The Application of Target Costing to the Real-Estate Investment Industry – A Dual Model Approach

Chi-Ling Wu\textsuperscript{a, \*}, David Brown\textsuperscript{b}, Prabhu Sivabal\textsuperscript{b}, Pei-How Huang\textsuperscript{c}

\textsuperscript{a}Revenue Officier, Local Tax Bureau of Changhua County, Taiwan
\textsuperscript{b}Faculty of Accounting, University of Technology Sydney, Australia
\textsuperscript{c}Faculty of Business Administration, National Sun Yat-sen University, Taiwan

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Abstract

This paper applies target costing (TC) to Taiwan’s real-estate investment industry by considering the variation of selling prices in a batch of heterogeneous products (apartments). TC has largely been applied and studied in the manufacturing industry, assuming a structure of a single sale-price for homogenous products within the same batch. However, the products in the same construction batch in a real-estate investment project often have different prices caused by product attributes (floor level, orientation, location) and product changes requested by clients. We provide interview evidence from six real-estate investment firms highlighting how batch profit is pursued while focusing on different product prices within the same product batch. Unlike traditional applications of TC, our findings show target-cost levels may increase for higher-priced products, and do not necessarily decrease for lower-priced products. This is due to the economies of scale arising from purchasing components and maintaining customer satisfaction. The findings also reveal the importance of considering processes/procedures for dual models by emphasizing the increased product price and land investment at the preliminary planning stages, to achieve a more practical TC in the real estate investment industry.

Keywords: Dual model, target costing, real-estate investment industry, value engineering, different target prices

1. Introduction

This paper applies target costing (TC) to the real-estate investment industry in Taiwan, and presents an approach for implementing it with dual models. These are the attributes of products with and without a client’s request for change to individual components in a batch of production. By the investment and development of real estate, the industry in Taiwan is committed to the building and sale or rental of residence/buildings, and may include construction companies directly allying, or indirectly groups (Yang, 1999; Zhang, 1999). We choose the construction industry as it is characterized by different selling prices in the same batch of production (a building) that exists for naturally heterogeneous products (different apartments within the building). Product heterogeneity arises from the inherent different
attributes of products (apartment floor level, orientation, location), and also client’s requests for changes to pre-set structures of products.

While TC is mostly applied in assembly manufacturing industries (Monden and Hamada, 1991; Kato, 1995; Pierce, 2002), there has been very little investigation of its application to the real-estate investment industry (Yang, 1999; Wu et al., 2011). It is important to investigate this as the nature of batch production is fundamentally different in the real estate industry, and this operational difference may lead to established accounting systems being applied differently. The manufacturing industry is characterized by the same sale price for a set of homogenous products in a batch of production (Fisher, 1995; Ansari et al, 1997; Cooper and Slagmulder 1997; 1999; Ibusuki, and Kaminski, 2007). However, the products in the same construction batch (a building) in the real-estate investment industry have vertically (higher or lower floors) or horizontally differentiated (aspect view, location and layout within the same floor) prices for different products. There is also little evidence that direct product costs aid the determination of selling prices, as opposed to differences in the number of floors, orientation and location (Fan, 1991; Feng and Qiu, 1993; Ling, 1995). Furthermore, a client may request for changes to a product, which causes a selling price change. In the Japanese construction industry, the tentative sale price suggested by the builder alters as specifications and allowable costs change during negotiations between the client and builder (Yook, et al., 2005). The desired profit determined by top management in the construction industry usually remains fixed (Yook, et al., 2005). However, the manner by which these changes impact target costing has not been investigated in management accounting research.

To investigate the above, we consider two types of products. These include preconstruction residences where different prices in products come from different attributes of the products and clients’ requests for product change; and second, already-constructed residences where the price difference only relates to product attributes, with clients unable to effect post construction alterations (Ling, 1995).

We use an explorative/theoretical discovery method (Keating, 1995) and investigate building projects by six different real-estate investment firms. We apply a case driven theoretical discovery approach as it informs knowledge gaps in theory and establishes an innovative theoretical model for complex phenomena (Keating, 1995).

Our findings show different TC approaches for higher-priced products compared to lower-priced products. While target cost levels may increase for higher-priced products, they do not necessarily decrease for lower-priced products. This is due to the economies of scale arising from purchasing components (leading to a higher percentage of committed costs) and maintaining customer satisfaction. The findings also reveal the importance of the proposed emphasized processes/procedures for dual models by emphasizing the increased product price and land investment at the preliminary planning stages to achieve a more practical TC in the real estate investment industry.

This paper is organized as follows: In section 2, we construct a literature review and structure our propositions. We also present our proposed TC dual model in real-estate investment industries. We subsequently introduce our research method and provide background information for our study. We then identify case findings and finally outline our conclusions, limitations and suggestions for future research.

