

Full Length Research Paper

Target performance management for an international shipping harbor: An integration activity-based budgeting with a balanced scorecard approach, the case of Keelung Harbor

Wen Cheng Lin^{1*} and Shmuel Yahalom²

¹Faculty of Business and Administration, Ching Yun University, Taiwan, R.O.C., Taiwan.

²State University of New York, Maritime College, USA

Accepted 24 August, 2009

The economy of Taiwan heavily depends on sea transportation. Port planning and development are related to the trade growth and changes in industrial structure. Keelung Harbor, located in northern Taiwan and built in 1886, is the second largest commercial port in Taiwan. Keelung Harbor's container throughput was 2108K TEUs in 1996, but it decreased to 2055K TEUs in 2008. Due to the competitive environment, Keelung Harbor must pay more attention to operational efficiency and devise an overall performance evaluation. Balanced scorecard (BSC) is a system of performance evaluation; activity-based budgeting (ABB) follows the organization's need to budget. The two systems can help a firm reach the performance target that BSC sets. In order to evaluate the overall performance of Keelung Harbor, the authors design an evaluation system integrating balanced scorecard with activity-based budgeting to control cost and examine the achievement rate of target performance. The results of this study indicate that an organization's target and resources can be integrated by employing the BSC and ABB systems. The results of the study can be applied to Keelung Harbor stevedoring and warehousing operations in order to improve their operations and to become a guide to other ports as well. The determination of a port's needs could be obtained using Analytic Hierarchy Process (AHP) methods.

Key words: Balanced scorecard (BSC), activity-based budgeting (ABB), target performance, management, analytic hierarchy process (AHP)

INTRODUCTION

Port planning and development in general are all associated with trade growth and changes in industrial structure. Many ports in Asia have invested in new equipment and in improving port facilities. To cope with global competition and remain competitive, the government must provide a strategy for future growth. The economy of Taiwan heavily depends on sea transportation. Taiwan is also a hub center along the American-European route. With its exceptional geographical location and well established facilities, Taiwan can play an important role in the global economy and ocean trade. The government could also contribute to policy for the Asian-Pacific Operational Center by taking advantage of Taiwan's geographical location and its involvement in port opera-

tion liberalization and the plans to upgrade Taiwan's trading country status.

In managing the port, the port authority should prepare a performance evaluation that would help it operate the port based on long-term benefits. The principles imbedded in Balanced Scorecard can achieve multiple objectives: organization balance of the short-term operations and long-term tactical goals. Thereby, the port authority can reach an effective performance and improve the port's competitiveness.

Keelung Harbor is the northern exports hub of Taiwan and the second largest port in Taiwan. With an increase in competition, an organization could improve its competing edge using performance measures and other methods in order to improve its external and internal operations environment. Kaplan and Norton (1992) indicated: if you cannot measure it, you cannot manage it. Kaplan and Norton develop a Balance Scorecard (BSC) method that can be used as a management and measurement tool. It focuses internal process, customer, learning and growth.

*Corresponding author. E-mail: lwcheng@cyu.edu.tw. Tel: +886-3-4581196 ext. 7112. Fax: +886-3-2503905.

Furthermore, it also considers short-term financial and long-term competing edge aspects. Facing strong competition from other ports in the region, Keelung Port must pay attention to efficiency and effectiveness. Thus, the Port should design a system of performance evaluation. This paper applies the BSC to Keelung Harbor in order to improve the Ports ability to measure its performance.

