Mg/kg	44,1	Ref.AOAC 957.02
N	%	0,87	Ref.AOAC 957.13 (*)

Source: Ky Quang Company, 2018

Because the cultivated soil in Sen Viet garden is the acid sulfate soil (pH = 4.2) and the organic matter is poor, so to grow basil, farmers often add more manure to compost. The results of biochar supplementation together with composting chicken manure showed the important role of biochar in increasing yield, quality of vegetables and changing the properties of acid sulphate soil into stable cultivation. Therefore, the aim of this study was to find optimum biochar ratios with respect to plant response and improving soil.

1. Methods or Experimental

1.1. Research materials: Seedling of *Ocimum basilicum* L.; Mixed nutrient soil: 70% soil + 30% composting chicken manure; Pot size: 22x12x8 cm; TSBio-fertilizer and Bio-pesticide (100% neem oil).

1.2. Experimental layout method

Experiment 1: Effect of the rate of applying biochar to the growth of *Ocimum basilicum* are growing in pots

One-factorial study was designed follow the RCBD type, with seven treatments in four replications. Each treatment had 4 pots, the total of pots were 112.

Treatment 1: Biochar 0% (Control-symbol B0)

Treatment 2: Biochar 5% (symbol B5)

Treatment 3: Biochar 10% (symbol B10)

Treatment 4: Biochar 15% (symbol B15)

Treatment 5: Biochar 20% (symbol B20)

Treatment 6: Biochar 25% (symbol B25)

Treatment 7: Biochar 30% (symbol B30)

Experiment 2: The best result from experiment 1 is chosen to do in the experiment 2. One-factorial study was designed follow the RCBD type, with 3 treatments in four replications. Each treatment had $1m^2$. A total of 4 x 2 x 1 = $8m^2$.

Treatment 1: Non Biochar (Control 1), NB symbol

Treatment 2: According to local cultivation (Control 2), the symbol of LF (local farmer)

Treatment 3: Biochar ratos follow the best result of the experiment 1, symbol B

1.3. Method of data collection*:* Measurement and counting the height and diameter all the plant in pots. All measured were marked on the pot and at the measurement site of plants. Measure and record data weekly.

1.4. Data processing methods: To calculate statistical speciality: average, range, standard deviation, percentage (%), maximum and minimum values. Input data, calculate sample characteristics and draw charts by excel software. Using statgraphics Plus 15.0, SPSS and Genstat 7.1 for statistical analysis.

2. Results and Discussions

2.1. Effect of ratio of biochar to growth of *Ocimum basilicum* L. in the pots

The 15 days of seedling are planted in the pot, each pot plant 3 seedlings. 7 days after the seedling transfering to the pots, using the TSbio 1:400 to spray, and then spraying once a week still the time before harvesting one week.

The results after 40 days observing (in table 2) recorded: There was an increase in height and circumference of the stems between treatments from B0 to B7. The best results are belong to B20 and B25, and this results have the statistical significance difference with other treatments at the meaning of 1%. Besides, the weight of the plant (biomass) also differential statistical significance at the 5% between the B20 & B25 compare to others.

The process of monitoring and observing the growth of the *Ocimum basilicum* L. is also recorded that, treatment B30 has the rate of dead plants is 82%, while the other treatments, the plants do not die.

Table 2. The growth and biomass of the *Ocimum basilicum* L. plant in the pot in different biochar ratios treatment (from July, 1st 2018 to Aug, 8th 2018)

Treatment	Height (cm)	Circumference of stem (cm)	Diameter of crown (cm)	Weight (kg/chậu)
B0	24.33e	0.70b	18.77	0.20c
B5	26.35d	0.88a	21.10	0.31b
B10	29.93c	0.89a	21.10	0.33ab
B15	33.23b	0.89a	21.10	0.33ab
B20	34.83a	0.89a	21.11	0.35a
B25	34.72a	0.89a	21.11	0.35a
B30	32.84b	0.68b	21.10	0.32b
F	**	**	ns	*
CV(%)	17.5	1.0	20.7	25.4

Note: *In the same column, the number followed by letters is statistically different at the level of 1% (**), 5% (*) and non statistically different (ns).*

Result of the experiment and to comparison of all components of yield, quality and investment costs, B20 (20% biochar) was evaluated as optimal and selected for studying in the experiment 2.

2.2. Effect of biochar to growth and biomass of *Ocimum basilicum* that are growed in the bed

There are 60 seedlings are grow per 1 m^2. After 40 days of monitoring and observing and getting data, the results are presented in table 3.

The treatment that adding 20% biochar has recored the highest in all of the measuring indicators, higher and differential statistical significance at the 15 and 5% between to others. Especially, the biomass is higher the control 80 % (3.08 kg/m^2 compare to 1.71 kg/m^2) and higher the LF (local farmer) 120 % (3.08 kg/m^2 compare to 1.40 kg/m^2).

Table 3. The growth and weight of of the Ocimum basilicum plant in the bed (From Aug, 1st 2018 to Sept, 30st 2018)

Treatment	Height (cm)	Circumference of stem (cm)	Diameter of crown (cm)	Weight (kg/m^2)
NB	26.52b	0.70b	22.21b	1.71b
LF	24.91b	0.66b	17.25c	1.40c
B	**35.53a**	**0.91a**	**24.14a**	**3.08a**
F	**	*	*	*
CV(%)	13.5	1.2	17.7	24.4

2.3. Results of soil analysis before and after adding biochar

According to the analysis results of soil samples from the Department of Soil Science - Institute of Agricultural Science for Southern Viet Nam (Table 4).

Compounds and elements	Nos.	Content	
		Before adding biochar	*After adding biochar*
EC	µS/cm	264	164
pH		4.20	6.51
Organic Carbon	%	3.69	12.5
N_total	%	0.177	0.183
P_2O_5_total	mg/kg	107	615
K_2O_total	mg/kg	830	2747
P_ available	mg/kg	17.6	334
Al_ available	$Cmol^+/kg$	0.46	2.19
Fe_ available	$Cmol^+/kg$	0.024	0.071
Hg	mg/kg	0.03	0.03
Pb	mg/kg	13.4	13.4

Source: Sen Viet Garden, 2018

The results in table 4 show that after adding biochar to the acid soil in the adapted ratio, the quality of soil are improved very clearly in the first crop, the pH form 4,2 to 6,5 after 4 month applying, organic carbon increase from 3.69% to 12.5%, EC from 246 decrease to 164 µS/cm and other elements are change to the useful for plants and cultivated soil environment.

3. Conclusions

(1) The treatment of biochar with organic farming solution has been remarkably effective for *Ocimum basilicum*, resulting has an increase of biomass to 80-120% compare to the control. Especially, it also increases the quality of *Ocimum basilicum* (healthy plant, no yellow leaves, no disease,…). The results also show that the level of biochar that applied in this experiment are difference statistically significant. Only 2 treatments (B20 and B25) are not clear differences, therefore, after considering all the factors as cost of materials and labors, the local compost formulation of in combination with 20% of biochar is recommended for better growth and yield of *Ocimum basilicum*.

(2) Effectively improve soil physical and chemical properties through soil analysis results before and after applying biochar. This indicates the positive role of biochar and compost fertilizer for the solution of improving acid sulfate soil in Sen Viet. This result contributes an important part to the development of Sen Viet's organic agriculture, while opening a positive direction for sustainable agricultural development in Vietnam.

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Simple Design Framework for Wearable Applications with IoT and Edge Computing Technologies

Kazunari Ishida*

Abstract

A simple design framework for wearable applications is proposed with IoT and edge computing technologies. To implement wearable applications without tremendous effort, a simple framework for inter-device communication is defined in terms of wireless access control, service provision, and information flow. Sports training is selected as an example of wearable application to describe how to apply the framework to design a wearable application. Especially, action sports are attracting a younger audience. Skateboarding is one of the popular action sports. Inertial sensors can provide us necessary and sufficient information to evaluate basic skateboarding skill in terms of average, standard deviation, and auto-correlation, and cross-correlation of time series data on body and skateboard. A design example of wearable application with the framework is proposed to measure motions and to estimate skill level. Users can check their skill on the wrist device and can share training record through their smartphone on crowd data sharing to form training community.

Keywords: IoT, Edge computing, Wireless access control, Service provision, Information flow, Wearable application, Sports training, Skateboarding.

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使用物聯網和邊緣計算技術於可穿戴應用的簡單設計框架

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摘要

通過物聯網和邊緣計算技術，本文提出了一種簡單的可穿戴應用設計框架。本文選擇運動訓練作為可穿戴應用的示例，描述了如何應用框架來設計可穿戴應用。近日極限運動吸引了許多的年輕觀眾，而滑板運動是最受歡迎的運動項目之一，因此本文示範藉由慣性傳感器，可以對運動使用者提供必要和充分的信息，以評估基本滑板技能的平均值，標準偏差和自相關性，以及身體和滑板上時間序列數據的互相關性。最後本文提出了一個帶有框架的可穿戴應用的設計實例，來完成測量運動和估計技能水平。用戶可以在手腕設備上查看自己的技能，並可以通過智能手機在數據雲分享培訓記錄，充實培訓社區的數據資料與人際的連結。

關鍵詞：物聯網、邊緣計算、無線接入控制、服務提供、信息流、可穿戴應用、運動訓練、滑板。

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1. Introduction

A simple design framework for wearable applications is proposed with IoT and edge computing technologies. These technologies are attracting huge attentions and then their applications tend to be complex and huge at planet-scale, such as connected car, smart energy, smart city, and so on. There are varieties of frameworks to build the huge scale applications, while they are too complex to build wearable applications. To implement wearable applications without tremendous effort, a simple framework for inter-device communication is defined in terms of wireless access control, service provision, and information flow.

2. Framework and Technologies

A simple framework for inter-device communication for wearable applications will be defined in 2.1. To implement them with the framework, communication and measurement technologies will be surveyed in 2.2 and 2.3, respectively.

2.1 Proposed Framework

The proposed frame work is composed of three factors. The first factor is wireless access control, i.e. access point device or station device. The second factor is service provision, i.e. client device or server device. The third factor is information flow, i.e. source device or destination device. When we clarify these three factors of wearable devices, we can design and implement a wearable application easily.

Table 1 Proposed Framework

Factor / Choice	Wireless Access Control	Service Provision	Information Flow
1	Access Point	Server	Destination
2	Station	Client	Source

To implement wireless access control, we have to have an access point device for the other station devices. When we put multiple wearable devices on our body, we need a control device, e.g. smart watch, to operate wearable application. The control device is appropriate to have the access point function due to the integrated control purpose, while the other wearable devices can be station devices to connect the control device.

To coordinate communication among devices, we have to assign server or client role on all devices. Based on HTTP protocol, we can send and receive data between client and server bi-directionally, hence we can assign the roles on any devices. A client can start sending request to server anytime to receive necessary data. A server has to wait client device connections and consumes computation resources to accept client requests. We have to decide assignment of

server roles on wearable devices based on load balance among devices.

Information flow is naturally defined by function of each wearable device. A wearable device which contains sensors can be source device. In addition, a device can be source and destination device simultaneously, when it has a sensor and needs data transferred from the other devices to process the combined data. We also have to decide assignment of calculation task on wearable devices based on load balance.