2. Methodology

2.1 Target costing

Target Costing (TC), developed in the early 1960s (Kato, 1993; Ansari, et al., 1997; Pierce, 2002; Hibbets et al. 2003; Feil et al., 2004), was originally labeled cost planning or cost projection systems (Kato, 1993). TC provides more than a cost control framework by offering
a comprehensive strategic profit management system, which takes into account the importance of cost/price, functionality and quality (Kato, 1993; Cooper and Slagmulder, 1997; Pierce, 2002). TC is designed to help prevent senior managers from launching low-margin products that do not generate appropriate returns (Cooper and Chew, 1996; Feil et al., 2004). Furthermore, TC is a highly sophisticated way to increase intra-organizational integration across a number of functions, transmitting the competitive pressure faced by the firm to product designers and suppliers (Cooper and Slagmulder 1997; 1999).

2.2 Different prices for heterogeneous products in a batch

The products in the real-estate investment industry have vertically or horizontally differentiated prices for different attributes of products in the same construction batch (Fan, 1991; Feng and Qiu, 1993; Ling, 1995). Ling (1995) indicated that the prices of products were influenced by orientation, floor levels, location, and so on. Feng and Qiu (1993) pointed out that the different floor levels made vertical differential prices, while orientation, location, and natural light made horizontal differential prices. Fan (1991) argued that the characteristics of differential pricing in the same batch in the real-estate industry include two things. First are the characteristics of the property, such as the number of rooms, facilities, floor area, location and floor levels. Second are the characteristics of the building; such as parking space, the type of usage and age. Consequently, the product characteristics affects product price (see appendix A). In this paper we focus on the attributes of products related to heterogeneous prices which are not proportional to construction costs. This is different from the standard model of TC, which has a unique sale-price within a batch of homogenous products.

2.3 Dual model

The costing and pricing approach used in the real-estate investment industry is different from the manufacturing industry. Manufacturing industry has a unique sale-price within a batch for generally homogenous products (Fisher, 1995; Ansari et al, 1997; Cooper and Slagmulder 1997; 1999; Ibusuki, and Kaminski, 2007). In the real-estate investment industry the products in the same construction batch have different prices for heterogeneous products which as argued earlier are caused by different attributes of products, and the clients’ request for change.

Generally the producer (real-estate investment firm) offers a specification for the design, facility and materials for the products (apartments). However, the client may request changes within scope, in a manner not affecting the structural safety of the building. Such structural elements relate to indoor facility and materials, and include entresol, electric switches, location of water supply, room numbers, and any other element that may not impact structural integrity. Changeable facilities and materials include: floors, wall (paintings or wall paper), ceiling, kitchen facility, light, hardware parts, and materials of walls between rooms. Accordingly, we propose a dual model as follows:
2.4 The emphasized process/procedures of implementing TC

Because TC processes vary on a firm level (Cooper and Slagmulder, 1997; Yook et al., 2005), we refer to previous literature (Cooper and Chew, 1996; Cooper and Slagmulder, 1997; 1999; Ellram, 2006; Ibusuki et al., 2007; Monden and Hamada, 1991; Pierce, 2002), and mainly use Cooper and Slagmulder (1997; 1999)’s, Monden and Hamada (1991)’s and Wu et al. (2011)’s studies to structure the process of TC applied to the real-estate investment industry. There are 5 stages, of which the prior three are adopted from Cooper and Slagmulder (1997; 1999). The latter two are supplemented from Monden and Hamada (1991).

2.4.1 Market-driven costing; customers’ oriented new product development plans

2.4.1.1 Establish the long/medium-term profit plans for the whole company

Typically TC begins with the company’s long-term sales and profit objectives (Cooper and Slagmulder, 1997; 1999) and the long- and medium-term profit plans are established (Monden and Hamada, 1991). In the real-estate investment industry, a one-year profit plan or case number (project) is adopted by most companies with a TC framework (Wu et al., 2011). For the heterogeneous products (apartments) in a batch, caused by product attributes (floor level, orientation, location) and by clients’ request for product changes separately, the process aforementioned for a whole batch is required.

2.4.1.2 Market research support

A comprehensive program of market research is undertaken in the use of TC in the real-estate investment industry (Wu et al., 2011). This includes the long-term (Cooper and Slagmulder 1997; 1999) or one-year profit plan, general product plan (Yang, 1999), land investigation, nearby product-price market intelligence for developing specific new projects (Pierce, 2002; Ibusuki et al., 2007), function development (Monden and Hamada, 1991; Ellram, 2006), and facility and materials used before and after land procurement (Wu et al., 2011). Consequently, the company’s market-research capacity is important when
implementing TC (Yang, 1999; Wu et al., 2011). Considering the heterogeneous products (apartments) in a batch, market research should be comprehensive in the process of TC in the industry, including the room numbers, product prices, function development, facility and materials used and so on in the nearby heterogeneous products.