Budgeting is essential to good performance. A budget system, if planned appropriately, can provide efficiency measurements to assure that the operation is on track to enhance performance. In the traditional budgeting system, next year's budget is based on the current year's budget with a small percent increase or decrease. This budgeting methodology increases the budget from year to year but it does not ensure the benefits of performance improvement. There are shortcomings in traditional budget system. The Activity-Based Budgeting (ABB) system was developed to overcome the shortcomings by combining the activities and the budget. Budgeting based on actual demand, can help an organization control cost and raise its performance level effectively. This paper integrates the ABB with the BSC in order to improve the performance of Keelung Harbor with respect to competitiveness. The purposes of this paper are to:

- Demonstrate how Keelung Harbor can use its ABC and BSC systems complementarily. In addition, our framework introduces an approach of linking the key performance measures of a BSC directly to Keelung Harbor's overall goals or objectives. Specifically, it illustrates how the questionnaire survey can facilitate that linkage.
- Integrate the ABB system with the BSC, in order to improve the operation efficiency and upgrade the management performance strategy.

The paper is organized as follows: a literature review and proposition development: followed by a case study of Keelung Harbor. The application of ABB to stevedoring and warehousing of Keelung Harbor is reported. The paper ends with a conclusion, discussion and suggestions for future research.

Literature review

A firm's long-term strategy is to draft a plan consistent with long-term goals. In a changing business environment, enterprises must design management and operation strategies for continuous growth. Furthermore, organizations must also design a control system to assure the effectiveness of the action including a control system that includes execution strategies and information feedback.

Balanced scorecard (BSC)

The Balanced Scorecard is a management and evaluation tool for system performance evaluation and management

strategy. It can facilitate in planning and executing strategy, pointing out problems at any time, obtaining the common understanding and support from the staff and making strategies for continued organizational success.

Kaplan and Norton developed the BSC in 1992 by comparing performance measures. Kaplan and Norton believed that evaluating the performance of a company using only financial measures has a negative influence on the enterprise value; thus, an alternative evaluation tool for evaluating performance must be developed. Hence, the Balanced Scorecard was developed.

Kaplan and Norton BSC are used to measure financial performances that drive future performance improvement. It also links the performance indicators with corporate strategies. BSC creates a new performance management structure and completes a full cycle derived from corporate vision and strategies through financial perspective, customer perspective, internal business perspective, learning and growth perspective and back to the corporate vision. These multi forces construct an organizational strategy with clear and rigorous concept and form specific goals and measurements. The BSC takes the future growth of a company into consideration while pursuing sales growth. In general, the BSC is an operating measurement system and a strategic management system used for long-term strategic planning. Figure 1 displays the BSC framework to transform a strategy into operations.

The four perspectives of BSC include:

Financial perspective: Financial perspective considers the strategy from the perspective of investors. It can also reveal the past performance of a firm. The impact of implementation and execution of corporate strategy on sales growth can be measured by financial performance. For example, when an enterprise is focused on reducing cost and increasing productivity, the revenue per employee may be an appropriate indicator. When the enterprise is focused on asset utilization, the sales per dollar may be an appropriate indicator. Furthermore, the perspectives chosen by BSC are all linked and are closely related for the purpose of improving financial performance.

Customer perspective: Based on the target customers and market segment, the customer perspective adjusts to key measures: customer satisfaction, customer retention and loyalty, customer acquisition and customer profitability. Figure 2 displays the causality chain of customer perspective. The above mentioned measures are useful for any organization. Enterprises must set the goal of potential profitability or the groups of potential customer based on their organizational characteristic and revise these measures properly.

Internal process perspective: With limited resources, enterprises need to consider customer need and shareholder preference in order to allocate internal resources