2.2 Communication Technologies

There are various wireless communication technologies, i.e. WiMax (IEEE 802.16), WiFi (IEEE 802.11), Bluetooth (IEEE 802.15.1), and ZigBee (IEEE 802.15.4) [1]. WiMax is one of the choices for broadband cellular networking, hence we can use it to store wearable sensors data on a cloud service through the Internet. WiFi is one of the popular wireless technologies to connect multiple devices in a LAN. Bluetooth is also one of the familiar technologies for point to point communication between a pair of peer devices. ZigBee is effective technology to gather data from numerous sensing devices at low energy consumption. To design wearable application, WiFi is suitable choice because it accepts multiple device at an access point with simple authentication and provides reasonable data transfer speed. Bluetooth is not good choice, because it requires authentications between all pairs of device. ZigBee is also not good choice due to relatively slow data transfer speed. There are several WiFi enabled IoT and edge computing devices, i.e. Realtek RTL8710, MediaTek LinkIt 7697, Espresif ESP32, and so on.

2.3 Measurement Technologies

Micro electro mechanical systems (MEMS) technologies make inertial sensors smaller [2]. Due to the small footprint and light weight of MEMS, it is easy to put inertial sensors on parts of a human body to record all the motion data for wearable applications. A smartphone is an available device that contains various types of sensors. However, in order to get synchronized data sets from multiple devices, we needed precise time stamps on the data collected from each device. In addition, due to the aggressive motions of specific wearable application, e.g. sports training, the wearable device had to be impact resistant. Due to these very specific needs, we need to develop our own wearable devices.

3. Design Case

Sports training is selected as an example of wearable application to describe how to apply the framework to design a small size application. Especially, action sports are attracting a younger audience. Skateboarding is one of the popular action sports. Based on statistical analysis of basic skateboarding tricks [3], a wearable application is designed in terms of the

proposed simple framework.

3.1 Motion Sensing and Statistical Analysis

A skateboard does not have any direct mechanism to move forward. Hence a skateboarder has to do Tic-Tac, which is a basic trick to move forward on a skateboard. To apply statistical method to analyze time series data of skateboarding, averages and standard deviations were derived from time series data with an inertial sensor [3]. The sensor is composed of three axis accelerometer and three axis gyroscope. Two sensors are attached on waist and skateboard, respectively. These sensors measure upper and lower body motions. The sensor generates three dimensional acceleration data and three dimensional gyroscope data. The average and standard deviation are calculated to summarize time series data. Hence, there are 24 variables derived from the two independent sensors on upper and lower body. According to the results [3], three important factors were identified, i.e. swing motion of skateboard, periodicity of swing motion, and counter motion between upper and lower body. Figure 1 summarizes important factors of tic-tac motion.

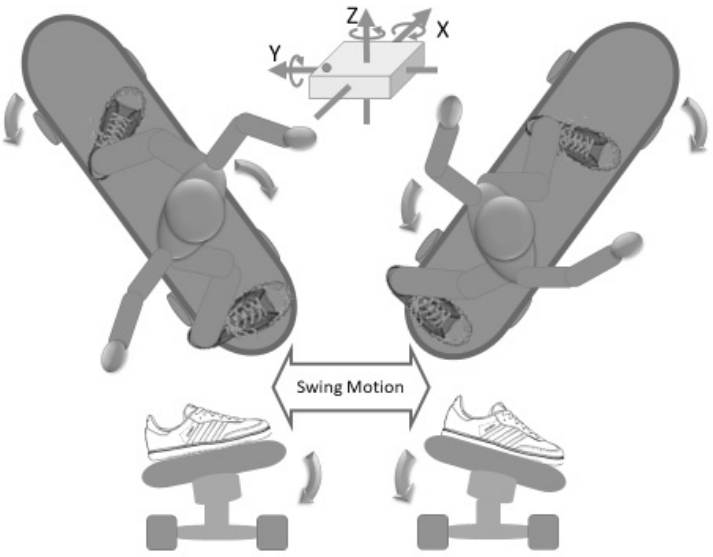

Fig. 1. Swing and Lean Motions for Tic-Tac

Effect of each independent variable on the running speed were also analyzed with simple linear regression analysis. According to the result, the lower body or skateboard motion has direct effect to get fast speed, while the upper body motion has only indirect effect, which balances and unbalances entire body to control skateboard. In addition, auto-correlations of upper and lower body was employed to understand relation between periodicity and running speed. The finding with regression analysis and discriminant analysis was that periodicity of

lower body or skateboard is more significant on speed compared to periodicity of body in terms of correlation between actual and predicted running speed. On the other hand, cross-correlations between upper and lower body in terms of accelerometer and gyroscope is calculated to discuss motion timing. The regression and discriminant analysis indicated that negative cross-correlation value on accelerometer is the most significant for fast running speed. In other words, counter motion between upper and lower body is effective to generate fast running speed. To sum up, inertial sensors, which are attached on body and skateboard, can provide us necessary and sufficient information to evaluate basic skateboarding skill in terms of average, standard deviation, and auto-correlation, and cross-correlation of time series data on body and skateboard.

3.2 Functions Assignment and Inter-Communication among Wearable Devices

To measure motions and to estimate skill level, a design example of wearable application with the framework is illustrated in figure 2. In the figure, there are three devices on wrist, waist, and skateboard, respectively. The device on wrist is a controller of the wearable application. It collects information, such as summarized motion data and evaluation results which are calculated by the edge devices on waist and skateboard. The devices on waist and skateboard process sensor data to evaluate skateboarding skill. Users can check their skill on the wrist device and can share training record through their smartphone on crowd data sharing to form training community.

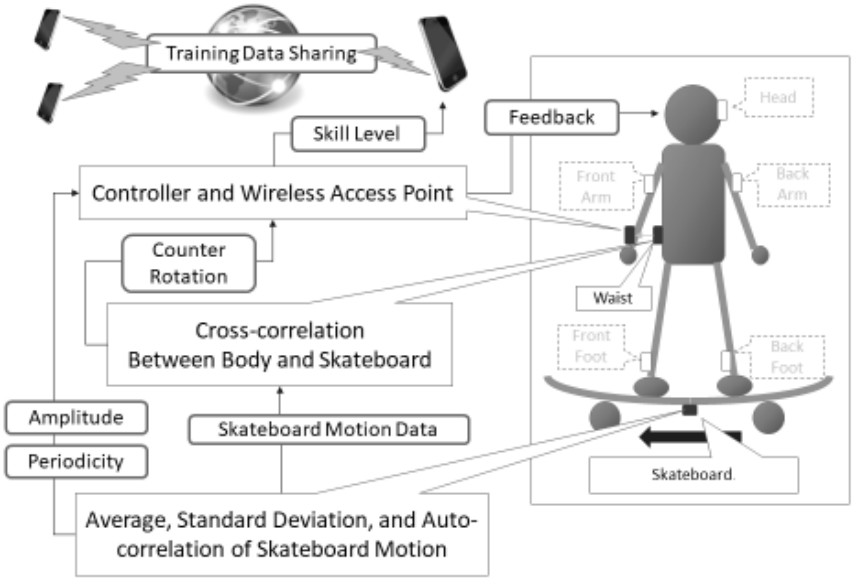

Fig. 2. Wearable Application

Based on the proposed framework on table 1, the wrist device can be the access point, server, and destination device for the waist and board devices. To estimate skateboarding skill, amplitude and periodicity of swing motion of skateboard should be calculated on edge devices on waist and skateboard to reduce data transfer. The device on skateboard has to calculate average, standard deviation, and auto-correlation to evaluate amplitude and periodic swing motion of skateboard. The wearable system, which is composed of three devices on wrist, waist, and skateboard, also has to calculate cross-correlation to evaluate counter swing motions between upper and lower parts of body. To balance computation load among devices and to avoid increasing amount of data transfer, cross-correlation computation should be assigned on the waist device, because it has motion data of upper body and does not have any independent computation task. The last design choice is the assignment of client and server roles on the waist and board devices. HTTP is stateless protocol which is composed of a request from a client and a response from a server. Hence, the client can detect data transfer problem with the response code which has been sent by the server. The device on skateboard must keep the sensor data until completion of successful data transfer to the waist device to calculate cross-correlation properly. Hence the device on skateboard should be the client device to avoid sensor data lost. All assignment of functions on three devices are summarized on table 2.

Table 2 Wearable Devices and Assignment

	Wrist	**Waist**	**Skateboard**
Wireless access control	Access point device	Station device	Station device
Service provision	Server device for waist and skateboard	Server device for skateboard Client device for wrist	Client device for waist Client device for wrist
Information flow	Destination device for waist and skateboard	Destination device for skateboard Source device for waist	Source device for waist and wrist

4. Conclusions

A simple design framework for wearable applications was defined in terms of wireless access control, service provision, and information flow. Sports training was selected as an example of wearable application to describe how to apply the framework to design a wearable application. Based on a statistical analysis of sports training, a design example of wearable application with the framework was proposed to measure motions and to estimate skill level.

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Effect of Gasoline Contamination on the Bearing Capacity of SM Soil

Chusak Kererat*, Thaweesak Rungsakthaweekul

Abstract

This study examines the effect of oil contamination on the bearing capacity of silty sandy soil. The silty sandy soil (SM) in this study was obtained from Prachuap Khiri Khan Province, Thailand and the oil product was 95 octane gasoline. The SM soils were prepared in a tank model under the conditions of dry soil, gasoline-contaminated soil of 2%, and gasoline-contaminated soil of 4%. A laboratory experiment (direct shear test) and a field experiment (lightweight penetration test) were performed on SM soil for all conditions. The lightweight penetration test results reveal that the ultimate bearing capacity for the gasoline-contaminated SM soils of 2% and 4% decrease by 30% and 52%, respectively, on average compared to the dry soil condition. Furthermore, the internal friction angle obtained from the direct shear test linearly decreases with the gasoline content. The cohesion of the gasoline-contaminated SM soils increases with increasing gasoline content as according to the second-order polynomial regression. These results reveal that the gasoline contamination causes the loss of shear strength and reduces the ultimate bearing capacity of SM soil.

Keywords: Gasoline Contamination, Bearing Capacity, Silty Sandy Soil, Shear Strength.