2.4.1.3 Developing specific new product project plans and using concept value engineering

The specific new product project plan (Monden and Hamada, 1991; Fisher, 1995), the potential product directions and drafted plan (Yang, 1999; Wu et al., 2011) are proposed by a cross-functional team and by concept value engineering (VE) (Ibusuki, et al., 2007). The potential product directions indicate the future plans for the purpose of land investment, such as housing residence, business housing or parking lots, and for the short, medium or long terms (Yang, 1999). The drafted plan is based on the potential product directions, and simulates the potential type of product, total floor area, sale or rent of the product, and so on (Yang, 1999, Zhang, 1993). Value engineering (VE) is a systematic, interdisciplinary examination of factors identifying the optimal balance between cost and functionality through a collective and iterative activity of option identification, analysis and selection (Cooper and Slagmulder, 1997; Nicolini et al., 2000). Concept VE, defined at the first of three VE stages, focuses on the conceptual stage of product development, aiming at functional innovation (Ibusuki, et al., 2007). Land investigation is also undertaken before land procurement (Wu et al., 2011). When TC is applied to the real-estate investment industry, there is more emphasis on the earlier stage of the process such as land investment (Wu et al., 2011). Considering the heterogeneous products (apartments) in a batch, the specific new product project plan should be proposed by a cross-functional team and by concept VE. The drafted plan, including the plan for heterogeneous products caused by attributes of products before land procurement, should be emphasized at the land investment stage. The enacting of TC at the preliminary, earlier planning stages increases its impact on project operational management (Wu et al., 2011).

2.4.1.4 Setting target profit margin and checking profitability of the plan

When the TC framework is adopted during the land investigation stage, the cost of the plan is estimated and an analysis of whether the target profit is achievable is undertaken (Wu et al., 2011). TC appears to assist in profit attainment for a construction batch with a dynamic formula capturing the recognition of inflation impacts and economic depression by setting a fixed target profit margin rather than a fixed target cost (Wu et al., 2011). Furthermore, the target profit margin is related to a whole batch and for each product in a batch. The target profit margin for each planned heterogeneous product should also be considered for the attainment of the total target profit for the batch. The products within a batch in the real-estate investment industry that are jointly constructed during the same process may have different or the same construction cost depending on the indoor facility and material costs. We refer to Schneider (1989)’s categorization of costs, and categorize construction costs into two parts. First are joint costs relating to structure, safety and outdoor facilities and material; these cannot be changed with a client’s request. Second are separable costs which mainly indicate indoor facility and material costs in this paper. When it comes to target profit margin for joint products, Schneider (1989) used the Net Realizable Value Method (NRV) and set the same percentage markup to allocate joint costs. However, different from the allocation of joint costs by Schneider (1989) using relevant drivers, most joint costs in the construction industry are divided by product number (number of apartments). Accordingly we state the above approach in Proposition 1 for the real-estate investment industry:
P1a: The same target profit margin for indoor facilities and material is set for each heterogeneous product caused by the attributes of products within a batch.

P1b: The same target profit margin for indoor facilities and material is set for each heterogeneous product caused by a client’s request for change within a batch.

2.4.1.5 Determining the basic plan for a specific new product and setting target sale price in a market-oriented way

Whilst determining the basic plan for a specific new product, a market-driven target price must be established (Fisher, 1995; Cooper and Slagmulder, 1997; 1999; Pierce, 2002; Ellram, 2006; Everaert et al., 2006; Ibusuki et al., 2007). A basic plan is termed the original plan before project VE and cost deduction by the cross functional team. In the Taiwanese real-estate investment industry, a market-driven target-price is established at this stage (Wu et al., 2011). However, cost-plus costing may be mainly used for product sale (Wu et al., 2011), while costs themselves are adjusted by the market price at this stage – revealing the interweaving influence of target costing on cost plus costing in the industry. Owing to these barriers to thoroughly realize TC, the decision on product pricing for a whole batch refers to cost-plus costing before product sale (Wu et al., 2011). Furthermore, different prices are set for heterogeneous products within a batch. Accordingly we state the above approach in Proposition 2 for the real-estate investment industry.

P2b: Different prices are set for heterogeneous products caused by a clients’ request for change within a batch.

P2a: Different prices are set for heterogeneous products caused by attributes of products within a batch.

2.4.2 Setting product-level costing and using projects VE

Product-Level TC focuses the product designers’ creativity on achieving the survival zones when designing products (Cooper and Slagmulder, 1997; 1999). Survival zone in TC includes the survival factors: product functionality, quality and cost (Cooper and Slagmulder, 1997; 1999). At this stage, the cooperation of the architect and cross functional team can reduce the construction cost (Wu et al., 2011). The designers’ creativity when designing products should also be emphasized on the design of different products, as caused by the respective attributes of each product, to attain the goal of total target profit for the batch. For example, the duplex apartments/suites (in Taiwan it relates to the ladder in upper and lower two floors as one product) on the top floor, or different room numbers that have different orientations. Furthermore, at this stage, the cooperation of architects, customers and cross functional teams with experts should be emphasized to reduce construction costs and simultaneously increase product prices within the scope of the contract made with customers.

