



## Responsibility cost control system in China: a case of management accounting application

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This paper introduces the responsibility cost control system installed at Han Dan Iron and Steel Company in the People's Republic of China. The Company has adopted a series of management accounting techniques or procedures in its cost control system, including target costing, responsibility accounting, standard costing, flexible budgeting, internal transfer pricing, behavior motivation, performance evaluation, variance analysis, and so on. In particular, the system has integrated responsibility accounting and cost control by introducing market mechanisms to substantially reduce production costs and raise profitability. The successful experiment reveals that the responsibility cost control system is an effective tool for cost control under the changing Chinese business environment. The Han Dan experience demonstrates that management accounting can play a positive role in improving business management and profitability in China or other developing countries. In addition, this study casts light on effective diffusion of management accounting practices under different social and economic systems.

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### 1. Introduction

Management accounting, initiated at some large manufacturing companies in North America around the beginning of the 20th century, applies accounting and non-accounting measurements and procedures to generate management-oriented information (Johnson, 1975; Johnson and Kaplan, 1987). It assists managers at various levels inside an organization to effectively make strategic and operational

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decisions (Schweikart, 1986; Foster and Horngren, 1987; Garrison and Noreen, 1995; Atkinson *et al.*, 1997). Management accounting has made rapid progress since World War II, and become a multi-disciplinary management tool comprising a series of practical techniques such as standard costing, budgeting, cost-volume-profit analysis, internal transfer pricing, variance analysis, responsibility accounting, performance evaluation, etc. Management accounting plays a fairly active part in business management in the industrialized world (Gaumnitz and Kollaritsch, 1991; Mannino and Milani, 1992; Scapens, 1994; Kaplan, 1998; Smith, 2000).

Currently the application of management accounting in the less developed countries (LDCs) remains unsatisfactory and studies on this area are rare in the literature. This may be due to the relatively under-developed status of economic and business administration in LDCs. However, the demands for management-oriented accounting information are increasing following the economic growth in LDCs, and the promotion of the adoption of management accounting in business management. There are, nonetheless, certain differences in the application procedures or techniques of management accounting in practice in the industrialized world and LDCs owing to the varied economic, institutional and cultural settings concerned.

This paper reports the results of a field study on the 'responsibility cost control system' that has been operating at Han Dan Iron and Steel Company in China since the beginning of the 1990s. Based on the theoretical framework of 'institutional isomorphism', we intend to investigate why business enterprises in a developing country like China would need to search for innovative accounting practices, and how the advanced Western management accounting can be effectively applied under the specific Chinese business environment. Through field visits, personal interviews, on-site observations, and achieved studies, we found that the Company's cost control system centered by responsibility cost targets, has integrated a series of Western management accounting techniques and procedures to improve productivity and profitability by reducing production costs substantially and continuously. The Han Dan experience demonstrates that management accounting can play an active part in business management in the emerging economies.

With a detailed documentation of the motive of searching for innovations, the basic principles and operational mechanisms underlying the design, implementation and evaluation of the cost control system at the Han Dan Company, this paper not only introduces how the 'responsibility cost control system' is functioning in practice, but also provides some insight into effective diffusion of the advanced management and accounting practices from the industrialized countries to LDCs, thus making a contribution to the knowledge body of management accounting development in the developing countries. In addition, the study results should facilitate readers to have an updated understanding of Chinese management accounting practices and promote the application of management and accounting innovations in business enterprises in China and other LDCs.

## 2. Relevant studies

One of the main topics in contemporary management accounting studies is whether the management accounting techniques or procedures initiated in the industrialized countries can be effectively adopted in LDCs, or what are the factors (both impetus

and impediment) that would affect the application of management accounting practices in LDCs. Mixed theories exist in the literature while empirical evidence for successful adoption of management accounting in LDCs is rare at present. The central issue is nonetheless related to the desirability and feasibility of diffusing the advanced or innovative management practices to LDCs. In the literature of business management, the theory of 'institutional isomorphism' suggests that innovative management techniques or knowledge will be diffused to other firms in the course of market expansion and competition (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Mahajan and Peterson, 1985; Jovanovic and MacDonald, 1994). In particular, the diffusion of innovations will occur when there is a 'performance gap' or when the perceived shortcomings of an organizational process may be remedied in part by adoption of innovations (Brown, 1981; Callie and Brimson, 1988; Shingo and Robinson, 1990; Rogers, 1995).

Diffusion of innovative management practices applies also to cross-border operations (van de Ven *et al.*, 1989; Orru *et al.*, 1991). A major economic shock or negative shift in economic performance would often be the stimulus for the search for changes or innovations across different countries (Westney, 1987; Kimberly and de Pouvourville, 1993; Scapens, 1994; Firth, 1996; Jensen, 2001). One broad example of international diffusion of management innovations is the large-scale popularization of business management practices (including accounting procedures) from the United States to the European Continent under the Marshall Plan right after World War II (Carew, 1987; Puxty and Lyall, 1989). Similar evidence can be seen that the innovative management practices invented by Japanese firms such as Total quality management (TQM), Just-in-time manufacturing (JIT), Activity-based costing (ABC), and Target costing, etc., were adopted widely in North American firms in the 1990s to improve their production efficiency, competitiveness, and profitability (Cooper, 1990; Aris and Guillen, 1991; Monden and Hamada, 1991; Drury and Taylor, 1994; Jensen, 1994; Atkinson *et al.*, 1997; Kaplan, 1998; Smith, 2000). However, the existing studies focused mainly on theoretical analysis of the necessity, stimulus, or constraints of the diffusion of innovative management practices in the industrialized world. Some researchers contended that the dissemination of Western management experience to LDCs might encounter resistance owing to the variances stemmed from the social, legal, cultural and educational systems in the developed and less developed countries (Weinshall, 1977; Child and Bate, 1987; Abrahamson, 1991; Aris and Guillen, 1991). 'Sub-optimum' effects may appear when the diffusion of management innovations occurs in LDCs (Chatterji, 1990; Abrahamson, 1991; Kimberly and de Pouvourville, 1993; Morris *et al.*, 1998; Silveria, 2001). Nevertheless this line of assertion lacks empirical evidence.