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汽油污染對粉質砂質土壤承載力的影響

Chusak Kererat*, Thaweesak Rungsakthaweekul

摘要

本文研究油污染對粉質砂質土壤承載力的影響。研究中的粉質砂質土壤（SM）來自泰國的 Prachuap Khiri Khan 省，油品為 95 辛烷值汽油。以乾燥土壤為基底在罐模型中製備 SM 土壤，針對汽油污染土壤 2%和汽油污染土壤 4%的條件進行分析，同時進行相同條件下對 SM 土壤進行實驗室實驗（直接剪切試驗）和田間試驗（輕質滲透試驗）。輕質滲透試驗結果表明，與乾燥土壤條件相比，針對 2%和 4%汽油污染的 SM 土壤，其對應的極限承載力的平均值分別下降了 30%和 52%。此外，由直接剪切試驗本文發現內摩擦角隨汽油含量而線性降低的趨勢。而根據二階多項式回歸，汽油污染的 SM 土壤的內聚力隨著汽油含量的增加而增加。這些結果表明，汽油污染導致剪切強度的損失，降低了 SM 土壤的極限承載力。

關鍵詞：汽油污染、承載力、粉質砂土、抗剪強度。

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1. Introduction

Presently, the contamination of soil and water is increasing with the development of industry in Thailand. In particular, oil leakages contaminate the soil and can infiltrate into the subsoil and groundwater. Example causes of oil contamination are oil leakage from sea-boats, underground oil storage tanks, processing plants, etc. Consequently, the oil can migrate with the groundwater or move downward into the subsoil, particularly the sandy soil, which has more porosity. The accumulated contaminants in the subsoil affect changes in the following soil properties: permeability, compressibility, strength parameters, compaction parameters and Atterberg limits, as the oil contamination increases (Al-Sanad et al., 1995; Al-Sanad and Ismael, 1997; Khamehchiyan et al, 2007; Ijimdiya, 2007, 2010, 2011; Kermani and Ebadi, 2012; Ijimdiya and Igboro, 2012; Khosravi et al., 2013; Eissa et al., 2017). Evgin and Das (1992) studied the friction angle of clean and oil-contaminated quartz sand by conducting triaxial tests. As results, the full saturation with motor oil was a significant factor to reduce the friction angle of both loose and dense grains of sand and drastically increase the volumetric strain. Sztompka (1999) reported that petroleum products that penetrated into the soil layer affected the soil degradation. Shin and Das (2001) investigated the bearing capacity of unsaturated oil-contaminated sand. They tested samples with oil contents of 0-6%. The test results revealed that the oil contamination drastically reduced the bearing capacity of sand. Ochepo and Joseph (2014) evaluated the effect of spent oil contamination on the strength of lime stabilized laterite soil to make a pavement structure. The uncontaminated soil and contaminated soil were tested for UCS and CBR. The results showed that the oil contamination reduced the strength and bearing capacity.

Most of the previous studies were performed only in the laboratory, but this study has been examined in both a field test and laboratory test. The purpose of this study is to investigate the effect of oil-contamination and water saturation on the ultimate bearing capacity and shear strength parameters compared to those of the dry soil condition for silty sandy soil. Two test categories used in this study were divided into 2 experiments: a lightweight penetration test in the tank model and shear strength test in the laboratory. The correlation between the oil content and the shear strength parameters and the correlation between the shear strength parameters in the dry and contaminated soil conditions are constructed.

2. Materials and Methods

2.1 Experimental Materials

The soil in this study is sandy soil, which represents soil in the coastal area of Thailand

collected from Prachuap Khiri Khan Province. The gradation of sandy soil was examined by a dry-sieve analysis (ASTM D422); the results showed that the percent finer from a #200 sieve was 14.667, and the grain size distribution curve of this soil is shown in Fig. 1. The basic properties of liquid limit (LL), plastic limit (PL), plasticity index (PI) and specific gravity were 16.4%, 15.3%, 1.1% and 2.73, respectively. According to the sieve analysis (% passing a #200 sieve) and Atterberg limits (LL and PI), the soil type classified by the Unified Soil Classification System (ASTM D2487) was silty sandy soil (SM), which is sand with silty fines.

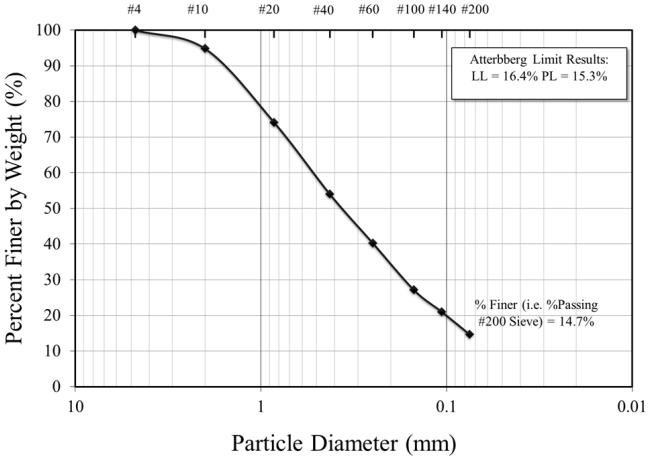

Fig. 1. The grain size distribution curve of SM soil

The contaminant in this work is 95 octane gasoline, which was collected from the gas station in HuaHin District, Prachuap Khiri Khan, Thailand. The basic properties are shown in Table 1.

Table 1 The basic properties of a 95 octane gasoline

Property	Appearance & Value
Color	Yellow, translucent, bright color
Odor	Hydrocarbon smell
Initial boiling point and boiling range (°C)	25 – 210
Relative density at 15 °C (kg/m3)	720 – 775
Vapor pressure at 37.8 °C (kPa)	45 – 90
Viscosity at 40 °C (cSt)	0.50 – 0.75
Flash point (°C)	< -40
Auto Ignition Temperature (°C)	> 250

2.2 Lightweight Penetration Test

2.2.1 Apparatus

The lightweight penetration test, i.e., Kunzelstab penetration test, is a sounding test based on a German standard (DIN 4094). The equipment is called a Kunzelstab penetrometer, as

shown in Fig. 2, which consists of (1) a guild rod, (2) a sounding rod, (3) a hammer, (4) an anvil, (5) a base plate, (6) a penetration controller, and (7) a cone penetration head with angles of 90 º.

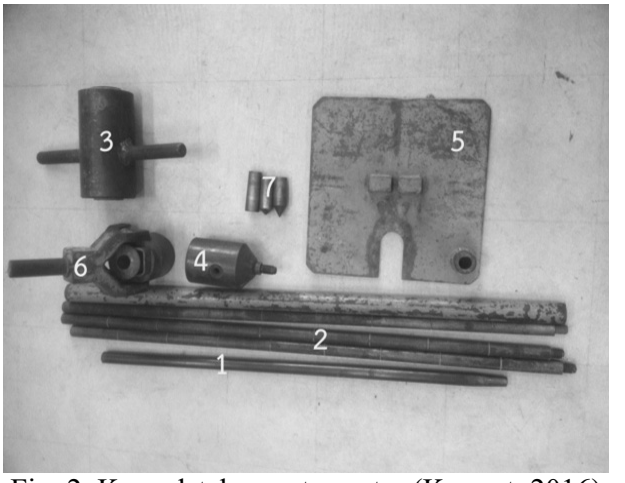

Fig. 2. Kunzelstab penetrometer (Kererat, 2016)

2.2.2 Soil Preparation in the Tank Model

The soil preparation procedures can be described as follows:

1. Spread out the soil sample to dry in the sun until the water content is close to zero.
2. Pluviate dry soil lift by lift, which is 5 cm high in the tank model, as sand rain. The overall inner dimensions of the tank model were 1 m x 1 m x 1.8 m. The dry density in each lift was verified to ensure a uniform density, which was the maximum dry density of 2 t/m3 throughout the tank model. The soil preparation was divided into 3 conditions. The first condition was dry soil (Fig. 3a). The second condition was contaminated soil, where dry soil was mixed with 95 octane gasoline with the amount of 2% by weight of the dry soil (Fig. 3b). After the soil layer reached 0.5 m in height, water was gradually added from the bottom until it reached the soil surface. Then, the oil-contaminated soil was continuously placed lift by lift until the thickness of the contaminated soil layer was 0.6 m. Consequently, the dry soil was continuously pluviated until it reached 0.5 m thick. The last condition was oil-contaminated soil, where dry soil was mixed with 95 octane gasoline with an amount of 4% by weight of the dry soil (Fig. 3c). The soil preparation was identical to that in the second case.

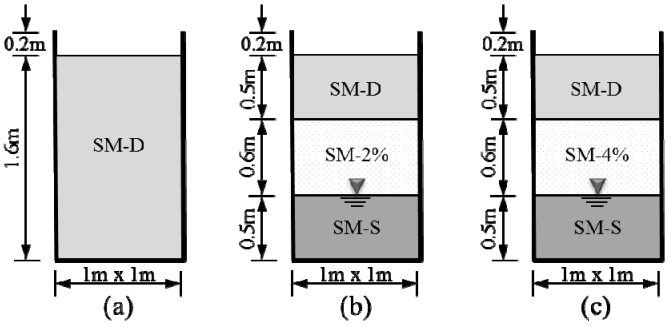

Fig. 3. Soil Preparation in the Tank Model: (a) the dry soil (b) the contaminated soil with 2% gasoline (c) contaminated soil with 4% gasoline

3. Define the abbreviation for the soil samples as follows: SM-D: dry soil condition; SM-2%: oil-contaminated soil with 2% 95 octane gasoline; SM-4%: oil-contaminated soil with 4% 95 octane gasoline.

2.2.3 Test Procedure

The lightweight penetration test was performed step by step as follows:

1. After the soil preparation is completed, place the base plate on the surface of the soil at the center of the tank model. Assemble the equipment as shown in Fig. 4a, which consists of the penetration controller, cone penetration head with a sounding rod, anvil, hammer and guide rod.

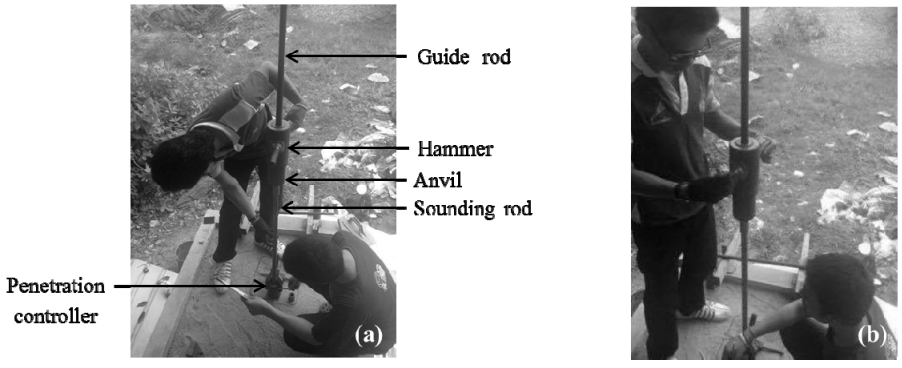

Fig. 4. The lightweight penetration test (a) Assemble the equipment (b) Perform testing

2. Take the apparatus on the vertical. Perform testing by lifting the 10-kg hammer by approximately 0.50 m in height and letting it fall on the anvil; count one blow, as shown in Fig. 4b. Record the number of blows (N) for each 0.20 m of the penetration. Continuously operate until the total depth of penetration is 1.4 m and then stop testing. Remove all equipment from the testing point.
3. Conduct the field density test using the water replacement method to examine the total density every 0.10 m throughout the depth and collect a soil sample to determine the water

content.

4. Compute the ultimate bearing capacity (Q_u) with factor of safety of 2.5 using Eq. (1), which was purposed by the DIN 4049 standard as follows:

$$Q_u = 1.6\ (N' - 3.57) \quad (1)$$

$$N' = 15 - 0.5\ (N - 15)$$

where Q_u = ultimate bearing capacity (t/m^2),

N = number of blows obtained by testing,

N′ = corrected number of blows.

5. Compare the number of blows and ultimate bearing capacity at the same level for all cases to investigate the effect of oil contamination for SM soil.

2.3 Direct Shear Test

This test determines the shear strength parameters (cohesion and internal friction angle), which are important parameters to control the bearing capacity of the soil.

2.3.1 Soil Preparation in Shear Box

After obtaining data on the dry density and water content, we prepared the soil samples to represent the soil at depths of 0.2 m, 0.6 m, 1.0 m and 1.4 m for all cases. All samples were artificially prepared in the identical condition to that in the field considering the condition of dry soil to preserve mixing with oil or water and blended according to the water content and oil content. We filled the 10 x 10 x 2 cm shear box with soil samples in five layers. The temper was used to compact the soil layer according to the desired density. We leveled the surface of the soil specimen. Then, we placed the shear box assembly in the direct shear machine.