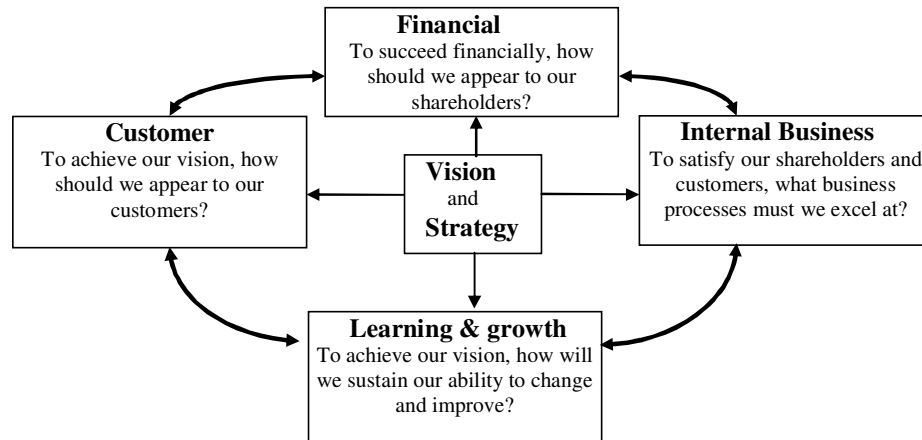


Figure 1. Balanced scorecard as a strategic management system (from Kaplan and Norton, 1996. *The Balance Scorecard*. Harvard Business School Press: 9, Original from HBR Jan/Feb 1996, p.76.).

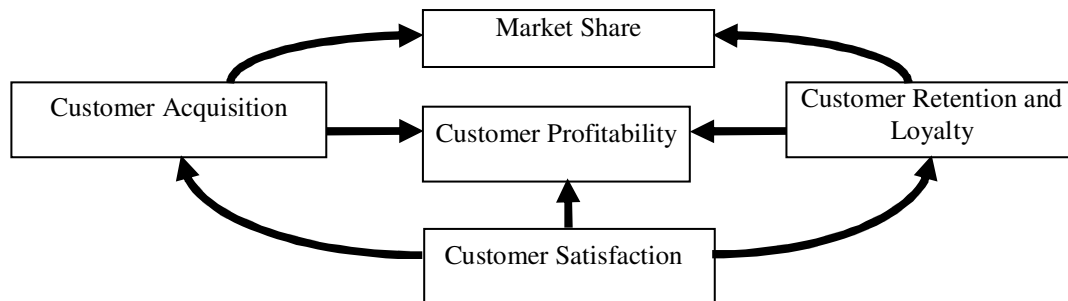


Figure 2. Customer perspective-key measures (from Cho, C. W., Haddad, K., Wu, A. N. and Shi, N. D., 2001).

effectively. So the order of developing a BSC is usually as follows: enterprises usually set the goal and measure of financial perspective and customer perspective first. Then, they follow by setting the measure of internal processes. Following the order of developing a BSC, enterprises can develop internal operation procedures that are closely related to customers' needs and shareholder profits.

Study and growth perspective: The study and growth perspective links the critical success factors from the other perspectives and ensures an environment that supports the other three objectives. The critical success factors center on three areas. The first is the efficient and effective use of employees (employee empowerment). The measures include improving employee morale, increasing skill development, increasing employee satisfaction, reducing employee turnover and increasing the participation of employees in the decision making process. The second critical success factor is increasing the information systems capabilities through improving the availability and timeliness of information. The third critical success factor involves measures of product innovation, such as increasing the number of new

products, new patents and so on.

Activity-based cost system (ABC)

ABC divides the manufacturing procedure of the products into a series of activities and allocates overhead cost to every activity first. Then, based on activity consumption of every kind of product, ABC directly allocates overhead cost to products. Production cost is allocated through cost driver method in two stages that can avoid cost distortion. The differences between ABC and traditional cost accounting system is the method of allocation of costs.

The ABC system is traced back to every activity and utilizes cost driver method to trace cost. However, the traditional cost system utilizes indirect cost method to allocate cost to its related cost center first and to products later. ABC uses a lot of cost the drivers, but the traditional cost system usually uses only a type of cost driver. Figure 3 displays this framework. Wegmann (2009) has analyzed several ABC applications of multidimensional accounting systems. Today, managers want specific applications with a high degree of modularity: a process costing system for