Firth (1996) investigated the possibility of diffusing Western management accounting to China from the perspectives of financial managers working at the joint ventures with Sino-foreign partners and the state-owned enterprises (SOEs). Significant changes had taken place in China since the ambitious economic reforms started in the early 1980s, such as the inflow of Western capital and a rapid transition from the highly centralized planned economy to a market-oriented economy. The sharp changes in economic and business environment provided a stimulus for Chinese enterprises to adopt more advanced practices of Western business management and accounting (Brownwich and Wang, 1991; Scapens and Meng, 1993). However Firth's survey study revealed that the application of Western management accounting in

China was very limited, and mainly restricted to the joint ventures with foreign capital. The small number of accounting procedures that are similar to Western management accounting had, however, played different roles in the management process in Chinese enterprises in contrast to that in the industrialized world. For instance, standard costing has been widely applied for the purpose of production control, product pricing and performance evaluation in Western firms, but this management accounting technique, defined as the 'quota cost system' in China, was mainly used for budget preparation and inventory valuation in Chinese enterprises. Firth (1996) concluded that the diffusion of Western management accounting to China would be a slow process even if it is necessary and possible for Chinese enterprises to adopt Western management accounting practices under the changing social and economic environment.

However the wide-ranged economic reforms had resulted in rapid changes in the business environment in China in recent years. Following the deregulation of direct governmental business administration, Chinese enterprises have been increasingly exposed to the emerging markets. Firms' management must now make strategic and operating decisions under increasing business uncertainty and market pressures (Scapens and Meng, 1993; Singha, 1995; Lin *et al.*, 1998). Thus the traditional business administration and accounting systems derived from the former planned economy can no longer meet the management needs in the new business environment. To deal with the dramatic changes or challenges, searches for new management and accounting practices gained momentum in Chinese enterprises. As a result, the more advanced management accounting techniques and procedures prevailing in the industrialized world were selectively experimented within the country in pace with the growth of the market-oriented economic reforms (Chen *et al.*, 1997; Lin *et al.*, 1998; Chan and Rotenberg, 1999). In particular, a small number of Chinese enterprises have tried to develop management accounting system in recent years, including the adoption of certain innovative practices that fit particularly the business conditions in China. For instance, the 'responsibility cost control system' being experimented with at Han Dan Iron and Steel Company in China is currently a successful case of applying Western management accounting practices in the Chinese business environment.

### 3. Study approach

We conducted a field study at Han Dan Company in order to examine the successful diffusion of Western management accounting in the developing Chinese economy. The main purpose of our study is to have an in-depth and on-site investigation of the 'responsibility cost control system' in respect of the development of management accounting in the course of economic transition in China. In particular, we intended to analyze why and how Western management accounting techniques have been incorporated or adapted in the design of a new cost control system, what are the mechanisms or difficulties in implementing the system, as well as the main merits and constraints of adopting Western management accounting procedures under the changing Chinese business conditions.

During 1999–2000, we paid three visits to Han Dan Company with 2–5-day stays, and held interviews with 18 managers and accounting staff at the Company. With the

consent of the Company's General Manager, we interviewed the Chief Accountant (equivalent to CFO) and directors of a few functional departments (e.g. finance and accounting, production control, marketing and sales, and human resources) at the headquarters and the managers of two production plants. In addition, we held two group interviews with key accounting staff, and operational managers or supervisors at production divisions and processes. The individual interviews lasted for 20–45 min each and the group interviews were about 2 hours in length.

In addition, we conducted archive reviews of the Company's production and accounting records and physically observed the operation of the responsibility cost control system at various levels of the production processes (including producing departments, processing sections, working groups/teams, and individual workers) and a few auxiliary plants and workshops. Our field interviews and observations were systematically documented through the use of preset question checklists and detailed note-taking of the responses from the interviewees. The interview questions have focused on the impetus, system design, implementation, monitoring and evaluation as well as the main benefits and potential weaknesses associated with the existing 'responsibility cost control system' at the Company. An English translation of the main question checklist for our interviews is presented in the Appendix.

This field study emphasizes generalizing the actual application of management accounting in the cost control system at Han Dan Company. Based on our field investigation results, we will first brief the background and the motives for the Company to develop the new cost control system. Then the basic principles, operational mechanisms, and implementation outcomes of the cost system are summarized, respectively, in the following sections. In addition, we will evaluate the Han Dan experience and discuss its practical implications with a reference to the contemporary management accounting theories and practices in the industrialized countries.

#### 4. The Company

Han Dan Iron and Steel Company is located in Han Dan City, Hebei Province, near Beijing in Northern China. Established in 1958, it was originally a state-owned iron and steel mill under the administration of government authority at provincial level. The iron and steel mill expanded rapidly since the 1980s and was reorganized as Han Dan Iron and Steel Company under state-ownership in 1996. A subsidiary of Han Dan Iron and Steel Stock Limited Company was formed to go public in 1997. The Company's stock was listed on the Shanghai Stock Exchange in the country in late 1997, with a total of 385 million shares issued publicly at a price of RMB¥7.20. The share price stood at RMB¥15.25 at the end of December 2000.

Today Han Dan Iron and Steel Company is an integrated iron and steel production complex in China. Its main manufacturing processes include sintering, coking, iron-smelting, steel-smelting, steel basing or casting, rolling or plating in a sequential order, with more than 28 types of iron and steel products being produced. The Company currently consists of 13 production factories, several auxiliary plants, servicing units, and subsidiaries. By the end of 2000, its employees totaled over 30 000, total assets were RMB¥27.5 billion (RMB¥8.20 = US\$1), and net assets were RMB¥14.8 billion. For 2000, the Company's total sales were RMB¥8.56 billion with a net profit of RMB¥722 million.