2.3.2 Normal Load Preparation

For each test, three samples were prepared. Therefore, three normal loads for each test were required according to the effective overburden stress (σ'_{vo}) in the tank model at the depths of 0.2 m, 0.6 m, 1.0 m and 1.4 m. Three stress levels ($0.5\sigma'_{vo}$, σ'_{vo} and $2\sigma'_{vo}$) were calculated and transferred to be normal loads for each sample.

2.3.3 Test Procedure

After completing the soil preparation in the shear box and normal load preparation, we applied the desired normal load to the specimen. The test was performed by fixing an applied rate of strain at 0.5 mm/minute for all samples. Each test was repeated until three samples were completed with three normal loads, and all samples had identical densities. We plotted the correlation between the shear strength parameters and the number of blows and made comparisons to other soil conditions.

3. Results and Discussions

3.1 Density and Water Content of Soil

According to the field density test and water content determination, we can plot the dry density, wet density, and water content versus the depth of the SM soil layer in the tank model, as shown in Fig. 5. The dry density of soils for all cases was approximately 2 ton/m3, which was the desired dry density. The wet density of soils increased with increasing water content, which indicates the decreasing tendency in bearing capacity. The dry density, wet density, and water content were used for the soil preparation in the direct shear test.

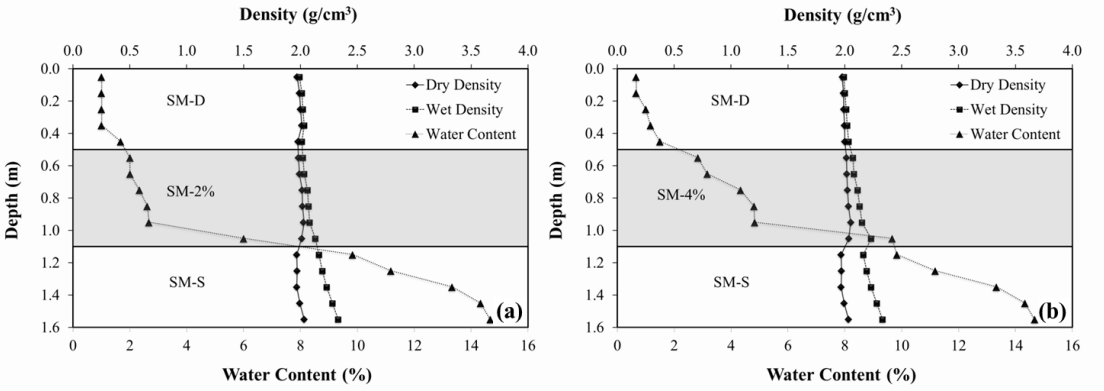

Fig. 5. The comparison of the dry density, wet density, and water content versus the depth of the SM soil layer in the tank model: (a) the contaminated soil with 2% gasoline (b) contaminated soil with 4% gasoline.

3.2 Effect of Oil Contamination on the Ultimate Bearing Capacity of Silty Sandy Soil

Fig. 6 plots the blows (Fig. 6a) and ultimate bearing capacity (Fig. 6b) versus the depth for the cases of oil-contaminated soil and dry soil. The oil contamination affected the decrease of the blows. For contaminated soil with 2% gasoline, the average decrease in ultimate bearing capacity obtained from the penetration test was approximately 30% compared to the dry soil condition. For oil-contaminated soil with 4% gasoline, the average decrease in ultimate bearing capacity obtained from the penetration test was approximately 52% compared to the dry soil condition. Since gasoline can be the lubricating substance, which affects the shear strength, the friction decreases and makes the ultimate bearing capacity decrease.

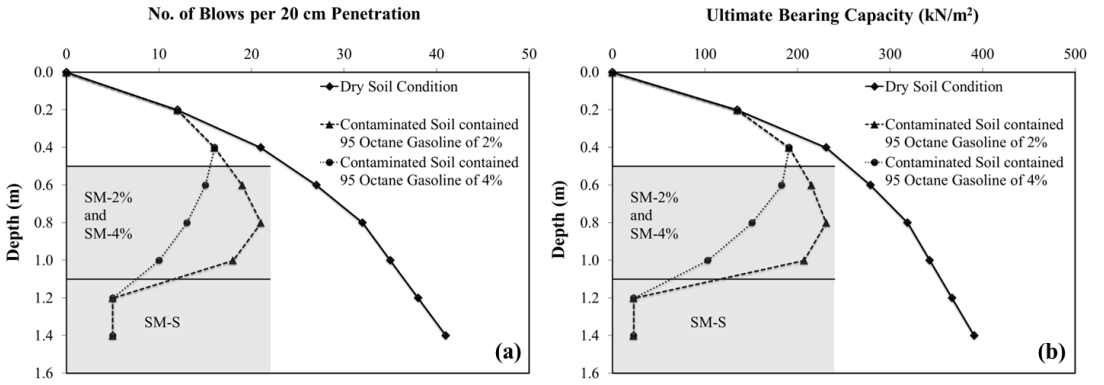

Fig. 6. The comparison of (a) the blows and (b) the ultimate bearing capacity versus the depth for the cases of oil-contaminated soil and dry soil

3.3 Test Results from the Direct Shear Test

The test results of the samples with identical properties in the tank model for all cases at the depths of 0.2, 0.6, 1.0 and 1.4 m are shown in Tables 2-4. For the dry soil, the internal friction angle increases with the depth because of the increasing overburden stress of the soil. In both cases of contamination, the internal friction angle increases at the depth of 0.2-0.6 m and gradually decreases until reach the water level at the depth of 1.1 m. The internal friction angle decreases more when the percentage of gasoline content increases. According to the results, the increase and decrease in internal friction angle correspond to the results of the lightweight penetration test. The cohesion of soil samples for all cases is notably small because silty sandy soil is classified as non-cohesive soil. According to Terzaghi and Meyerhof's theory of bearing capacity analysis, the shear strength parameters are related to the bearing capacity determination. Hence, in addition to the decrease in bearing capacity caused by water, the increase in oil contamination results in a further decrease, which is consistent with the previous studies of Evgin and Das (1992), Shin et al. (1999), and Shin and Das (2001).

Table 2 Test results from the direct shear test for the case of the dry soil

Depth (m)	Wet Density (ton/m^3)	Dry Density (ton/m^3)	Cohesion (kg/cm^2)	Internal Friction Angle (degree)
0.2	1.99	1.98	0.1380	38.44
0.6	1.99	1.98	0.1718	43.38
1.0	2.00	1.99	0.1685	47.19
1.4	2.01	2.00	0.1773	47.65

Table 3 Test results from direct shear test for the case of the contaminated soil with 2% gasoline

Depth (m)	Wet Density (ton/m^3)	Dry Density (ton/m^3)	Cohesion (kg/cm^2)	Internal Friction Angle (degree)
0.2	1.99	1.98	0.1380	38.44

0.6	2.06	2.01	0.1731	42.36
1.0	2.28	2.22	0.1720	40.04
1.4	2.23	1.96	0.1740	11.37

Table 4 Test results from direct shear test for the case of the contaminated soil with 4% gasoline

Depth (m)	Wet Density (ton/m^3)	Dry Density (ton/m^3)	Cohesion, c (kg/cm^2)	Internal Friction Angle (degree)
0.2	1.98	1.97	0.1380	38.44
0.6	2.05	1.98	0.1737	38.65
1.0	2.10	2.06	0.1743	36.64
1.4	2.23	1.96	0.1740	11.37

3.4 Correlation of the Shear Strength Parameters with the Oil Content

According to the correlation between the internal friction angle and the oil content as shown in Fig. 7, when the percentage of gasoline increases, the internal friction angle of SM soil decreases, and the correlation can be expressed as a linear equation. This reduction occurs because oil acts as a lubricant and enables the soil particles to slip and slide against one another. Therefore, the oil contamination is more effective in decreasing the friction between the soil particles, which reduces the interlocking among the soil grains. As a result, the internal friction angle of the soil samples decreases with the oil content, which is consistent with the former studies by Puri (2000), Khamehchiyan et al. (2007), and Shaheen (2007).

The correlation between the cohesion and the oil content in Figure 10 shows that an apparent cohesion appeared and gradually increased when oil was added to the soil. The correlation can be shown as a second-order polynomial regression with a coefficient of determination of 1. According to the trend line, if we attempt to predict the cohesion, we find that when the oil content is greater than 8%, the cohesion of SM soil will decrease, which is consistent with the previous study by Shaheen (2007). The apparent cohesion of SM soil results from the capillary tension in the voids. Having more oil in the soil makes the capillary tension decrease, so the apparent cohesion of the soil decreases.

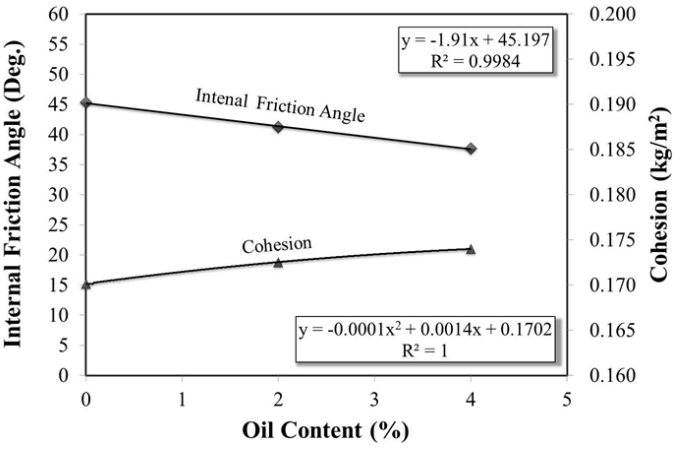

Fig. 7. The correlation between the different oil contents and shear strength parameters

4. Conclusions

The following conclusions can be asserted from the results and discussion:

1. The decrease in the ultimate bearing capacity as a result of the lightweight penetration test is approximately 30% and 52% compared to the dry soil condition with 2% and 4% gasoline contents, respectively. The lubrication of gasoline reduces the friction among the soil particles, which makes the ultimate bearing capacity decrease.
2. For both cases of contamination, the internal friction angle linearly decreases. Therefore, the internal friction angle will decrease with the increase in the percentage of gasoline content.
3. The apparent cohesion gradually increases with more oil content in the soil. The correlation between the cohesion and the oil content can be illustrated as the second-order polynomial regression. As the extra prediction, the cohesion of the SM soil will be reduced when the oil content is greater than 8%. The correlation between the average cohesion and the depth was similar in the cases of dry-silty sandy soil.
4. In areas with high risks of oil contamination, the calculation of the bearing capacity for silty sandy soil should consider the effects of the contamination. The safety factor of a shallow foundation may have to increase.

Acknowledgments

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The Impact of Supplementary Educate Institute's Corporate Social Responsibility on Employees Engagement — the Job Satisfaction as Mediating Variable

Chien-Wen Wang, Bi-Han Dong*, Tie-Qi Xing

Abstract

After the reforming and opening up of mainland China, the basic educate has made great progress. The purpose of this study is to understand the differences among corporate social responsibility, job satisfaction and employee engagement with different backgrounds in Longhai District of Zhangzhou City. With the job satisfaction as a mediating variable, we discussed the corporate society of the supplementary education industry effect on personnel work engagement in-depth. The study carried out a sampling questionnaire survey of the legal supplementary educational services, taking the Art, Science and English classes in Longhai District of Zhangzhou City as research objects, a total of 400 questionnaires were sent out and 373 effective questionnaires were actually recovered. The effective recovery rate is 93.25%. Through the statistical analysis, the following conclusions are summarized.