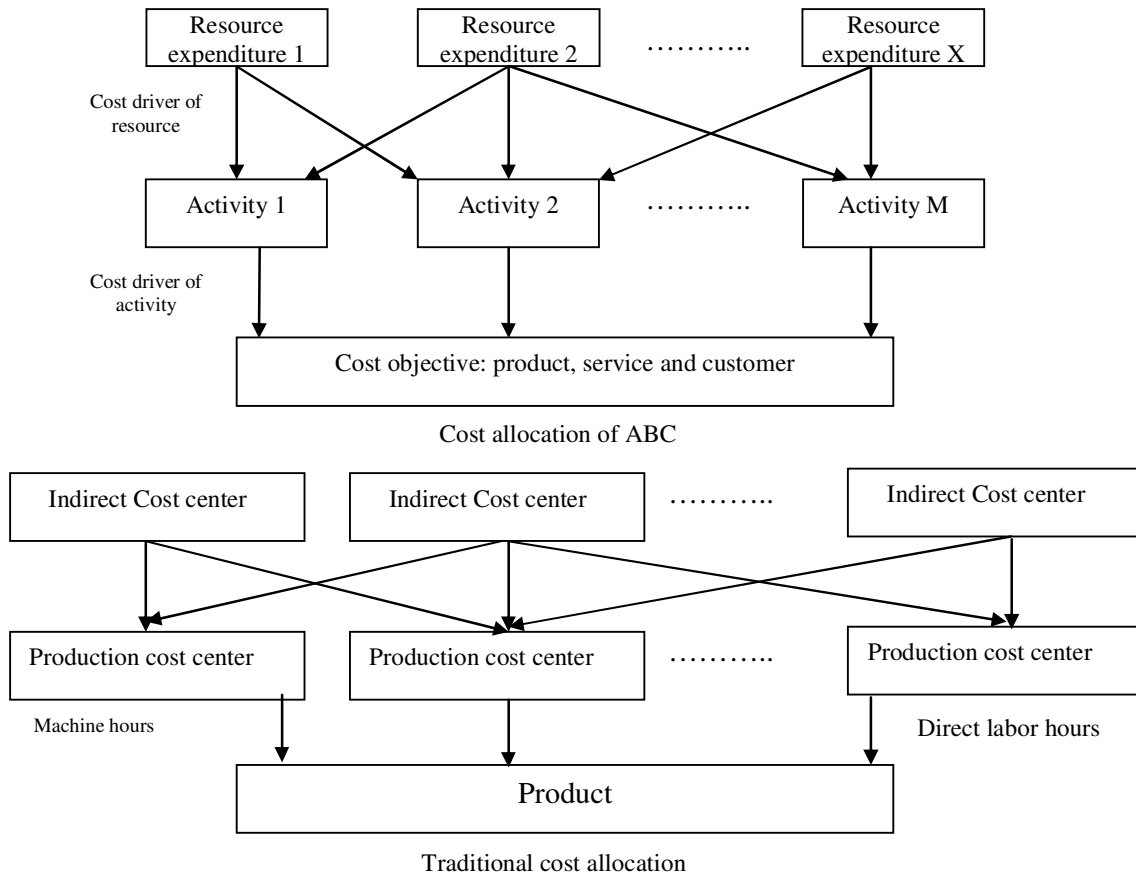


Figure 3. Two types of cost allocation (from Kaplan and Cooper, 1998).

a standard production, combined with a customer-driven ABC and a time-driven ABC for very complex activities.

Integration BSC with ABC

The integration between BSC and ABC is based on the work of Matthew and Miller (1988), Wu (2003).

(1) Matthew and Miller (1988) consider ABC and BSC as decision tools. The integration of ABC and BSC provides enterprises with tools to make decision more efficiently. How are BSC and ABC integrated? It starts with ABC. From the strategies aspects, ABC offers a better cost-benefit analysis than the traditional accounting method. Enterprises can seek case of higher profitability and improve the efficiency of strategy development. After developing the strategy, the firm sets performance goal based on BSC, supervise the enterprise on every activity and measure the efficiency. Meanwhile, because ABC offers better cost and resource consumption information, it helps the enterprises improve the exactness of performance measurements.