Under the original centralized business administration system, the Company's production and sales, like other SOEs, had long been subject to the compulsory production plans imposed by government authorities. Due to a lack of production initiatives and poor management the Company had long suffered from low productivity and poor operating results. It had to rely mainly upon governmental subsidies to survival. According to its books, the Company operated at a loss for 17 years during 1958–77, worse than the average level of all SOEs in the country.

Thanks to the government's campaign of economic development after the 10-year turmoil of the 'Cultural Revolution' (1966–76), the volume of capital investment and construction rose sharply in China. Market demands for steel products rose and helped the Company turn to profit in 1978. As favorable market conditions continued and the government's new investments increased, the Company had expanded its production capacity by more than double during 1978–89 and reported operating profits consecutively in the same period.

However market demands changed dramatically after the Chinese government implemented an austerity program in the late part of 1989 to curb the overheated economy and run-away inflation. Steel products were overstocked and prices dropped about 30 per cent by the end of 1989 compared to the peak at the mid of the same year. On the other hand, business enterprises were exposed to market pressures for their purchases, production and sales while competition intensified following the emergence of a market-oriented economy in China.

With sharp changes in the economic and business conditions, Han Dan Company encountered great difficulties in operation. From January to May in 1990, the Company turned to operating deficits every month. All of its 28 main products, except for two, suffered losses. The situation was worsened by severe overspending of its capital construction projects that had been launched in the mid 1980s owing to a high inflation in the economy. The Company's interest expenses for borrowings rose sharply in 1990 (averaging around 20%), a fairly heavy burden for its operations.

## 5. Search for innovations

The unfavorable changes of business environment forced the Company's management to overhaul operational and management processes. The main problems in its production system were identified: (1) the original operation control system was subject to following the government-imposed production plans without consideration of market demands; (2) with no exposure to external market pressures the managers (directors) of internal producing units were concerned only about fulfilling the production quotas assigned by the headquarters and had generally ignored the Company's profitability; (3) the cost accounting system focused mainly on generating cost information to report the execution of the production plans or spending quota imposed by government authorities but lacked mechanisms for effective cost control at different levels of production processes; and (4) there were no incentive programs for individual producing units as employees' incomes were not linked to their productivity.

To resolve those problems, the senior management recognized that it is necessary and imperative for the Company to adopt innovative management procedures to overcome the operating difficulties in order to survive and grow under increasing

market uncertainty and pressures. In particular, it was critical to raise profitability through a significant reduction of production spending or product costs in response to the changing business environment. Under the authorization of the senior management, a task force on improving cost management was formed, headed by the Director of the Department of Finance and Accounting (DFA) and consisted of the heads or supervisors from other departments such as production control, technical support, purchasing, marketing and sales, human resources, quality control, and so on.

According to the minutes of this task force, members investigated the necessary changes or alternative costing systems. In particular, staff of the DFA studied and introduced the main principles and procedures of cost management systems in the industrialized countries, which had been promoted by scholars in China as a result of the 'open-door' policy since the early 1980s (Chow *et al.*, 1995; Chan, 1996). Although some members were skeptical of the applicability of Western costing procedures in the business environment in China, the Director of DFA (now the Chief-accountant) insisted that the responsibility accounting and standard costing system in Western management accounting could be a solution to overcome the main deficiency of the old costing system, i.e. the lack of effective control over production spending and other expenditures. He proposed that the control of production spending must be incorporated into the responsibility of managers at various levels, accompanied by an incentive mechanism for cost control. This proposal received the support of the senior management. After several months of studies and preparation, a new responsibility cost control system was designed and installed in March 1990 as a main effort to enhance cost management and improve profitability.

Although some difficulties were encountered during the initial experiment period owing to the unfamiliarity with the Western cost management system or the resistance against changes by some managers at production lines, the new cost control system had been implemented company-wide under a push of the senior management. The new system generated very encouraging results as the production costs were under control while the Company returned again to profits in 1991, despite a relatively flat movement in the prices of steel products due to intensified market competition resulting from the deregulation of governmental price control.

## 6. The responsibility cost control system

In general the basic principles underlying the responsibility cost control system at Han Dan Company include: (1) setting cost and profit targets (responsibility standards) that take into account market pressures; (2) assigning target costs to various levels of responsibility center; (3) evaluating performance based on fulfillment of the responsibility cost targets; and (4) implementing a reward scheme with built-in incentive mechanisms. The essence of this cost control system is to establish and measure the responsibility cost standards throughout the entire management cycle, i.e. planning, implementation, control (monitoring) and evaluation (feedback), in order to promote goal congruence and achieve cost reduction continuously. Based on our field observations, the system's operating mechanisms can be summarized as below.

### *Division of responsibility centers*

In light of the principle of decentralization in operational management, responsibility accounting was implemented at the Company to raise the production initiatives

of all internal divisions and employees. Over 60 internal units or subsidiaries were regrouped according to their functions relating to the Company's operational goals. In particular, two major categories are classified: producing divisions and servicing units. Two subgroups of producing divisions were created, one is the primary production factories (e.g. 13 factories engaging in producing iron and steel products) and another is non-primary production plants that are not directly associated with the production of iron and steel products (e.g. repairs and maintenance workshop, equipment installation and construction, transportation facilities, limestone processing workshop, and other subsidiaries controlled by the Company). Each primary producing factory is run as a profit center that must be accountable for fulfilling both cost and profit targets. Sub-divisions of the servicing units consists of auxiliary producing units (e.g. the workshops that provide water, power, gas, and other utilities to primary production factories) and functional administration departments. The auxiliary production units are required to be either profit centers or cost centers while various functional administration departments are run as the cost centers, respectively. Since the operations of auxiliary production units and functional administration departments are mainly to provide production support or services, the responsibility cost control system is designed with a focus on the 13 primary production factories. In addition, four-tier subdivisions are divided within each primary production factory, e.g. producing departments, processing sections, working groups or teams, and individual workers. Exhibit 1 illustrates the responsibility structure in the new cost control system installed at Han Dan Company. Quoted from the Company's senior managers, the design of multi-tier responsibility centers has helped to clarify the operating responsibilities among different levels of producing units and facilitated the breakdown, implementation, control, measurement and evaluation of the responsibility cost targets within the entire Company.