1. There is a significant positive correlation among corporate social responsibility, job satisfaction and employee engagement in Longhai District of Zhangzhou City. 2. The corporate social responsibility, job satisfaction and employee engagement in Longhai District of Zhangzhou City are predicted, with the highest predictive power of "dedication" of 58.2%. 3. The "intrinsic satisfaction" of the job satisfaction has the most mediating effect on the relationship between the corporate social responsibility and employee engagement in Longhai District of Zhangzhou, the median strength reached 70.41%.

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Keywords: Supplementary Education Personnel, Corporate Social Responsibility, Job Satisfaction, Employee Engagement.

輔助教育機構的企業社會責任對員工敬業度的影響——以工作滿意度作為調解變量

Chien-Wen Wang, Bi-Han Dong*, Tie-Qi Xing

摘要

中國大陸改革開放後，基礎教育取得了長足的進步。本研究的目的是了解漳州市龍海區企業社會責任，工作滿意度和不同背景的員工敬業度之間的差異。以工作滿意度為中介變量，深入探討了企業社會對輔助教育機構對人事工作的影響。本研究以法律輔助教育服務抽樣問卷調查為研究對象，以漳州市隴海區的藝術，科學，英語課為研究對象，共發放問卷 400 份，回收有效問卷 373 份。有效回收率為 93.25%。通過統計分析，本文總結出以下的結果：1. 漳州市龍海區企業社會責任，工作滿意度與員工敬業度呈顯著正相關。2. 成功預測漳州市龍海區企業社會責任，工作滿意度和員工敬業度，其中對於“奉獻力”的預測能力最高，達到 58.2%。3. 工作滿意度中的“內在滿意度”對漳州市龍海區企業社會責任與員工敬業度的關係影響最大，中位數達到 70.41%。

關鍵詞：輔助教育人員、企業社會責任、工作滿意度、員工敬業度。

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1. Introduction

The supplementary education business is a kind of social service industries belong to small and medium-sized enterprises, which is also an important part of social education. In recent years, with the rapid growth of the economic environment in China and the family structure changed, parents have regarded the situation of sending children to after-class as a normal state. In Longhai District of Zhangzhou, it is not decrease due to the small population. And it aims at cultivating the excellent talents, also promoting social progress.

Based on the children's education problems, the need of after-school classes has also increased relatively. The legal after-school classes and tutors have sprung up, especially around the school. However, in the Longhai District of Zhangzhou, the Education Bureau has limited requirements for the quality of the supplementary education industry. There is no practical norm for the teaching or quality management related to the after-school classes. Parents also have basic consideration to choose after-school classes and tutors. The concept development background of corporate social responsibility (CSR) from the humanistic reflection caused by the industrial development in the 20th century. CSR has gradually been a part of corporations and supplementary education business in advanced countries. Their value of the supplementary education business have gradually begun to change. Economic benefit is no longer the only goal, they must pay more attention to the rights of partners, parents, students and suppliers. It is believed that more companies will pay attention to CSR and bring it into their operations. Therefore, many employees complained there is no teachers' majesty and their status were low, so the job satisfaction became lower and lower. Researchers believe that the discussion of job satisfaction is not only necessary, but also one of the meaningful and worthy topic. Sonnentag (2003) thought that employees' innovative behavior and positive work results depend on the employee's work engagement to reach. After all, job satisfaction is work attitude. It is the positive state and pleasant mood produced by individuals evaluate their work or work experience. If business expect employees have better work attitudes or behaviors, they can start with employees work attitude to improve their job satisfaction. In summary, the researchers believe it is necessary to know about corporate social responsibility, job satisfaction and work engagement.

According to the above research background and motivation, this study intends to conduct a survey by questionnaires. The employees in Longhai District of Zhangzhou City are testers. The purposes of this study are as follows:

(1) Know about the current status of corporate social responsibility, job satisfaction and work

engagement in Longhai District of Zhangzhou City.

(2) Analyze the differences among corporate social responsibility, job satisfaction and work engagement in different background variables in the Longhai District of Zhangzhou City.

(3) Analyze the relevant situation of corporate social responsibility, job satisfaction and work engagement in employees in Longhai District of Zhangzhou City.

(4) In terms of corporate social responsibility and job satisfaction, find out the forecast of the employees work engagement in Longhai District of Zhangzhou City.

(5) Discuss the mediation effect of job satisfaction between the employee's corporation social responsibility and work engagement in Longhai District of Zhangzhou City.

2. Literature discussion

2.1 Definition of corporate social responsibility

Wood(1991) studies that the CSR is the social obligation of the organization, the corporations are responsible for their primary and secondary range(the primary range refers to the functional role of the corporation, while the secondary range refers to the influence of the company's activities.) We summarizes many discussion of CSR's definition and believes the CSR is to clarify the role that corporates should play in society. We summarized the scholar's definition of corporate social responsibility in Table 2.2.1.

Table 2.2.1 The definition of corporate social resopnsibility

Scolar(Year)	Definition
Manne& Wallich(1972)	Corporation social responsibility is the voluntary behavior of them.
Carroll(1979 & 1981)	He proposed the corporate social resopnsibility , the implication is to improve productivity and work enviornment. It' s also necessary to lagally and fairly for employee selection etc.
Buchholz(1995)	The obligations of the corporates are composed of its related policies,decisions ,actions and the goals and values of the society.
Davis, Keith. and Robe, L. Blomstrom. (1975).	Corporation social reponsibility of policy makers, the corporcates must consider and take practical actions to protecet and promote social harmony when they pursuing the company' s benefit.
Sonnentag, S. (2003).	Through the contribution of economic development, corporations should improve the quailty of life of employee' s family, and coummunities they live to fulfill corporate social responsibility.

2.2 The definition of job satisfaction

The job satisfaction also known as a sense of fulfillment in work, which is an important research topic in the field of human resources, organizational behavior etc. Robbins&Judge(2007) pointed out the job satisfaction represents an individual's general attitude to his/her work. The study was summarized as follows shown in Table 2.3.1

Scholar(Year)	Definition
Qiuxian,Lin(2011)	The definition of job satisifaction is individuals feel the more they agree with work process,content,and enviornment, the higher job satisfaction they have.
Yaling,Hong(2011)	Job satisfaction is the overall feeling or evaluation of the employee' s work and related factors. This feeling or evaluation is better than expected, it will results in high job satasifaction.
Weiming,Zhao(2013)	Job satisfaction is individual in the work situation, they feel the attitude,content,emotion and the difference between expected value of work and the actual value they gained.

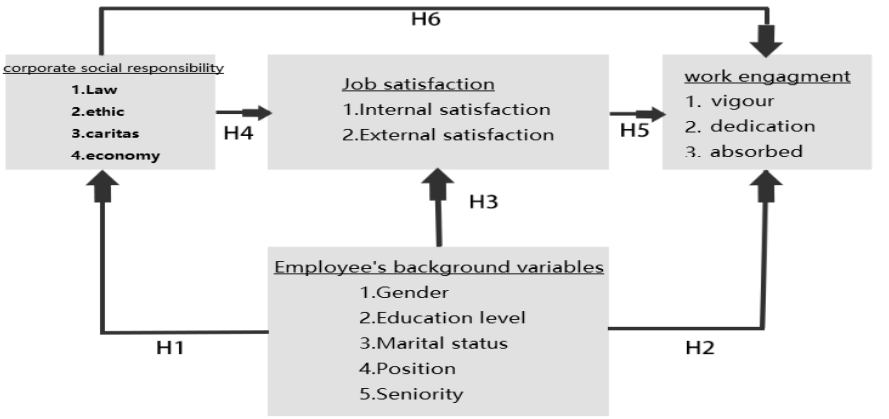
Based on the above scholar's research, the definition of job satisfaction can be summarized into three categories: (1) Overall satisfaction, (2) Expectation discrepancy and (3) Frame of reference.

2.3 The definition of work engagement

Although the definition of workplace engagement, scholars have different ways to explain it, and discussed from different vantage points and theories. As a result, many researchers have stated that the topic of work engagement has attracted many researcher's interest, and it can predicts employee's achievement, organizational success and financial performance. Kahn(1990) defines work engagement as: the members can control themselves to combine themselves with work roles. According to the above, work engagement is related to the work performance. Therefore, it's also proposed that it's contrary to job burnout. The characteristics of work engagement are energy, involvement, efficacy.(Maslach etal,2001)

3. Research methods and the result of data analysis

The research structure mainly includes:(One)Background variables.(Two)The corporation social responsibility (Three)Job satisfaction (Four)Work engagement: shown in the architecture diagram3.1.1.First, we explore the relationship of CSR, job satisfaction and the work engagement as H4 in the architecture diagram, then analyze and discuss the CSR, job satisfaction and the predictive power of work engagement as H5; Finally, analyze whether the job satisfaction has a mediating effect on corporate social responsibility and work engagement as H6 in the architecture diagram.



In this study, we refer to the information of legal classes in Longhai District and use the method of sampling, sample the different types and establishment time of the supplementary education institute as the questionnaire objects. This study conducted a formal survey from Nov.20 to Dec.20, 2018. A total of 400 people were sampled in the study, and 400 questionnaires were sent out, 373 questionnaires were returned, and 27 invalid questionnaires were excluded, the effective recovery rate is 93.25%.

Table 4.1.1 Descriptive analysis of personal background(N=373)

Background variable	sort	People	percent(%)	Omission
Gender	male	147	39.62	2
	female	224	60.38	
Highest education	High vocational/junior education	40	10.84	4
	University/collegd	279	75.61	
	Reaserch laboratory	50	13.55	
Marital status	unmarried	195	52.99	5
	married	172	46.74	
Position	functionary	34	9.47	14
	Class adviser	80	22.28	
	teacher	175	48.75	
	Admini stration	69	19.22	
The length of work time	Less than3 years	71	19.78	14
	3-9 years	166	46.24	
	More than 10 years	122	33.98	

Analyze the three areas of CSR based on empirical evidence, and explain them.

(1) Project analysis - According to the analysis criteria of the empirical project, the results showed the Cronbach's α coefficient of the overall scale is 0.954, and the value of expectation is between 0.612 and 0.775. It can be known that the relevant parts of the project and the total score are above 0.3, and reach a significant level, all have internal consistency criterion. According to the analysis criteria of the work engagement project, the Cronbach's α coefficient of the overall scale is 0.965. The value of expectation is between 752 and 0.894.The relevant parts of project and total score are all above 0.3 and reach a significant level. According to the analysis criteria of job satisfaction project, the

results of job satisfaction project analysis, the Cronbach's α coefficient of the overall scale is 0.964, value of expectation is between 0.672~0.788, it can be known that the relevant parts of the project and the total score are above 0.3, and reach a significant level, all with internal consistency criterion.