If the cost-price relationship all require similar target profit margins for construction costs, apartments with higher costing indoor facility and material costs should command higher prices. The concept of cost allocation here is different from a product mix because of the joint-production for the products. It is also different from the allocation of joint costs by Schneider (1989), in that joint costs are divided by the number of products in the real-estate investment industry.

Given the close relation between the above argument and the two statements comprising Proposition 1, we state the above approach as a supplement to Proposition 1.

Supplement to P1a: Different target costs for indoor facilities and material are set proportional to product prices for heterogeneous products caused by the attributes of products.
Supplement to P1b: Different target costs for indoor facilities and material are proportional to product prices for heterogeneous products caused by the clients’ request for change.

2.4.3 Setting component-level target costing and using validation VE

Component-level TC helps focus the creativity of suppliers in ways which are beneficial to the firm (Cooper and Slagmulder, 1997; 1999). Validation VE focuses on the validation stage of the product and process, and also aims at improvement in the production process (Ibusuki, et al., 2007). The effort of Validation VE to achieve the target cost include: diminish the direct material costs, including reducing the number of parts, designing smaller and lighter parts, using cheaper parts and designing parts that do not require special high precision or very expensive production processes (Ibusuki, et al., 2007). In real-estate investment, industry practice prohibits supplier involvement in parts of the TC process, especially at the early stages (Wu et al., 2011). In addition, owing to competitive considerations, products with similar facilities and materials to market competitors find that cost-reduction is limited (Wu et al., 2011). The limitation of the application of component-level TC is for a whole batch of products, but not supposed to be among heterogeneous products within a same batch. According to the assumption of the same target profit margin in facility and material costs for each product in the same batch in Proposition 1 and literatures aforementioned, we propose:

P3a: Lower/higher-priced products correspond with lower/higher costs of indoor facility and material in heterogeneous products caused by attributes of products within a batch.

P3b: Lower/higher-priced products correspond with lower/higher costs of indoor facility and material in heterogeneous products caused by the clients’ request for change within a batch.

2.4.4 Product transfer plan

Standard values of material consumption, labor hours and so on are established (Monden and Hamada, 1991) and controlled with the use of budgets during production by companies adopting TC framework (Wu et al., 2011). Considering the heterogeneous products (apartments) in a batch, the budgeting in whole of batch and in each heterogeneous product should be established and controlled. It should include the adjustment for client’s request during the production by the companies with TC framework.

2.4.5 Target-cost achievement during project and phase-gate review

Measuring results and maintaining management are focused on the target-cost achievement during project and phase-gate review (Ibusuki et al., 2007; Wu et al., 2011). If the target costs aren’t achieved, investigations are made to clarify where the responsibility lies and the gap arises (Monden and Hamada, 1991; Wu et al., 2011). Considering the heterogeneous products (apartments) in a batch, measuring results and maintaining management should be focused on the target-cost achievement for a whole batch and each heterogeneous product. Investigations should be made to clarify where the responsibility lies and the gap arises (Wu et al., 2011).

3. Research method

We adopt the case approach to investigate our Propositions. Everaert et al. (2006) argues that a case study approach for TC is appropriate for the following reasons. First, the concept of TC has not been clearly defined and means different things to different people (Dekker and Smidt, 2003). Second, the current state of knowledge on TC can be described as at the clinical
knowledge stage, where researchers are trying to understand and capture the many dimensions of the phenomenon. Third, the case study approach enables direct and in-depth contact with practitioners to inform the theory. Fourth, field research has a comparative advantage over the survey method when the topic of inquiry is so complex that the phenomenon of interest is not readily distinguishable from its context. Subsequently, we undertake a case study approach to review, revise and supplement TC theory in the real-estate investment industry.

In-depth semi-structured interviews were conducted around an exploration about the design and use of TC in each of the case companies. Two researchers conducted each of the interviews. These interviews were then transcribed and coded based on the TC constructs. The data was then analyzed to assess the validity of the Propositions.