#### *Establishment of responsibility cost standards*

Responsibility cost is the most important measurement in the cost control system. Managers at various levels of the responsibility chain are assigned the cost and/or profit targets through a top-down approach. Performance is evaluated based on fulfillment of the responsibility cost targets. Thus setting the responsibility cost targets plays a vital part in the cost control system and the target costing technique is adopted in this regard. The cost targets are set separately for each of the main products that are sold to external markets. Differing from the traditional procedures of cost planning or standard costing, a pull (backward-working) approach is employed to determine the responsibility costs contextual to ensuring the target profit under the existing market demands or pressures:

$$\begin{array}{r} \text{Projected total} \\ \text{sales} \end{array} - \begin{array}{r} \text{Total target} \\ \text{profits} \end{array} - \begin{array}{r} \text{Assigned corporate} \\ \text{overhead} \end{array} = \begin{array}{r} \text{Total target costs} \\ \text{(by product)} \end{array}$$

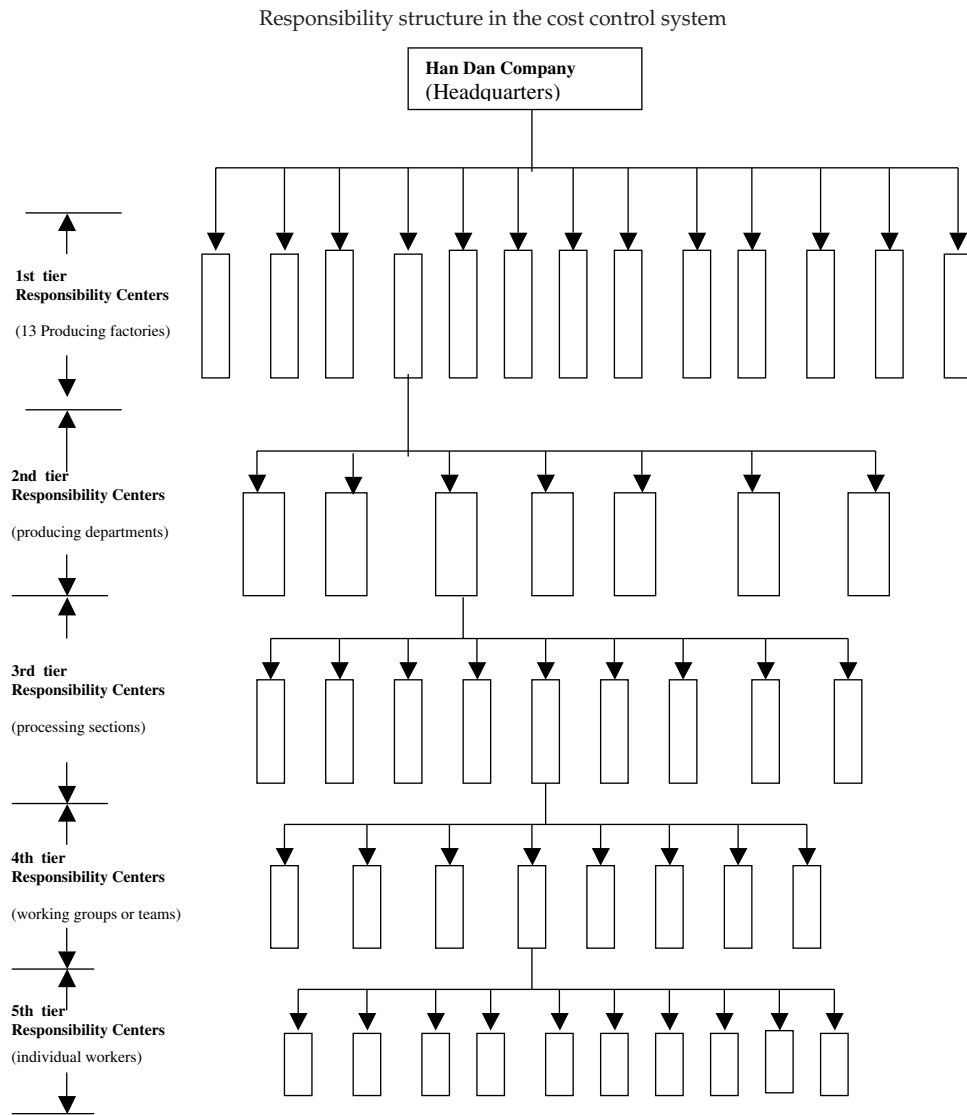
or,

$$\sum \left( \frac{\text{Sale volume} \times \text{Unit}}{\text{price of Product } i} \right) - \sum \left( \frac{\text{Sale volume} \times \text{Unit target}}{\text{profit of Product } i} \right) - \text{Corporate overhead} = \sum \left( \frac{\text{Sale volume} \times \text{Unit target}}{\text{cost of Product } i} \right)$$

Determination of the target cost and profit is based on information relating to market demands, sale projection, and profit analysis of each product. As recalled by the staff of DFA a basic rationale underlying this formula for setting responsibility cost is to incorporate market pressure (price changes) into the cost control. Sale



Exhibit 1.



prices are determined based on currently available market prices. Since market prices fluctuate frequently, the price data adopted in setting target costs and profits are calculated by the moving averages of market price, based on semi-annual sales forecasting. Unit profit for each product is set in terms of the 5-year strategic plans and annual operating budgets, with references to the best profit level in history or the industrial standards. For budgeting the corporate overhead, detailed analysis of each expense item is applied. Through this process, target cost and profit is set for each product, followed by preparing the aggregated cost or profit targets of the entire Company before each fiscal year. In setting the unit cost target, the standard

costing technique is applied. It is necessary to establish usage/quantity standard and price/rate standard for each product and semi-product. For instance, production or quantity measurements such as power consumption per ton of steel, coke usage per heat of steel, or output of iron base per heat of steel, etc., are utilized in setting individual unit cost targets.