(2) The literature suggests that the BSC and ABC can independently improve the performance of firms that

implement the processes well. However, there is evidence that implementation of both of these innovations have not been as successful as hoped or as suggested in the literature. Shields (1995) claim that while performance enhancing programs can be individually effective, they have been implemented in ways that lack balance with competing priorities, thus resulting in a reduction or no increase in performance.

(3) Newing (1995) suggests that the BSC works well in conjunction with ABC and Activity-based management (ABM) because they are integral parts of the BSC giving quantified visibility of what is really driving cost from outside the business, as well as within. ABC is a system that attempts to accurately link the consumption of resources to designated outputs. Because of this, ABC is likely to facilitate the measurements within all four of the BSC sectors as well as assisting in analyzing the trade-off implicit in the four sectors.

(4) Maiga and Jacobs (2003) tested effects between BSC and ABC based on survey data obtained from a sample of manufacturing units, the results indicate that each of the four BSC perspectives interacts with ABC to affect performance.

(5) Wu (2003) views that ABC provides better cost information in the four perspectives of BSC. While running

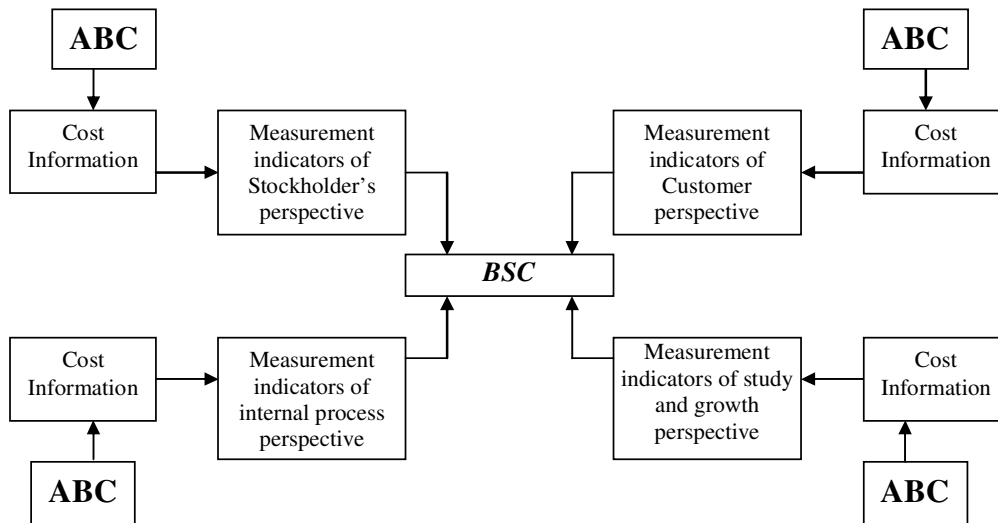


Figure 4. The integration BSC with ABC (Wu, 2003).

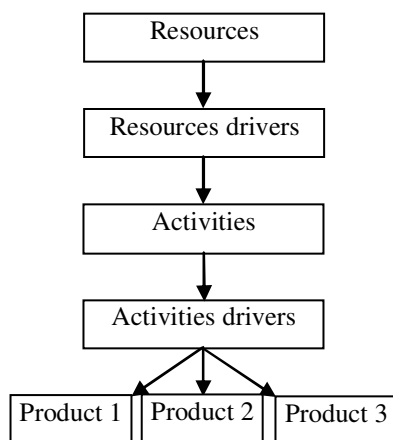


Figure 5. The relationship between ABC and ABB (from Kaplan and Cooper, 1998, p. 468).

the business and taking four perspectives into consideration, enterprises can increase the operating performance. Figure 4 displays this concept.