3.1 Case brief

We interviewed six real-estate investment companies in Taiwan, one of them (F Company) during 2004 and five of them from the end of 2007 through to second quarter of 2008. The basic data for the companies are as follows:

<table>
<thead>
<tr>
<th>Company Items</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewees</td>
<td>General manager(G)</td>
<td>General manager (H) and financial manager (I)</td>
<td>General manager (J)</td>
<td>General manager (J)</td>
<td>General manager (K)</td>
<td>General manager</td>
</tr>
<tr>
<td>Employee numbers</td>
<td>More than 100</td>
<td>11-30</td>
<td>1-10</td>
<td>51-75</td>
<td>1-10</td>
<td>11-30</td>
</tr>
<tr>
<td>Capital (million NTD)</td>
<td>7500-10000</td>
<td>1000-5000</td>
<td>50-100</td>
<td>7500-10000</td>
<td>10-50</td>
<td>5000-7500</td>
</tr>
<tr>
<td>Revenue/year (million NTD)</td>
<td>5000-10000</td>
<td>500-1000</td>
<td>300-500</td>
<td>5000-10000</td>
<td>500-1000</td>
<td>300-500</td>
</tr>
<tr>
<td>Size</td>
<td>Listed company branch</td>
<td>Listed company branch</td>
<td>Small</td>
<td>Listed company branch</td>
<td>Small</td>
<td>Listed company branch</td>
</tr>
<tr>
<td>Products location</td>
<td>Southern Taiwan (lower-price area)</td>
<td>South near middle of Taiwan (lower-price area)</td>
<td>Southern Taiwan (lower-price area)</td>
<td>Middle Taiwan</td>
<td>Southern Taiwan (lower-price area)</td>
<td>Southern Taiwan (lower-price area)</td>
</tr>
<tr>
<td>Residence Type</td>
<td>House/Terrace/Edifice/Unit/Office</td>
<td>House/Terrace/Edifice/Unit/Office</td>
<td>House/Terrace</td>
<td>House/Terrace/Edifice/Unit/Office</td>
<td>House/Terrace</td>
<td>House/Terrace/Edifice/Unit/Office</td>
</tr>
<tr>
<td>Construction company</td>
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<td>Allied</td>
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<td>Allied</td>
<td>Allied</td>
<td>No</td>
</tr>
<tr>
<td>TC adoption</td>
<td>TC framework</td>
<td>More detailed TC framework</td>
<td>TC framework</td>
<td>TC framework</td>
<td>TC framework</td>
<td>No</td>
</tr>
</tbody>
</table>
4. Case findings

4.1 P1a: heterogeneous product caused by the attributes of products

As explained previously, we refer to Schneider (1989)’s study and categorized construction costs into: first, joint costs, relating to structure safety and outdoor materials. These costs cannot be changed to accommodate client’s requests. Second are separation costs, which mainly includes indoor facilities and material costs in the real-estate investment industry. This style of sub-categorization is consistent with our respondents’ explanations of cost structures:

H: ...We divide it (the material costs) into two parts: one is structure materials, and the other is the facility materials. The structure materials are difficult to change, because it relates to safety...At facility materials aspects, you may invest too large an amount on them, but it should be connected with the market...You check the material used by our competitors, because consumers don’t check your structure costs...They check the materials. ...We go to see the nearby cases, and check what brand of facility competitors use in the kitchen...Facility materials roughly are these; bathroom, kitchen, floor...Facility materials should be adjusted flexibly.

J: The structure of construction includes concrete/grinding engineering. ...Generally facilities include kitchen, bathroom facilities...Materials includes tiles, concrete, marble...The outdoor materials can’t be changed, but indoor materials are changeable.

We found that the same target profit margin for indoor facility and material costs is not set for each heterogeneous product caused by attributes of products within a batch. Proposition 1a is therefore not supported. This result may derive from the practice of buying a whole batch of indoor facilities/materials and competitive considerations for the customer’s perception in the industry. Real-estate investment companies tend to use the same construction costs; including joint costs and the same separate costs for each product in the same batch. That is, the target profit margin for heterogeneous products will correspond with prices. However, there still exists some space for changeable separation costs in indoor facility and material (see case finding in Proposition 3a). Within the specific spaces, the target profit margin becomes similar for heterogeneous products in the same batch, which allows higher-priced products to finitely correspond with higher-priced indoor materials and facilities.

We summarize these results and infer that different target profit margins for heterogeneous products caused by attributes of products tends to correspond with different prices, but still allow for scope for changeable separation costs in indoor facilities and material. The construction costs should be between specific ranges (see case finding in Proposition 3a) for each product, and controlled by managers, depending on the decision of indoor facilities and materials used to attain the goal of total target profit for the batch. This reflects a looser application of target costing than that normatively espoused. We use Table 2 to express the product plan for target price, profit and costs in the real-estate investment industry as follows:
4.2 Proposition 1b: heterogeneous products caused by the client’s request for change

As to heterogeneous products caused by the client’s request for change, cost-plus costing (keeping the same target profit margin) is used for the prices of changed facility or materials (see the interview quotes in Proposition 2b). Proposition 1b is therefore supported.

J: ...Normally the company deducts 10% for the one changed, and add 10% for a new one...