#### *Decomposition of responsibility cost targets*

The companywide target costs and/or profits must be decomposed from the headquarters to the 13 primary production factories along the product line or manufacturing processes. Internal transfer prices are set for various products or semi-products flowing through the processing chains of different production factories to facilitate performance evaluation of each production factory as a relatively independent profit center. The basic principle underlying the intracompany transfer pricing is to directly adopt market prices if a product or semi-product can be sold to external markets. Target cost (or standard cost) is used when no external market is available.<sup>1</sup> Breakdown of the responsibility costs requires commitment from senior management and managers (directors) of individual profit centers. Through consultations or negotiations, both sides must sign an agreement contract to specify the cost and profit targets to be achieved by each profit center and the necessary production support or services guaranteed by the headquarters.

The responsibility standards being assigned to primary production factories are further broken down within each profit center. In general, only the cost targets are disaggregated, step by step, to producing departments, processing sections, working groups or teams, and individual workers. Each of the subordinate units is treated as a cost center for the broken-down responsibility cost target (or spending standard). In order to facilitate performance measurement and evaluation, non-controllable common costs are excluded from the responsibility costs decomposed within primary production factories. Responsibility contracts between factory managers (directors) and managers or supervisors at lower levels must also be signed. At the lowest level of the cost control system, the responsibility cost for individual workers mainly consists of quantity/usage standard and/or price standard. In addition, the administrative units within primary production factories (e.g. engineering design and technical support, quality control, processing statistics, production recording, and general administration, etc.) would also be assigned with the responsibility costs as they are treated as supporting units to the profit centers concerned.

#### *System operation and monitoring control*

Implementation of the responsibility cost control system is within the responsibilities of senior management. The Chief-accountant (at the rank of deputy general-manager) is in charge of implementing the responsibility cost control system at companywide level, and co-ordinating the joint efforts by various administration departments at the headquarters to solve emerging issues in the operation of the cost control system.

<sup>1</sup>Under this approach the sum of the target costs (or target profits) for the 13 primary production factories may not equal the aggregated cost or profit targets set out for the Company as a whole because a safety margin may be set for breaking down the total responsibility costs, or a nominal profit margin is added at primary production factories derived from internal transfer pricing. The variances are reconciled by the DFA at the headquarters when it prepares the required financial statements for each production period.

Among functional administration departments, the DFA is the key player in the cost control system. The department, under direct leadership of the Chief-accountant, is responsible for designing, implementing, monitoring and evaluating the cost control system. For instance, the department must prepare cost and profit targets in terms of the strategic plans set out by the senior management and forward the projected responsibility costs or profits to other functional departments for review and verification. Breakdown of the aggregated responsibility targets to all profit centers and their subordinates is conducted by the department. In addition, the DFA is responsible for monthly and yearly reporting of the execution results of the responsibility cost control system. It also reports and analyzes the variances between actual outcomes and responsibility targets, and determines the necessary bonus rewards (or penalty) for each responsibility center in terms of the fulfillment of the cost and profit targets as specified in the responsibility contracts signed by managers at the headquarters and individual profit centers.

Other functional administration departments also play an active role in the cost control system. They not only offer necessary data input and verification for the preparation of responsibility cost targets but also participate in monitoring or controlling the implementation of those performance measures relating to their administrative functions (e.g. production control, engineering design and technical support, marketing and sales, purchase, quality control, human resources, etc.). Due to the built-in links in performance evaluation of functional administration departments and primary production factories, all administration departments are motivated to actively assist or ensure the fulfillment of responsibility standards by various responsibility centers within the Company. Although the emphasis of this cost control system is on the responsibility costs, other comprehensive responsibility measures such as production output, product mix, quality, usage/consumption rate, labor safety and protection, etc., are incorporated in the control system as well. Thus all responsibility centers are required to achieve a series of other responsibility standards as specified in the contract agreement and their performance will be monitored and assessed by the designated administration departments.

#### *Performance evaluation and reward scheme*

For performance evaluation, the senior management has paid particular attention to the fulfillment of responsibility cost targets at each level of responsibility centers (e.g. from the headquarters down to individual workers). A mechanism of 'cost-veto' is enforced. This means that the cost standards are applied as the most important indicator of responsibility performance. If a responsibility center or individual worker failed to meet the cost targets specified in the responsibility contracts, all bonus and other benefits relating to the responsibility unit or worker will be forfeited, even though other responsibility standards have been met. As the bonus accounts for a significant amount of income for managers and workers (about 40–50% of their total income), the effect of the 'cost-veto' mechanism is substantial and has forced individual responsibility centers and workers to do their best to achieve the cost targets.