(2) Factor analysis - The empirical analysis of the KMO value is 0.959 which was judged to be excellent, and the value of Bartlett test x2 is 4815.905, showing the significant level. And in the area of "law" can explain the variation of 70.650 °%; In the "ethical" aspect can explain the variation of 61.026 °%; In the "fraternity" can explain the variation of 65.982 °%; In the "economic" can explain 71.608% of the variation, its variants fall within the original plan's facet. The work engagement's KMO value is 0.957, which was judged to be excellent, and the Bartlett test x2 value is 3660.247, showing the significant level. There are common factors between the variables in this questionnaire, which are suitable for factor analysis. In terms of "vigor", the variation of 90.040% can be explained; In the case of "dedication", the variation of 85.991% can be explained; in the case of "concentration", the variation of 81.538% can be explained, and the variants fall within the original plan's facets. The job satisfaction's KMO value is 0.967, which was judged to be excellent, and the Bartlett test x2 value is 5508.577, showing a significant level. It is suitable for factor analysis. In terms of "internal satisfaction", the variation of 61.806% can be explained; In the case of "external satisfaction", the variation of 62.279% can be explained, and the total variation can be explained by 52.821%. The variation items are all in the original plan's facets.

(3) Reliability analysis - The reliability coefficient of the scale of the study is based on the internal consistency criterion of the Cronbach's α score scale empirical analysis. The internal consistency coefficient of the overall CSR scale is 0.954; the internal consistency coefficient of the subscale in the "law" aspect is 0.861,in the "ethical" aspect is 0.892, in the "caritas" aspect is 0.870, in the "economic" aspect is 0.867. Work engagement's reliability coefficient of the scale is based on the internal consistency of the Cronbach's α score scale. The internal consistency coefficient of the overall job satisfaction scale is 0.965, in terms of "vigor" the coefficient is 0.944, in the "contribute" is 0.918, in terms of "focus" is 0.886.

We can know from Table 4.2.1, the different gender employees don't have significant differences in the aspects of "legal" and "ethics", but the analysis of "caritas" and "Economy" have significant differences. Therefore, the assume of this study1-1: Different genders in the Longhai District of Zhangzhou City, the employees in the corporate social responsibility's

various aspects have significant differences and received partial support. It can be seen from Table 4.2.1 that the different gender employees "inner satisfaction" and "external satisfaction" of the overall CSR are not significantly different. Therefore, the assumption of this study: 2-1: The different gender employees in Longhai District of Zhangzhou City did not show significant differences in job satisfaction. From the aspect of work engagement, it can be seen from Table 4.2.1, the analysis of the "vigor", "contribute" and work engagement has significantly different. Therefore, the assume of this study: 3-1: The different gender employees in Longhai District of Zhangzhou City have shown significant differences in the various aspects of their work engagement and received partial support. Table 4.2.1 Summary table of differences in CSR, job satisfaction and work engagement from different genders.

Variable aspect	Male(n=143) Average number(M)	Standard deviation(SD)	Female(n=221) Average number(M)	Standard deviation(SD)	t value
Corporate social responsibility	87.57	11.14	85.46	10.98	1.78
legal	87.83	12.75	85.77	12.37	1.54
Ethics	88.82	10.86	88.50	10.37	0.29
Caritas	85.47	13.04	82.01	13.66	2.40 *
Economy	87.73	13.04	84.12	13.82	2.49 *
Job	87.45	11.12	85.30	11.62	1.75
Internal satisfaction	87.67	11.19	85.67	11.65	1.63
External satisfaction	87.05	11.49	84.64	12.33	1.88
Work	87.92	13.00	84.41	14.13	2.39 *
vigor	87.68	14.70	82.51	16.10	3.09
contribute	87.41	13.61	83.80	15.28	2.30 *
focus	88.68	12.58	86.92	13.02	1.27

It can be seen from Table 4.2.2, the "law", "ethics" and "caritas" of CSR in different marital status are not significantly different, but in the "economy" has significant differences. Therefore, assumption of this study: 1-4: The employee's marital status has shown significant differences in the various aspects of corporate social responsibility in Longhai District of Zhangzhou City. It can be seen from Table 4.2.2, there are significant differences in the analysis of the "vigor" and "contribute" with different marital status, but there is no significant difference in the "focus" part. Therefore, assumption of this study: 2-4: The different marital status of employees in Longhai District of Zhangzhou City, have received partial support in the various aspects of the work engagement. It can be seen from Table 4.2.2 that the employees with different marital status have significantly difference in terms of "inner satisfaction" and "external satisfaction". Therefore, the assumption of this study 2-4: the different marital status of the employee has received partial support in various aspect of job satisfaction in Longhai District of Zhangzhou City. Summary table 4.2.2: Differences in Corporate Social Responsibility, Job Satisfaction, and Work engagement in Different Marital Status.

Variable	unmarried(n=193) Average(M)	Standard	Average	married(n=169) Standard deviation (SD)	T Value
CSR	85.17	10.42	87.	11.71	-1.97 *
legal	85.52	12.32	87.	12.74	-1.65
Enthics	87.91	9.67	89.	11.47	-1.31
caritas	82.06	12.89	84.	14.09	-1.91
economy	83.99	13.32	87.	13.79	-2.22 *
Job satisfaction	84.65	11.62	87.76	11.08	-2.60 **
Internal satisfaction	85.05	11.71	87.97	11.10	-2.42 *
External satisfaction	83.92	12.30	87.39	11.54	-2.76 **
Work engagement	84.32	13.66	87.39	13.83	-2.12 *
Vigour	82.89	15.89	86.33	15.47	-2.08 *
Dedication	83.43	14.79	87.	14.50	-2.40 *
Absorbed	86.63	12.49	88	13.24	-1.53

（CSR=corporate social responsibility, JS=job satisfaction）

*p <0.05, **p<0.01

The educational level of the study sample was divided into three groups: graduate from “high vocational/junior education", "University/college" and research laboratory". We calculated the average number and standard deviation of each aspect, and performed the analyze of single factor variance. We used Tukey way to compared, the results of the study: the assume of this study have significant difference among the employees with different education level in various aspects of CSR, work engagement and job satisfaction but they have not been partially supported. The different analysis among the employee’s CSR, job satisfaction and work engagement in different position have received partially supported. Through the different analysis of different service year among CSR, work engagement and job satisfaction, we found that they have not been partially supported.

4. Analysis of Corporate Social Responsibility, Job satisfaction and Work Engagement.

(1) The related analysis of various aspects of corporate social responsibility and work engagement

This study used Pearson's product moment correlation to know the relation between the various aspects of CSR and work engagement, as shown in Table 4.3.1. The study found, the overall social responsibility of the employees are positive for vigor ($r=0.621$, $p<0.001$), contribution ($r=0.629$, $p<0.001$), concentration ($r=0.623$, $p<0.001$), and overall work engagement ($r=0.654$, $p<0.001$). In terms of CSR and job satisfaction, it can be found that each aspect is high-positive correlation, and the "law" is the most related. Therefore, the assume 4-1 of this study: the employees of supplementary education institute in Longhai District of

Zhangzhou City have a high-positive correlation with the work engagement and received support. This study uses Pearson's product moment correlation analysis to know the relation between job satisfaction and work engagement, shown in Table 4.3.2.

Summary table 4.3.2 The analysis of CSR and work engagement

Aspect	Vigour	Dedicate	Absorbed	Work engagement
Law	0.571 ***	0.571 ***	0.569 ***	0.598 ***
Ethic	0.537 ***	0.574 ***	0.594 ***	0.594 ***
Caritas	0 575 ***	0.558 ***	0.529 ***	0 582 ***
Economy	0 559 ***	0.558 ***	0.542 ***	0 580 ***
CSR	0.621 ***	0.629 ***	0.623 ***	0.654 ***

Aupect	Inner satinfaction	external satisfaction	Job satisfaction
vigor	0.725 ***	0709 ***	0 735 ***
dedication	0760 ***	0.728 ***	0.765 ***
contribute	0746 ***	0.691 ***	0.742 ***
Work engagement	0.779 ***	0.744 ***	0.783 ***

***p<0.001

(2) The related analysis between job satisfaction and corporate social responsibility

This study uses Pearson's product moment correlation analysis to know the relation between job satisfaction and corporate social responsibility, as shown in Table 4.3.3.

Table 4.3.3 Analysis Table of Job Satisfaction and work engagement.

Summary table 4.3.4 the analysis of CSR and job satisfaction

Aspect	Inner satinfaction	external satisfaction	Job satisfaction
Law	0.712 1	0.730 ***	0.733 ***
Ethic	0 773 ***	0.749 ***	0.780 ***
Caritas	0674 ***	0.707 ***	0.700 ***
Economy	0716***	0.729 ***	0.736 ***
CSR	0.802 ***	0.811 ***	0.822 ***

p<0.001

Based on the above results, we proposed the assumption 4: CSR, work engagement and job satisfaction are significantly related. Among them, corporate social responsibility has a high-positive correlation with work engagement; job satisfaction has a high-positive correlation

with work engagement and corporate social responsibility. Stepwise multiple regression analysis of corporate social responsibility and job satisfaction. This section is to know whether CSR and job satisfaction have a predictive effect on work engagement. CSR and job satisfaction are predictors, and work engagement's "vigor", "concentrate", "contribute" and "the overall work engagement" as the criterion, which is shown in Table 4.4.1. Therefore, this study assumes 5-1: The supplementary education employee's CSR and job satisfaction has predictive power to "vigor" and received supported in Longhai District of Zhangzhou city. The predictive role of the CSR and job satisfaction of the employees on the "contribute" of work engagement is gradually analyzed. As shown in table 4.4.2, this study assumes 5-2: the employee's CSR and job satisfaction are predictive and work engagement in Longhai District of Zhangzhou City and received supported. The predictive effect of the CSR and job satisfaction of the employees on the "focus" of work engagement is gradually analyzed. As shown in Table 4.4.3, this study assumes 5-3: the employee's corporate social responsibility and job satisfaction are predictive to the work engagement in Longhai District of Zhangzhou City.

	Work engagemnet(Y)		Job satisfaction(M)	
Variable aspect	Model1	Model 3	Model 2	
Predictive variable(X)			M1	M2
CSR	0655 ***	0.046	0.805 ***	0.813 ***
Mediating variable(M)				
Inter satisfaction(M1)		0 573		
External satisfaction(M2)		0.182 *		
Quantification of mediating effects				
c=	0.655	a*b=	0.461	0.148
c'=	0.046			
c-c'=	0.609			
Sa*b=	0.609			
Inspection of mediation effects Sobel			6.670 ***	2.142 *
The strength of the mediating effect SM(%)			70.41%	22.59%

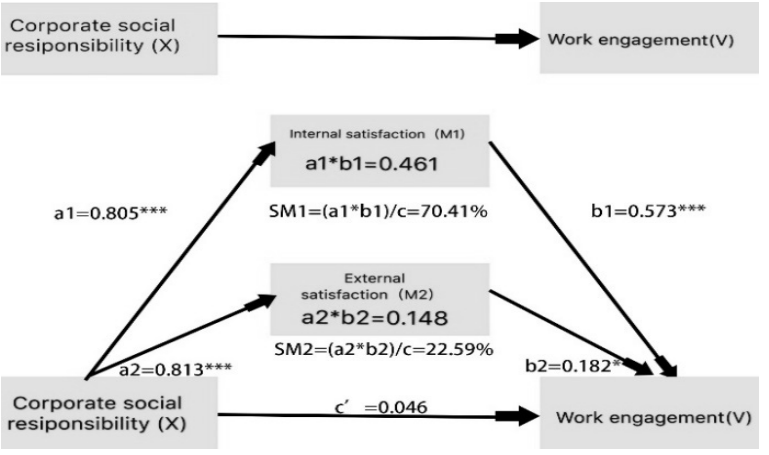
It can be known from the above analysis results, it has predictive effects on the each variable of the supplementary education institute's job satisfaction and work engagement. The assume5 of this study: The corporate social responsibility and job satisfaction have predictive power to the employees in Zhangzhou.