H: ...if you want to change the facility, what is available ...we deduct and add them to the costs.

4.3 Proposition 2a: heterogeneous product caused by the attributes of products

As to the vertical and horizontal differential prices caused by orientation, floor levels, location, and so on (Fan, 1991; Ling, 1995; Feng and Qiu, 1993), the products in the same construction batch do have different prices, which is different from theoretical TC with a unique sale price in the same batch of products. All interviewees explained such a manner of working. Proposition 2a is therefore supported:

K: ...You see the house at the end can leave more space, more natural light. For utility benefits, it will have a higher price...

J: The first floor has a higher price than the second floor. The prices decrease corresponding with the number of floors...The fourth floor will be the lowest. ...the south-faced residence has a higher price than the north-faced one...

H: ...So they (sale advertising company) sell some products adopting a method where actual value is greater than its price. Other products are sold by a value smaller than its price. Each product is different because the orientation and floors are different. ...

G: We consider total price for the whole batch (building). How much price for the whole batch; that is, how many products we will produce totally? We translate into units; how much per square meter. That is controlled by total sale price. Then we do a more detailed plan; vertical direction, that is floor; and horizontal direction, that is whether the product located at the end of building. Because of different floors and locations, the prices of some units need to absorb the prices of others in unfavorable floors...We still consider the pricing based on the total price (for all units in the batch)...

From our interviews, we identify vertically and horizontally differentiated prices as follows: products/units are residences (apartments) in the edifice, which exhibit in Figure 2. Given that floor areas affect the price of products, we use price per square meter of product
instead of total price of the product to express differential prices. With respect to vertically differential prices, the price per square meter of product on the first floor is higher than others for higher costs of land (Ling, 1995). Prices subsequently decrease as floors increase, until the middle floor (the fourth floor, which sounds dead in Mandarin and Taiwanese). They then continue to increase as floors become higher (Ling, 1995). With respect to horizontally differentiated prices, apartments with a southerly aspect have higher prices per square meter than products facing north. Further, prices of apartments with good views, natural light, or ends of the building are higher. In Figure 2, we use the term, Matrix of Product Price Structure, to express that the product prices per square meter are different at the factors of floor, location and orientation. In the matrix, the vertical axis represents the different floors, while the horizontal axes represent different locations and orientations. We use \( P_{a1b1c1} \) to express the product per square meter on the first floor, facing south, and at the end. \( P_{a2b1c1} \) denotes the price per square meter of the product on the second floor, facing south, and at the end. This model can be used in house/terrace when we omit the vertical difference.

![Figure 2. The matrix of product price structure](image)

4.3 Proposition 2b: heterogeneous products caused by the client’s request for change

Normally cost-plus costing is used for the prices of changed facility or materials caused by the client’s request, including the labor wages to change them. Furthermore, the client needs to notify the company within the time scheduled according to the contract between the client and company. According to the aforementioned, Proposition 2b is supported.

**J:** Customers need to sign change-application forms, and send them into my company to calculate the items, quantity and price...We have a time limit on the contract for the customer’s changes...If you, customer, want to change, you have to inform in advance...If it’s material changes, we need earlier notification (compared to the walls of rooms) because material needs to be ordered in advance...Normally the company deducts 10% for the one changed, and add 10% for a new one...For example, the tiles on the floor are changed from non-slip tiles into marble, we deduct 90% of the costs of non-slip tiles, and add 10% more for the new material......If the exchanged tiles are the same brand; that is, the colors are different, but the size is similar, then the wages for the change is the same. Only the price of material adds up. However, if the materials are changes from wood into marble, then it needs to add and deduct certain (different) percentage....Generally if the wall between rooms will be torn down, the expense of the material should be deducted (from the customer’s account). This normally happens before the start of construction...
4.4 Supplement of P1a: heterogeneous product caused by the attributes of products

Similar to the findings observed from the interviews, regarding target profit margin (see case finding in Proposition 1a), different target costs for indoor facility and material costs are partly set for each heterogeneous product caused by attributes of products. Target costs in heterogeneous products tend to be the same, but still leave space for changeable separation costs in indoor facilities and material. The construction costs should be between specific ranges (see case finding in Proposition 3) for each product to attain the goal of total target profit for the batch. Overall, the supplement to Proposition 1a is not supported.

4.5 Supplement of P1b: heterogeneous products caused by the client’s request for change

According to the case study, the same target profit margin, and target costs proportional to target prices (indoor facility and material costs) is set for each heterogeneous product caused by the clients’ request for change (see case finding in Proposition 1b, and interview quotes in Proposition 2b). The supplement to Proposition 1b is supported.