The 'cost-veto' mechanism is rigidly enforced at all levels in the companywide responsibility chain. Exemption or exception is usually not permitted. For instance, within the Company, the Iron Smelting Factory may not be able to meet the cost targets because of disruption in supply of water, power or gas from auxiliary production plants, or the Steel Rolling Factory may fail to reach the targeted

costs owing to below-standard quality of steel blooms produced by the Steelwork Factory. It could be argued that those influential factors are non-controllable for the managers at the Iron Smelting Factory or the Steel Rolling Factory. However both factories would not receive bonuses from the headquarters as they failed to fulfill the responsibility cost targets. In addition, bonuses for the administrative units are tied into the implementation results of responsibility cost targets by the primary production factories which they are associated with. If a primary production factory failed to meet cost targets, all of its administrative units would also not receive bonus rewards. As addressed by the Company's Deputy general manager, the 'hard-binding' nature of responsibility costs would force all responsibility centers and their supporting or servicing units to work hard jointly to fulfill the cost targets (Li, 1999).

While adhering to the sternness of the responsibility cost targets, the control system incorporates some supplementary standards in the performance measurement and reward scheme to prevent potential negative effects or undesirable behaviors due to the 'cost-veto' mechanism. First, evaluation of the fulfillment of responsibility cost targets is allowed to be carried out on a cumulative basis, although monthly assessment is conducted. The total bonus rewards are divided into two parts: monthly bonuses (about 60%) and annual comprehensive bonus (around 40%). If a production factory incurred ¥10 000 overspending in its total responsibility costs in January, it could not receive any bonuses for the month. When the factory achieved cost savings with greater efforts in the following 2 months, the headquarters would pay bonuses for the 3 months in total so long as the cost savings in February and March exceeded ¥10 000. However, no monthly bonus would be paid in February or March if the cost savings in the 2 months, individually or combined, could not make up the overspending in January. Under the Company's existing reward scheme, benefits other than bonus (such as promotion and housing) will also be affected if a responsibility center or worker fails to reach responsibility cost targets in 3 consecutive months.

Second, a flexible budgeting technique has been utilized in establishing responsibility cost targets. Three levels of target cost are usually set for individual responsibility centers, sub-units and workers, i.e. 'benchmark cost', 'improvement cost', and 'high efficiency cost'. The 'benchmark cost' is the cost level that can be reached with normal efforts. The 'improvement cost' is a standard that requires substantial efforts to achieve. The 'high efficiency cost' can only be reached by a small number of responsibility centers or individual workers through great efforts in cost reduction. For instance, the responsibility costs at the First Steel Plant for the three levels of target are ¥1180, ¥1100, and ¥1040, respectively, as specified in the responsibility contract between the production plant and the Company's headquarters in 2000. A similar procedure is applied in setting other performance targets on a flexible basis. The 'cost-veto' mechanism is nonetheless applied based on the 'benchmark cost'. The other two levels of cost target serve as the measures for top-up bonus but would not affect the primary bonus for individual responsibility centers and workers.

Third, performance evaluation will also consider the achievement of other related responsibility standards such as production output, product mix, quality, usage/consumption rates, labor safety and protection, and so on. Bonuses are set separately for each of those responsibility targets. Thus the reward scheme will motivate individual responsibility centers and workers to fulfill other responsibility standards beyond the cost targets. However the incentive role of other responsibility measurements is secondary subject to the 'cost-veto' mechanism.

Finally the control of responsibility costs is carried out from the headquarters down to individual workers at the front lines of production. The responsibility cost target for individual workers consists of quantity and price standards. The price/rate standard is determined based on the anticipated market prices and announced on the first day of each week by each profit center (e.g. primary production factories). Measurement of a worker's performance is, in fact, based upon his/her fulfillment of the quantity/spending standard. Individual workers could then self-assess their performance by multiplying the pre-set price/rate standard and their actual spending/quantity amount on each working day. They could determine or project their daily income and bonus. Such a mechanism has in fact motivated workers to consciously reduce production spending (or costs) and raise productivity, thus to ensure an effective operation of the responsibility cost control system.

## 7. Outcomes of the cost control system

The responsibility cost control system installed at Han Dan Company in the early 1990s has yielded satisfactory outcomes. Managers and workers participating in our interviews agreed overwhelmingly that the responsibility cost control system has contributed positively to a significant reduction in production spending or product costs, and greatly enhanced the Company's productivity and profitability. As demonstrated by Exhibit 2 compiled from accounting records for the period after the new cost system was installed in the early 1990s, the Company has again made profits consecutively from 1991 to 2000. Relatively speaking, the costs of all products have been under control even though the prices of raw materials and utilities (e.g. electricity and water supply) kept rising sharply in passing years. According to data provided by the DFA, the Company's product costs, although increased slightly in absolute amount, had been continuously reduced by about 5 per cent per year, on average, from 1991 to 1999 after adjustment of price changes for raw materials and utility costs. Therefore the cost control system has led to a significant improvement in the Company's productivity and profitability. This is also confirmed by an official report issued by a study group organized by the State Commission on Economic Reforms and Development that the responsibility cost control system had enabled Han Dan Company to achieve a high degree of effectiveness in cost reduction and profitability improvement although a majority of SOEs in China continued to suffer losses in the same period.<sup>2</sup>

Today, Han Dan Company has become a showcase of business restructuring of SOEs well recognized by the government and business community in China.<sup>3</sup> The Company's production capacity has expanded continuously through technological renovations and restructuring based on the increased amount of retained profits from operations. Currently most of the Company's technical and financial indexes for iron and steel production are among the leading industrial standards in China (Li, 1999).

<sup>2</sup>See *The People's Daily*, (Overseas Edition), March 16, 1999.

<sup>3</sup>For instance, more than 100 000 people from 14 000 business entities in China have paid visits to Han Dan Company to study the 'Han Dan experience' in recent years (see *The People's Daily*, (Overseas Edition), March 16, 1998).