(3) The result of job satisfaction tested by work engagement's mediating effect.

Work engagement:

The test results are shown in Table 4.5.1. In the mode I, the "Corporate Social Responsibility" is the forecast variable, and the "Work Engagement" is the depend variable. The overall effect Beta value is 0.655. The corporate social responsibility show positive impact

to work engagement ($p<0.001$). In Mode III, the control variable, corporate social responsibility and job satisfaction are used as predictive variables, and the work engagement is depend variable beta value is 0.573 ($p<0.001$); the external satisfaction Beta value is 0.182 ($p<0.05$). Job Satisfaction in the CSR have significant for the test coefficient in the regression analysis of work engagement, and the test coefficient c' of direct effect (Beta value is 0.046) is lower than the overall, but still be significant. The test coefficient c of 0.655) is low, but it is still significant. Therefore, the job satisfaction has partly intermediary effect of corporate social responsibility on work engagement, so the evaluation of the intermediary effect is carried out. The Judd & Kenny's coefficient difference method is used to calculate Bindirect's β value is 0.609, and the statistical significance of the mediation effect is offered by the online test tool provided by Preacher & Leonardelli (2008). As shown in Table 4.5.1



5. Conclusion

First, the employees have a medium or higher level of cognition in all aspects of corporate social responsibility, job satisfaction and work engagement. The employee's potential of CSR has reached a medium or higher level in Longhai District of Zhangzhou city. Among them, the "ethical" facet score is up to 88, the "caritas" facet score is 83 on average and the job satisfaction is 86, which is in the upper middle level. The average number of "internal satisfaction" is higher than that of "external satisfaction". The performance of work engagement is above average. Among them, the highest score is "focus" facet, and the lowest is "vigor". Second, the employee with different background has significant differences in corporate social responsibility, job satisfaction and work engagement:

(1) Women, unmarried, high school/specialist graduates, service years less than 3 years, and the administrative staff have significantly lower corporate social responsibility in Longhai District of Zhangzhou city.

(2) Women, unmarried, service years less than 3 years, and the administrative staff have significantly lower job satisfaction in Longhai District of Zhangzhou city.

(3) Women, unmarried, high school/specialist graduates, service years less than 3 years, and the administrative staff have significantly lower work engagement in Longhai District of Zhangzhou city.

The men in the supplementary education institute have a significantly higher level of "vigor", "contribute" and "the overall work engagement" than the women. The employees who have been working for more than 10 years and 3 to 9 years have a significantly higher sense of "vigor" than the employees who under three years in work engagement facet. The employees who have been working for 3 to 9 years have a significantly higher level of “contribute”, and “overall work engagement” than those who have been under 3 years; The employee feels the "vigor" is significantly higher than that of the class teacher and the administrative staff; the manager, the teacher, and the class teacher feel work engagement is significantly higher than that of the administrative staff and the teacher. The teacher feels significantly higher than the administrative staff in "focus" and "whole work engagement" facets; This study combines the above findings: different employee’s level of education, marital status, service years, and position will feeling different in work engagement aspect.

Third, the employee has a significant-positive correlation among CSR, job satisfaction and work engagement.

(1) In the corporate social responsibility, there is a significant-positive correlation among the "law", "ethical", "caritas", "economic" and "overall corporate social responsibility" aspects with job satisfaction.

(2) There is a significant positive correlation among the “vigor”, “contribute” and “concentration” of job satisfaction in Longhai District of Zhangzhou city, and the result show that the more satisfied the employees feel, the more work engagement will increase. The employee’s job satisfaction has a positive effect on work engagement, and the overall job satisfaction has more significant effect on work engagement than the individual job satisfaction.

(3) The employees’ various aspects of corporate social responsibility have a significant-positive correlation with “vigor”, “contribute” and “concentration” in Longhai District of Zhangzhou City.

(4) The employee’s corporate social responsibility and job satisfaction have positive predictive effects on work engagement: the employee’s CSR and job satisfaction in Longhai District of Zhangzhou City has significant predictive effect on “vigor” and the

predictive power reached 54.9%; The "contribute" has a significant predictive effect, and predictive power is 58.2%; The "focus" has a significant predictive effect, and predictive power is 55%; Work engagement has a significant predictive effect, and a predictive power of 60.2%.

(5) The employees have some intermediary effects on the relationship among corporate social responsibility, job satisfaction and work engagement: The employee's job satisfaction-internal satisfaction have a partial mediating effect on work engagement, which the median strength is 70.41%, and the job satisfaction-external satisfaction has a partial mediating effect on work engagement, with a median strength is 22.59%.

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Introducing Global Competency in the Elementary School EFL Classroom using Children's Literature and Sustainable Consumption Activities

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Abstract

UNESCO's Education 2030 project released its set of 17 Sustainable Development Goals (SDGs), which identify environmental, economic, and societal issues facing the planet and its inhabitants. In Taiwan, most education for sustainable development (ESD) involves occasional teaching of environmental matters. This paper, however, presents preliminary efforts in the elementary school EFL classroom to address global competency skills, including awareness of non-environmental sustainability issues and attitudes such as global-mindedness and perspective-taking. Relevant texts from children's literature and cultural objects were paired with ESD activities regarding the responsible consumption to introduce sustainability concepts and their relevant English vocabulary. After a classroom trial in an after school English program, semi-structured interviews of students demonstrated that students had a growing understanding of responsible consumption topics, and a qualitative assessment of vocabulary comprehension showed an expansion of simple English economic vocabulary pertinent to SD issues.

Keywords: Education for Sustainable Development, Elementary, EFL, Children'S Literature.

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利用兒童文學和永續消費活動在小學 EFL 課堂中導入全球競爭力思維

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摘要

聯合國教科文組織針對 2030 年的教育遠景項目發布了 17 項永續發展目標（SDG），指出了地球與居民面臨的環境，經濟和社會問題。而在台灣大多數永續發展教育（ESD）仍只有較為狹隘的著重於環境問題的教學。本文介紹了關於小學 EFL 課堂的初步工作，嘗試解決導引學生具有了解全球現況的技能，包括對非環境議題的永續性問題的認識，以及引發學生能夠具有全球意識的觀點與解決問題的視角。其中兒童文學和文化對象的相關文本與永續發展教育活動相互結合，可以同步的導入永續發展概念及其相關的英語詞彙。在以課後英語課程中完成進行的課堂試驗後，本文發現學生對於「負責任的消費」議題有了越來越多的理解，而對詞彙理解的定性評估表明了，學生對於了解與認知永續議題相關的簡單英語經濟詞彙具有明顯地成長。

關鍵詞：永續發展教育、小學、EFL（英語當作外國語文學習）、兒童文學。

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1. Introduction

Educational for Sustainable Development (ESD) is a movement in education designed to prepare students to address UNESCO's set of 17 Sustainable Development Goals (SDGs) by developing global competence, defined as "the capacity to examine local, global and intercultural issues, to understand and appreciate the perspectives and world views of others, to engage in…interactions with people from different cultures, and to act for collective well-being and sustainable development.", (OECD, 2018, p.7). Although ESD is growing, especially at the elementary school level, most attention is paid to environmental issues. This paper, in contrast, is concerned with developing global competency to help young students develop a critical eye towards consumption practices so that they might be better prepared in the future to question the patterns of consumption that guide much of industrialized culture and contribute to or exacerbate non-sustainable practices. In high school classrooms, excellent resources exist which take a critical posture of players in the linear economy that drives much of first world consumption practices. At lower levels, however, children's literature in conjunction with SD-focused exercises can begin to introduce the concepts at a young age that lead to comprehension of more complex issues at higher educational levels.

This study looks at the effects of an SD-based learning module on a group of elementary school students in their EFL class in south Taiwan, and had several components: a mindfulness exercise, an online SD exercise, and an accompanying children's literature text. The activity was run in three 2.5 hour sessions, and spanned several weeks.

1.1 Global Competency

In explaining the role education can play in striving toward the SDGs, UNESCO has outlined the knowledge, skills and attitudes which students should develop to be better prepared to solve not only current SD issues, but those that they will face in the future, and were compiled by the OECD's Global Competency Self-Assessment Survey (OECD, 2018). Generally, these knowledge and skills cover such things as *awareness of global issues, self-efficacy regarding global issues, adaptability,* and *perspective-taking,* while attitudes identified by the assessment are constructed such as *global mindedness*, and *engagement regarding global issues*. (OECD, 2018) Obviously, a number of these are somewhat advanced for the elementary classroom, but others are appropriate as a means to engage with SD issues and begin the process of developing agency—an agency to affect the future of sustainable development. The skills and knowledge identified above which can be better targeted and taught in the elementary school EFL classroom are those constructs of *awareness of global issues* and *perspective-taking,* while targeted attitudes are *global mindedness* and *engagement regarding global issues,* and are defined in Table 1. Post-activity interview questions were developed for each of these constructs.

Table 1. Definitions of Study's Global Competency Constructs (OECD, 2018).

Construct and Definition
Awareness of global issues and **Engagement in global issues**: Global issues are those that affect all individuals…and reveal how different regions around the world are interconnected by shedding light on the diversity and commonality of their experiences (Boix Mansilla and Jackson, 2011). (OECD, 2018, p. 12)
Perspective taking: refers to the cognitive and social skills individuals need in order to understand how other people think and feel. It is the capacity to identify and take on often conflicting points of view, "stepping into someone else's shoes"…*Understanding others' perspectives facilitates more mature and tolerant interpretations of differences among groups.* (*emphasis mine*) (OECD, 2018, p. 15)
Global mindedness: defined as "a worldview in which one sees oneself as *connected to the world community* and feels a sense of responsibility for its members" (Hett cited in Hansen, 2010). Globally-minded individuals *exercise agency and voice with a critical awareness* of the fact that other people might have a different vision of what humanity needs, and are *open to reflecting on and changing their vision* as they learn about these different perspectives (*emphasis mine*). (OECD, 2018, p. 17)

1.2 ESD in the EFL Classroom

Primary school EFL classrooms in Taiwan can be categorized into several levels. The lowest level are public school classrooms designed to provide basic exposure, while mid-level students may attend additional English learning in afterschool cram schools *(bushibans)* primarily, but not exclusively, in preparation for English testing. A third "high level" of students

are in afterschool programs that follow learning goals appropriate for native English speakers. The learning module presented here was given to a high level classroom in an afterschool English program.

One area where ESD education may be introduced is in mindfulness education. In brief, mindfulness attempts to instill in students a greater awareness of self, sensory experience and an enhanced ontological relationship to nature. Although this focus is not directly related to improving global competency, its indirect effects in terms of improving the thoughtfulness, empathy and compassion of students may have positive effects in developing responsible practices.

A second method to introduce ESD is by modifying online SD exercises designed for native English classrooms to address language elements of the exercises that will be positive additions to an English lexicon regarding SD issues. In this study, we used pre-existing exercises provided online by www.coolaustralia.org, a wide-ranging teaching resource. Although there are a number of other online resources, these exercises are provided as samples as they were tested in a classroom situation.