4.6 Proposition 3a: heterogeneous product caused by the attributes of products

Owing to industry practice and competitive considerations, the cost reduction at this stage of component-level TC is limited for a whole batch of products (Wu et al., 2011). Besides, economies of scale for purchasing components and customer’s satisfaction partly hinder the application of component-level TC to individual heterogeneous products. Higher-priced products finitely correspond with higher-priced indoor material and facilities, but lower-priced products do not. This result causes companies to tend toward using the same construction costs; including joint costs and the same separate costs for products in a batch, but still leave some space for changeable separation costs in indoor facilities and material. The aforementioned space is between two points: one end at the same target costs, and the other at the construction costs with the same margin profits for higher-priced indoor material and facilities. The impact on product price by changes to indoor facility and material is also heterogeneous.

When asked whether it’s possible for lower-priced products to correspond with lower-priced materials and facilities, all of the companies, A, B, C/D, E and F, answer that it’s impossible because of economies of scale for purchasing components and considerations of customer satisfaction in the industry. However, for lower-priced products, the company may use the same architectural designs, for example duplex apartments/suites on the top floor, subsidize/grant for indoor design/decoration, or explanation for customer’s change for higher-priced facility and material.

K: ...That is the price is lower, but the costs are the same. Materials are all the same, because when you source out, it’s wholly outsourced. We won’t buy cheaper materials for the products (lower price) ... It’s impossible, because it causes problems. Customers might compare with competitors nearby, and ask why your materials are worse than others. That will result in stagnancy on our sales...

G: It won’t be that (lower-priced product with lower-priced material and facility). On the contrary, that is bad. You don’t need to use different types of materials for only one product ... You may build duplex apartments/suites ... But the materials are the same. If the customer doesn’t like the materials, they might want to change ... but that causes
the whole community to become messy. That is not good. The quality should be the same... The customers buying our product must experience consistent recognition, so the materials we use are the same...

**J:** (The cost of each product) is the same. (If lower-priced product has lower-priced material and facility) the person live in it will feel that he lives in the poor place compared with others. Normally the living condition is worse, so the price is cheaper.... You absolutely can’t do it... He (the buyer) will have a bad feeling... Fourth floor doesn’t sound good, so we have to lower the price, for example 10% discount. However, it may lose too much. So we may give the customers free indoor design/coration... The customer perceives greater value, and has a willingness to buy it... The construction costs are the same (for each product).

**H:** No, basically we won’t (have higher/lower price product correspond with higher/lower-priced materials and facility). The company may use indoor design to handle it. When the customers buy the product, we will tell them if you don’t like the floor, we deduct the cost and change into those of German’s brand. Original cost for kitchen facility may be NTD $50,000, but they consider for NTD$ 500,000...

As to whether higher-priced products correspond with higher-priced materials and facilities, three companies, C/D and E, mention that it may work when the products have specific attributes, for example, larger squares of land in house products, or when there are different types of products in a batch, such as a house and terrace/duplex. As aforementioned, Proposition 3a is partly supported.

**K:** Sometimes because of land procurement, it’s not square, but odd-figured. If a normal product is 30 square meters, the product maybe 50 square meters. Because of larger space, the price is higher, and we’ll consider better materials.

**J:** Not like that (higher-priced product with higher-priced materials and facility), unless it’s a house or terrace. Your products are different in the same batch. In this community, some residences are houses, but some are terrace. Then you want a better price, so the materials are better in it... Unless in the community, there is a better building, for example facing parks and so on. As to others having the same conditions, you don’t need to divide (the types of materials).

4.7 Proposition 3b: heterogeneous products caused by the client’s request for change

Our case study evidence indicates that (see interview quotes in Proposition 2b), the same target profit margin; target costs proportional to target prices, for indoor facility and material costs is set for each heterogeneous product caused by the clients’ request for change. Furthermore, at this stage, the cooperation of architects, customers and cross functional teams with experts is emphasized to reduce construction costs and simultaneously increase product prices within the scope of the contract made with customers.

We summarize that Adjusted Target Costing in Table 2 exhibits the sequence of TC in heterogeneous products caused by product attributes (see left side in Figure 1). However, the target costs should be controlled between specific ranges (see case finding in Proposition 3) for each product to attain the goal of total target profit for the batch because according to this case study, target cost levels may increase for higher-priced products, but they do not necessarily decrease for lower-priced products. In respect to heterogeneous products change requested by clients, Applied Target Costing in Table 2 exhibits the sequence of TC (see right side in Figure 1). Besides, we apply the target costs of heterogeneous products caused by product attributes and product changes requested by clients to preconstruction residences. Only the target costs of heterogeneous products caused by product attributes is applied to constructed residences.