Exhibit 2

Profit and Cost Data of Han Dan Iron and Steel Company, 1991–2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<b>Net profit</b> (million ¥)	1.00	50.20	149.15	453.79	779.60	709.49	701.68	502.95	504.81	604.23	722.14
<b>Cost of iron</b> (¥/ton)	449.00	498.00	585.00	820.00	858.00	858.00	911.00	925.00	948.00	931.00	936.00
<b>Cost of steel</b> (¥/ton)	790.00	836.00	943.00	1338.00	1262.00	1291.00	1313.00	1336.00	1321.00	1301.00	1319.00
<b>Cost of shaped steel</b> (¥/ton)	1026.00	1090.00	1231.00	1614.00	1497.00	1468.00	1468.00	1540.00	1522.00	1496.00	1508.00

## 8. Discussions

The responsibility cost control system at Han Dan Company is a successful experiment of management accounting in China where reforms towards a market-oriented economy are underway. The new cost control system was introduced by the Company as an effort to adopt innovative management and accounting practices to overcome its operating difficulties and meet the new challenges of the emerging markets. This experience provides evidence that the advanced management accounting practices initiated in the industrialized world can be effectively transferred to LDCs when significant changes took place or when economic shock or performance gap become apparent. Nonetheless, the cost control system at Han Dan does not apply the Western management accounting techniques mechanically. It has in fact integrated a series of important management accounting procedures and techniques to serve the purpose of cost control throughout the entire responsibility chain, including standard costing, target cost and profit, flexible budgeting, responsibility accounting, internal transfer pricing, variance analysis, performance evaluation, incentive programs, and so on. Aimed at effective cost reduction and fulfillment of responsibility standards the cost control system has contributed to stimulating the production initiatives of individual producing and administrative departments and workers and to raise the firm's productivity and profitability continuously. Our investigation indicates the system is working well with desirable outcomes at Han Dan Company.

The responsibility cost control system is built up by a top-down approach. The responsibility standards (cost and profit targets) are established with direct market input and intracompany transfer pricing procedures. Thus the cost control system could reflect market pressures and enhance the relevance of cost control to the strategic goals of business survival and growth under continuously changing market conditions. The decomposition of overall responsibility costs to individual producing units and managers or workers along the responsibility chain facilitates not only the assignment and implementation of the responsibility standards for cost control, but also the monitoring and reporting of the operation of the cost control system. By establishing and implementing responsibility cost targets the system has in fact shifted the emphasis of cost control from the *ex-post* to *ex-ante* basis and enhanced the effectiveness of cost management. In addition, the breakdown of responsibility cost targets along the organizational responsibility chain would have stimulated

the production initiatives of all responsibility units and workers as well as their enthusiasm in cost reduction. Hence the system is able to promote goal congruence for making joint-efforts to reach the overall cost and profit targets.

More importantly the responsibility cost standards are set on a 'hard-binding' basis. The stringent enforcement of responsibility standards is regarded as a 'must' for the success of the cost control system installed at Han Dan. In addition, the Company has linked employees' income or benefits to actual cost savings of individual responsibility centers/workers to solve the problems of lacking accountability and low productivity under the traditional government-oriented business administration system. Maintaining a stern pressure of the responsibility costs through the stringent enforcement processes is a significant improvement in contrast to the 'soft-binding' production planning and control under the former governmental business administration in China. In particular, the mechanism of 'cost-veto' is critical and has served as an effective tool to implement the cost control system since the fulfillment of responsibility cost targets would directly affect personal income and other benefits of individual managers and workers.

Effective operation of the cost control system depends upon sound incentive programs associated with the system. The key is to set a direct link (e.g. bonus rewards and penalty) between the implementation outcomes of responsibility standards and the income or other benefits of managers and workers at various levels. This incentive mechanism motivates all participating units or workers to achieve their responsibility targets enthusiastically. At Han Dan the design of three level responsibility cost standards through a flexible budgeting technique and the use of 3-month rollover evaluation criteria had encouraged continuing improvement in cost control. Also, performance evaluation based on multifold responsibility standards, such as profit, production output, quality, technical or production spending, labor safety, etc., cannot only ensure a stringent implementation of cost targets, but also prevent potential short-term behaviors at the expense of other production targets. It is worthy of notice that the responsibility standards for individual workers at production lines are set in advance and updated at a regular interval. Such a responsibility measure could facilitate individual workers to self-assess the production output and their income in advance, and is an effective built-in incentive to maximize the performance of individual workers.

The responsibility cost control system at Han Dan Company is still in progress. Although many Western management accounting techniques have been integratively incorporated in the cost control system, further analysis and diagnostic overhaul would be beneficial to the system refinement. In particular, the cost control system could be improved in certain aspects. For example, the determination, measurement, and evaluation of the responsibility cost targets are mainly based on direct costs or expenses, while simplified procedures are adopted to account for indirect or common costs in the existing cost control system. Lack of analyzing cost drivers and cost behavior of indirect or common costs may distort the performance evaluation of responsibility centers or the accuracy and relevance of cost information to management's decision needs (Atkinson *et al.*, 1997; Kaplan, 1998). Thus recent innovations in Western management accounting (such as ABC and JIT) should be further incorporated in the cost control system. It is also necessary to examine whether the existing procedures for dealing with non-controllable factors in performance evaluation and the reward scheme at the Company might

have certain unfavorable behavioral impacts on individual responsibility centers or workers. During our interviews, a few managers at producing factories or serving departments expressed concern about whether they might have been penalized by factors out of their control under the existing 'cost-veto' mechanism. This problem is worthy of further attention and should be more carefully dealt with in refining the responsibility cost control system.

## 9. Implications

The Han Dan experience demonstrates that management accounting can play a very important part in business management in China or other LDCs. Business management and accounting practices are relatively weak in most developing countries in contrast to those in the industrialized world. However, effectively adopting the advanced management and accounting practices from the developed countries with necessary adaptation in terms of specific local business conditions will contribute to improving business management significantly and raise the operating efficiency and profitability substantially in LDCs. The Han Dan case provides convincing evidence that diffusion of management innovations to LDCs is not necessarily 'sub-optimum'. The Han Dan experience will not only be applicable to other business enterprises in China, but also beneficial to improving business management in other developing countries.