Finally, this paper examines the use of children's literature with thematic interests pertinent to SD issues, and suggests that their inclusion alongside pre-existing exercises provides a method to introduce SD issues that is not only successful, but does not require a significant outlay of effort to create new materials, as both the exercises and children's texts may be acquired fairly easily.

2. Methods

Each teaching session was presented to a classroom of 1st to 3rd grade high level students in an afterschool English program in a large city in Taiwan, and began with a mindfulness exercise and/or discussion of a previous mindfulness exercise, followed by one of the online exercises from Table 2, paired with an accompanying text from children's literature from Table 3. Each session was followed by investigator-lead semi-structured interviews to gauge learning outcomes. The module was designed to highlight global competency skills and attitudes that support sustainable consumption practices, and each exercise was supplemented with English language education. Details are presented below.

Mindfulness Exercises may provide students with skills that develop empathy and awareness useful for addressing SD issues in the future. A number of studies have found positive effects of mindfulness exercises, particularly in students aged 15-18 (Carsley, Khoury & Heath, 2018). The main exercise used in the learning module here, *The Mind Jar*, instructs

students in creating a mason jar full of glitter suspended in water. Students shake the jar to represent a state of anger and practice breathing exercises as the debris settles and the water clears, providing visual support and a metaphor for the effects of mindfulness training. The exercise utilizes English only in terms of following directions and is appropriate for even low-level English students.

Table 2. Sample online exercises for improving global competency in the elementary school EFL classroom

Exercise	Possible English Language Concepts	English Level
The Mind Jar	following directions, describing feelings	low-high
Doorways to Waste	prediction; verb tenses; where(how) did/do/will…	mid-high
Needs and Wants	explanation; reasoning; noun/verb pair; ranking	mid

Source: http://www.coolaustralia.org

Online Exercises. After the mindfulness exercise, students completed the tandem of online exercise/children's literature for the remainder of the class time. Table 2 provides summary details of mindfulness exercises and online exercises appropriate for introducing responsible consumption in elementary school EFL classrooms. Exercises here are from www.coolaustralia.org and were slightly modified for use in EFL classrooms by providing vocabulary backgrounds.

In the exercise *Doorway to Waste*, students were first shown a handmade heirloom quilt and were told how clothing could be reused to create it, demonstrating different attitudes toward consumption. Students were then asked to reflect on the past, present and future through a series of questions about how people acquired food and material goods, what they did if these goods broke, and how they disposed of their waste. Students first considered Taiwan aboriginal populations, practicing responses in the past tense. They then considered current and future methods. Another exercise used in class, *Needs and Wants*, asks students to consider the difference between material goods that they either "need" or "want" in an attempt to get students to consider the relative necessity of their consumption patterns. The language extension exists both in verb-noun pairings as well as practice for the student in crafting a reason for those answers.

Children's Literature: Table 3 presents a sampling of the children's literature texts which are appropriate for developing global competency skills and attitudes, especially when paired with online exercises.

The first group investigates how to reduce anger, with students choosing the successful methods of diffusing anger in the classroom in *If You're Angry and You Know It*. The *Sophie*

text introduces the healing powers of nature itself, as the protagonist finds the most successful way to defuse her anger is to pursue mindfulness activities in her favorite natural spot until "the wide world conforts her," reminding students of the **Table 3**. Sample texts from children's literature appropriate for use in developing global competency for ESD

ESD Construct and Learning Goal	Texts
Perspective taking Mindfulness (acceptance and well-being)	*If You're Angry and You Know It* by Cecily Kaiser*, When Sophie Gets Angry—Really, Really Angry* by Molly Bang, *Hey, Little Ant* by Phillip and Hannah Hoose*, The Invisible Boy* by Trudy Ludwig
Global mindedness Interconnectedness of humans and nature	*Make Way for Ducklings* by Robert McCloskey, *Haystack* by Bonnie and Arthur Kaiser, *Hey, Little Ant* by Phillip and Hannah Hoose
Global mindedness **Engagement in global issues** Responsibility for and agency to solve SD issues	*Swimmy* by Leo Lionni, *Maybelle The Cable Car* by Virgina Lee Burton, *Henry Works* by D.B. Johnson, *The Lorax, Horton Hears a Who!* by Dr. Suess, *What If Everybody Did That?* by Ellen Javernick
Engagement in global issues **Global mindedness** Responsible attitude toward material goods accumulation	*Henry Hikes to Fitchburg, Henry Builds a Cabin, Henry Works* by D.B. Johnson
Perspective taking Imagining how people from different backgrounds feel	*Cat and Mouse in the Snow* by Tomek Bogacki
Perspective taking **Global mindedness** Human/nature ontology	*Cat and Mouse in the Night* by Tomek Bogacki, *Henry Builds a Cabin* by D.B. Johnson, *The Story of Jumping Mouse* by John Steptoe, *Frederick* by Leo Lionni, *Old Turtle* by Douglas Wood and Cheng-Khee Chee, *(additional children's literature texts which develop alternative worldviews can be found in (Ver Steeg, 2019).*

Necessity of the human/nature relationship and returning it to a healthier ontology. The second two texts deal with developing empathy in children, as well as towards nature. The second group of texts deals with the interconnectedness of human and natural worlds. The familiar favorite *Make Way for Ducklings* presents what is in some ways a broken system where nature is in great danger, but also present human agency to affect change. *Haystack* is a text about the cyclical nature of life on the farm, and an especially instructive text for urban

students who may be unfamiliar with or not attuned to cyclical patterns of nature. Finally, *Hey Little Ant* asks students to see themselves in the role of an ant, and consider the view.

The ability to work together to affect change is presented in the next grouping of books. *Swimmy*'s piscine protagonist details a group effort of a school of fish to find safety, while *Maybelle The Cable Car* presents the power of the people to use political means to uphold worthwhile traditions. The next section introduces Transcendentalism through *Henry Hikes to Fitchburg*, *Henry Builds a Cabin,* and *Henry Works* the several of a series of four *Henry* books by D.B. Johnson. Henry represents Henry David Thoreau, and the series develops the idea that humans can live more simply, without as many possessions or material needs. Each book has a different focus, and can easily serve as jumping off point for numerous activities such as developing confidence to act as an agent of change. For teachers, a useful teaching guide has also been provided by the publisher (http://www.henryhikes.com/images/henry_guides.pdf). The *Cat and Mouse* series is also a starting point for discussions of topics pertinent to SD issue discourse. *Cat and Mouse in the Snow* describes how animals which would be erstwhile enemies can change their understanding of each other, and can easily serve as a jump off point for discussions of race or class. Another in the *Cat and Mouse* series, that of *Cat and Mouse in the Night* is one of a number of examples of children's literature texts that interrogates the human/nature ontological relationship in such a way as to suggest to students the concept that nature has an intrinsic value rather than simply a resource value. Sometimes these texts occur in stories drawn from indigenous people's oral histories presenting a different worldview (*The Story of Jumping Mouse*) or as a moralistic story of nature (*Old Turtle*). In *Frederick*, nature is given an intrinsic value to a group of mice in midwinter who see only the troubles of their existence and the resources that nature provides.

Fig. 1. Student drawings of (upper) a clean future world and (lower) a recycle robot

In the module described below, *When Sophie Gets Angry—Really, Really Angry…*, *Haystack*, and *Henry Hikes to Fitchburg* were used to accompany the online exercises *The Mind Jar*, *Doorways to Waste*, and *Needs and Wants*.

3. Results and Discussion

Each classroom session was followed by a semi-structured group interview. All sessions began with four questions, and followed by additional questions to open up the conversation. Interviews were recorded and processed by the artificial intelligence application Otter. Word frequencies were noted, and are presented in Table 4 along with student responses.

Student reactions to the *The Mind Jar/ Sophie* exercise were quite positive. Most students expressed an intention to use the jar at home to help them deal with "angry" situations. Though language learning potential is limited, the potential positive effects of a more calm and centered elementary school classroom should not be disregarded. Reactions to Sophie's anger quickly identified the power of nature as a recuperative environment, something which students seemed to inherently understand.

The *Doorway to Waste/Haystack* exercise engaged both lower and upper level students. Starting the exercise with a cultural object, an heirloom quilt, introduced the concepts in a vivid way for the youngest learners, while the imaginative aspect of waste disposal in the future ignited creative drawings and conversations from more confident students. Student

conversations about *Haystack* we re somewhat muted. The researcher arrived at the conclusion that many students were thoughtfully considering the agrarian lifestyle depicted in the book, and the unfamiliar "slower" movement of time.

Table 4. Interview questions with global competency construct, most frequent words used in responses, and student responses.

Word frequencies	Student Responses
The Mind Jar/ When Sophie Gets Angry—Really, Really Angry…	
angry (8), breath, breathe (8), nature (7), forest (5), calm (3), peaceful (3), ocean (2)	"I'll use this when my sister makes me angry" "go to the nature to feel calm"
Doorway to Waste/Haystack	
past: burn it, fire (4) in ground, bury (3) animals, bones (3), antlers (3) **present**: trash truck, recycle (8), compost bin (6), trash can (3), plastic paper, **future**: lasers (4), robot (3) ***Haystack***: cycle (7), cows (5), hay (3), reuse (6)	**past**: "use the antlers to use it again…make it into medicine" "put it in a wood box" **present**: "we put in the recycling truck" **future**: "We will use robots to recycle" "recycle robots will make it into a ball"
Needs and Wants/Henry Hikes to Fitchburg	
things we need (4), clothes (2), shoes (3), bed (2), food (2), want needs (5) wants (6) toys (7), Pokemon (3), simple (5) ***Henry***: save money (2), walking (4), Fitchburg (2), honey bee (2), faster (3), train (4), simple (3)	"spending less money is better" "some things I want I don't really need" "my sister doesn't need her doll" "having fun is better than working"

Finally, the *Needs and Wants/Henry* exercise introduced a complex understanding of the idea of necessity. There were items, such as some toys, that students identified as perhaps being unnecessary altogether. Students also began, to identify that "necessity" might also encompass the decision of whether a simple second-hand bicycle that was adequate for its purposes should be considered over a brand new bicycle which used more resources. The *Henry* book, placed as reaffirmation of a less materially-based life, resounded well with students, who noted the rewards of such a situation.

4. Conclusion

This paper is a preliminary qualitative study into the effects of introducing SD concepts into the EFL classroom at the elementary school level using a combination of online exercises and children's literature. Few EFL classes incorporate SD issues beyond environmental education, but this study examines an SD topic that primes young learners to develop critical

thinking that interrogates consumption and disposal patterns in modern industrialized economies. Group interviews with students involved in a limited trial in a high-level afterschool English program provided evidence that conceptual and vocabulary understanding was achieved. These results suggest that students, even those at both low educational levels, can benefit from attention to ESD.

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＊1. 若第三位評審意見為「接受刊登」或「修正後再審」時，則請作者對不予接受之審查意見進行答覆外，將採兩正方評審意見予以刊登。

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＊3. 任一評審審查意見為「修正後再審」，經函送投稿人日起計，逾 3 個月未回覆，該篇稿件以「不予刊登」處理。

第六條　本學報將針對審查意見及結果函送投稿人，並說明處理方式。

第七條　本學報評審作業相關人員對評審委員身份應予以保密，以避免紛爭。

第八條　本辦法經學報編審委員會議通過，陳請校長核定後公布實施，修正時亦同。

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