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5. Conclusions and suggestions

Using case evidence, we explore the application of TC characterized by different prices in a batch within the real estate investment industry, and present the dual model in this paper (see Figure 1). Our findings show (summarized in appendix B) that owing to economies of scale for purchasing components and customer satisfaction, target costs may be increased by higher-priced products, but not decreased by lower-priced products in a group of heterogeneous products (apartments) caused by product attributes (floor level, orientation, location). This may result in different target profit margins corresponding with different prices if the same target costs are used for heterogeneous products. However, firms still leave room for changeable separation costs in indoor facility and materials, when construction costs lie within specific ranges (see case finding in Proposition 3) for heterogeneous products in a batch. TC may cause different target prices, target profit margins and target costs in this industry (see Table 2), but more approach the same target costs for each product in our case studies. As to the different prices caused by a client’s request for change, cost-plus costing is mainly used for the prices of altered facility or materials, though the dominant target costing approach continues to drive price determination. This allows for the approximate maintenance of same target profit margins for heterogeneous products caused by a client’s request for change. With the dual model presented, we can apply TC to two types of products, preconstruction residences and already-constructed residences, and illustrate the process/procedures of TC in the practice of the industry.

Following previous literature (Wu et al., 2011), we firstly emphasize the increase of product price and land investment at earlier planning stages when TC is applied to the industry. The increase of product price should include the consideration of heterogeneous products in addition to the strategy and brand to create product value. It should also have more detailed drafted plans including the consideration of heterogeneous products caused by attributes of products at the land investment stage because TC is more effective at upstream stages in the industry. Although the plan and control of price, profit and cost for a whole batch are mainly emphasized, the heterogeneous products composing the batch need more attention to aid better planning, in order to minimize the subsidizing of profits between products in a batch, in attempting to attain batch profit goals. At the stage of determining the basic plan for a specific new product, a market-driven target-price should be established. Owing to the barriers to thoroughly realize TC, cost-plus costing is dominantly used at the decision of product price before product sale (Wu et al., 2011), but costs themselves are adjusted by market price – revealing the interweaving influence of target costing on cost plus costing in the industry. At the stage of product-level TC, the cooperation of architects and cross functional teams with experts should be emphasized on the design of heterogeneous products caused by attributes of products, and also include client members when heterogeneity is caused by the clients’ request for change. At the stage of component-level TC, cost reduction is finitely powerful because of the limitations caused by industry practice and competitive considerations for a whole batch of products; that is, caused by scale economics for purchasing components and customer satisfaction for an individual heterogeneous product. However, there still exists space for suppliers and internal cross-functional teams to improve.

5.1 Limitations and suggestions

We acknowledge certain limitations in our study: First, we use a case study as our research method, and interviewees are limited to the middle and southern regions of Taiwan. We have arguably not represented all the conditions in Taiwan. Moreover we do not assume that interviewees are able to represent all the TC practices of their firms. We acknowledge the possibility of variation in interpretation of TC practices, had other individuals been
This study has several issues that may be explored in the future. First, in addition to the methods mentioned in this context, such as indoor design, operational levels of TC in heterogeneous products with different prices in the industry may have more sophisticated methods to attain the goal of profit in a batch. Second, cases in other industries related to the issue of different prices in a batch without proportional costs to support the prices during application of TC may be used to compare with these results in the real-estate investment industry, to more broadly ascertain the relevance of our findings. Third, future research may use different research methods to increase the validity of the study.

References


Appendix A

Conditions on Product Prices

<table>
<thead>
<tr>
<th>Product Conditions</th>
<th>weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vertically Differentiated Prices</td>
<td></td>
</tr>
<tr>
<td>Floor</td>
<td></td>
</tr>
<tr>
<td>Horizontally Differentiated Prices</td>
<td></td>
</tr>
<tr>
<td>Orientation (South, North, East, West)</td>
<td></td>
</tr>
<tr>
<td>2. Location</td>
<td></td>
</tr>
<tr>
<td>On the side, or in the middle of the products</td>
<td></td>
</tr>
<tr>
<td>Beside road/ street/ lane (wide, narrow)</td>
<td></td>
</tr>
<tr>
<td>Width between another building</td>
<td></td>
</tr>
<tr>
<td>Beside vacant space (lots, few, no)</td>
<td></td>
</tr>
<tr>
<td>Geography (Fengshui)</td>
<td></td>
</tr>
<tr>
<td>View</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td></td>
</tr>
<tr>
<td>Privacy</td>
<td></td>
</tr>
<tr>
<td>3. Attributes of products with proportional construction costs to support the prices</td>
<td></td>
</tr>
<tr>
<td>Square meters</td>
<td></td>
</tr>
<tr>
<td>Ratio of common facilities</td>
<td></td>
</tr>
<tr>
<td>Meters for balcony</td>
<td></td>
</tr>
<tr>
<td>Meters for flower basins</td>
<td></td>
</tr>
<tr>
<td>Room numbers</td>
<td></td>
</tr>
<tr>
<td>Movement lines (for living room, kitchen, bathroom, bedroom)</td>
<td></td>
</tr>
</tbody>
</table>

(Adapted from Ling, 1995)