The Han Dan case confirms the necessity and feasibility of diffusing innovative management practices under different social and economic systems. Our study results support the theory of 'institutional isomorphism' that business enterprises will be motivated to adopt management innovations (including advanced accounting practices) from leading enterprises or other countries when they are facing significant changes in social and business environment or when they need to find a remedy to bridge 'performance gap'. As illustrated by the Han Dan case, rapid changes in China's economic and business administration systems (such as the deregulation of governmental control and increasing exposure to market pressures) and the operating difficulties encountered in the early 1990s are the necessary stimulus for the Company to adopt Western management accounting in developing the responsibility cost control system to improve its operating efficiency and effectiveness in production.

Although economic shock and 'performance gap' are necessary conditions for diffusion of innovative management practices into LDCs, they are not sufficient conditions. For instance, a fairly large number of SOEs in China, though under similar economic and operational situations to Han Dan Company, did not apply the responsibility cost control system effectively. Thus a successful adoption of Western management accounting practices should also be subject to specific conditions and management efforts in individual enterprises. For the Han Dan case, two particular conditions were generally agreed upon among our interviewees as the important internal factors contributing to the success of the responsibility cost control system. One is the professional qualification of management teams, the senior management in particular. More specifically it depends upon whether the senior executives and functional managers possess the spirit of entrepreneurship and can embrace innovations in business operations. Management's enthusiasm and ability for the



design, implementation, control and monitoring of the responsibility cost control system is a 'must' for effective operation of the new system. This may explain why such a cost control system has not been applied by some other enterprises in China. At present, most Chinese managers at SOEs are directly appointed by government authorities and lack training and skills for business administration contextual to market pressures. Another sufficient condition relates to a balance of decentralization and centralization in business administration structure (DeCaino *et al.*, 2001). A key mechanism in the responsibility cost control system at Han Dan lies in the decomposition of the overall responsibility targets along the responsibility chain within the entire Company. This requires firm commitment and contribution from managers at the headquarters and individual responsibility centers. In particular, managers and workers at various levels must be motivated to be actively involved in the cost control system. Proper balancing of the responsibility of senior and junior managers is thus another sufficient condition for successful operation of the cost control system at Han Dan Company. It is contended that an analysis of the necessary and sufficient conditions is pertinent to other enterprises in China, and should be a useful reference for the diffusion of advanced management and accounting practices in LDCs.

#### 10. Concluding remarks

The responsibility cost control system at Han Dan Iron and Steel Company is designed to cope with the problems of ineffective production and low profitability derived from the traditional business administration system dominated by governmental planning and control in China. The 'Han Dan experience' illustrates that management accounting or management-oriented accounting measures and procedures can play a positive role in Chinese business management. In pace with the progress of economic reforms or industrial restructuring, Chinese enterprises have increasingly embraced direct competition in the markets. They must dramatically improve their productivity and profitability to survive and grow in the new business environment. The management of Han Dan Company has focused particularly upon cost control, integrated with the application of responsibility accounting and incentive programs, to achieve significant cost reduction and profitability improvement. This experiment of employing management accounting techniques as well as encouraging an active participation of all internal units and workers in cost management could be a useful reference to other enterprises in China and other LDCs. Chinese accountants should extend the studies and application of management accounting in business management. In addition, the Han Dan experience may provide an insight into effective diffusion of management accounting practices under varied social and economic systems and promote a globalization of innovative management accounting practices.

Our study of the responsibility cost control system is limited to field interviews and on-site observations at Han Dan Company, with an emphasis of understanding or qualitative analysis of the principles and mechanisms underlying the design and operation of the cost control system. Although we have examined the cost system from the perspective of integrative application of management accounting techniques or procedures at the Company, we did not conduct detailed analysis and

empirical testing of relevant management accounting theories. Effective diffusion of Western management accounting in LDCs requires a serious analysis of the influential factors (both impetus and impediment) from the specific economic, social or cultural perspectives, so the similarity or difference in the application of management accounting in LDCs and the industrialized world deserves further studies in future.

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### **Appendix. Interview question checklist**

- (1) In your opinion, what is the relationship between cost control and operating effectiveness/efficiency or profitability?
- (2) What are the main motives for Han Dan Company to introduce the 'responsibility cost control system'? or, more specifically, why was the new cost control system introduced at your Company in the early 1990s?
- (3) What are the main differences between the 'responsibility cost control system' and the old costing system installed in your Company before 1990?
- (4) What are the basic principles, design components, and operational mechanisms of the 'responsibility cost control system'?
- (5) What were the main difficulties encountered during the implementation of the 'responsibility cost control system?' and how have those difficulties been overcome?
- (6) Why and how have the advanced Western management accounting practices been adopted or adapted in the design and implementation of the 'responsibility cost control system' at your Company?
- (7) What are the influential factors for a successful adoption of the advanced management and accounting practices from the industrialized countries under the specific business environment in China?
- (8) As a manager (director) of a production unit, how would you feel the 'responsibility cost control system' contributes to raise productivity and operating effectiveness? or, as an administrator, how would you feel the 'responsibility cost control system' contributes to enhance efficiency in business administration?
- (9) In your opinion, what are the main benefits or advantages of the 'responsibility cost control system' being implemented at your Company?
- (10) Why is the 'responsibility cost control system' a success at your Company? and what are the main determinants contributing to the effective operation of the cost control system at your Company?

- (11) In your opinion, are there any areas in the existing cost control system that should be further improved? or how can the improvements, if any, be incorporated into the existing cost control system?
- (12) Based on the experience at your Company, do you agree the 'responsibility cost control system' can also be successfully adopted in other SOEs in China? Why?

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