According to the views of the above literature, BSC and ABC play different roles, respectively. BSC offers an overall structure of organizational management from the basic target to the top target. Following the clearly defined target, an organization can improve performance. ABC offers to the firms' management information needed by a decision-maker. Furthermore, the organization can realize the desired performance and improve non-added activities through the cost allocation of ABC in order to attain the set goals of BSC. Thus, BSC and ABC are tools of performance management. This paper integrates BSC with ABC to achieve an integrated function in performance

management. By integrating the ABC system with the BSC, we expect to improve the operation efficiency and upgrade the performance of strategy management.

ABC Influence on the budget

Kaplan and Cooper (1998) viewed that the budgeting of ABB moves reversely from the cause and effect of ABC system. It starts from next year estimated activities through consumption information by accountants deciding the resources that should be offered in next year. Figure 5 displays the relationship between ABB and ABC.

Case study

The priority order of this paper is described in Figure 6. It provides the concept that integrates ABC system with BSC in order to improve operation efficiency and upgrade the performance of management strategy.

Case introduction

This part introduces the environment and organization of Keelung Harbor Bureau, Stevedoring and Warehousing Department in order to conduct a case study on planning and design of BSC and ABC.

Keelung Harbor, located in northern Taiwan and built in 1886, is the second largest commercial port in Taiwan. The containers throughout of Keelung Harbor were 2108K TEUs in 1996, but the containers throughout decreased to 2055K TEUs in 2008. Due to the competitive environment, Keelung Harbor is a natural harbor and the hub center along the American-European route. Keelung Harbor due to its geographical advantage, has become popular and

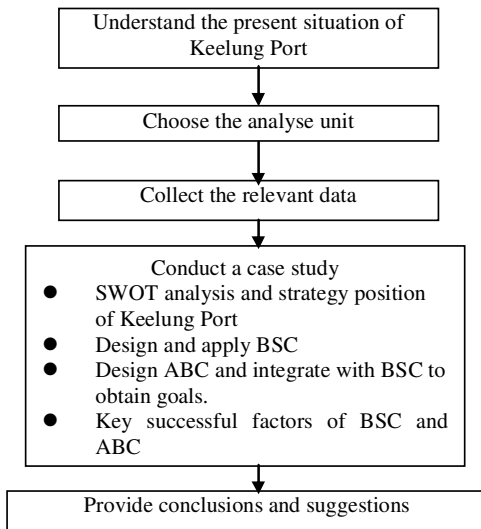


Figure 6. Flow chart of case study

among the cargo owners and ocean carriers; many carriers call Keelung Harbor. So the loading and discharging business grew vigorously for many years. For decades, containerized cargos of the northern Taiwan accounted for half of the overall cargo of Taiwan while bulk cargos declined. So Keelung Harbor progressively constructed more container terminals in order to satisfy the need of the container business. By now it has already reconstructed and finished 14 container terminals. Both general loading and discharging machines and ships can meet users' needs. With respect to storage facilities, Keelung Harbor has 20 general Marshalling Yards, three Container Freight Stations, 18 general warehouses and one granary.

With respect to operation, due to terrain restriction, Keelung Harbor does not have the space to extend and the water depth of some areas of Keelung Harbor is insufficient. These shortcomings impact the operation of the new large-scale machines and complicate transportation between the wharves. In addition, the traffic jam in the urban area also impacts the loading and discharging and urban transportation plans cannot be implemented because of populations' objections.

SWOT analysis of Keelung Harbor

The strategic planning analysis for Keelung Harbor is by using the SWOT methodology. SWOT is short for strength, weak, opportunities and threat. Strength analysis implies facing the challenge and competition; i.e, Keelung Harbor must pay more attention to operational efficiency and devise an overall performance evaluation. what are the enterprise's advantages and strong points? Weak analysis implies an analysis of the weak aspects of

enterprise in planning. Opportunity analysis is an attempt to check the external environment after the strength and weakness analysis are completed. Finally, the possible threat analysis implies taking precautionary steps in order to increase the probability of success. Through SWOT analysis, enterprises provide references for the future and realize the current environment. Due to the link with every aspect of BSC, an organization must develop an operations strategy. Thus, planning strategy is important to the BSC; SWOT analysis plays an important role in the planning strategy. SWOT analysis of Keelung Port is as follows:

Strength

1. Keelung Harbor has implemented privatization progressively and has encouraged joint venture so that the ocean carriers cooperate with specialists in loading and discharging in order to organize new companies and improve the operation efficiency. After privatization, the average loading and discharging time of each container ship shortened, which improved the operation efficiency of the container ship.
2. The bulk cargo wharves will be reconstructed in the container terminal. The old storage facilities are removed. This will help Keelung Harbor alleviate its space problem.

Weak

1. The traffic jam caused by connecting roads with the rest of the transportation system is causing a bottleneck in Keelung Harbor; the speed of transporting is reduced significantly.
2. The water depth of port is insufficient, thus, Panamax ship class vessels are unable to call the Port. With the trend of ship size maximization, Keelung Harbor must reconstruct its facilities appropriately and dredge the wharves.

Opportunity

1. Cross-Straits relationship developments between China and Taiwan provide Keelung Harbor with a win-win opportunity to maintain growth.
2. Taking advantage of the port liberalization policy, Keelung Harbor must simplify the processing procedures and open the loading and discharging operation to the private sector.
3. In light of government plan for an Asian-Pacific Operational Centre, Keelung Harbor must accelerate the reconstruction and upgrade port facilities.
4. Strengthening the functions of auxiliary port, Su-Oao port. In order to share the bulk cargos of Keelung Harbor, the Port must increase the efficiency of loading and discharging of containers.

Threat

1. China has advantages in the following areas: richness in natural resources, vast lands and low salary. Keelung Harbor must rise to the challenge of a future low port tariff of every coastal port in China, especially the threat coming from Shanghai Port. The emergence of the Pusan Port of Korea also impacts the number of containers.
2. The rise of environmental concerns threatens the construction and operation of Keelung Harbor.
3. Once Taipei Port is in operation, it will have an impact on Keelung Harbor. Taipei Port was originally constructed as a supporting port for Keelung Harbor. However, because of water depth and BOT development, the container handling volume of Taipei Port might be larger than that of Keelung Harbor, causing Taipei Port to gradually replace Keelung Harbor as the major northern commercial port of Taiwan.

Facilitate the linkage between BSC with ABC through analytic hierarchy process (AHP)

The AHP method was developed by Saaty (1977, 1991 and 1999). It is a multi-criteria decision-making method (of the third generation which was mentioned in the previous section), and provides for alternative prioritization. The AHP is based on the use of pair-wise comparisons, which lead to a detailed ratio scale. Moreover, the AHP provides for refining of the decision-making process while examining the global coherence of the user's preferences, as it can include the calculation of an overall consistency ratio. Saaty scales are likely to be used when performing these comparisons. Pair-wise comparisons generate square matrices, the diagonal elements of which are equal to 1 while the other elements verify the fact that, for i different from j , both inferior to the matrix dimension, the i - j element is equal to the inverse of the j - i element. Priorities are then determined, thanks to these matrices; then a global consistency test can be performed to judge of the coherence the user's judgments.

The AHP allows group decision making, where group members can use their experience, values and knowledge to break down a problem into a hierarchy and solve it by the AHP steps. Brainstorming and sharing ideas and insights (inherent in the use of Expert Choice in a group setting) often leads to a more complete representation and understanding of the issues. This study's chosen strategic goals and measurement indicators are defined using the modified Delphi method. Harbor bureau administrators (such as director-general, deputy director-general and stevedoring & warehousing dept. officer) and government officers (port expert) altogether from ten expert areas were chosen. Then they were issued a preliminary questionnaire in which four perspectives evaluation criteria based on BSC framework were incorporated (see Table 1).

Implement the BSC For Keelung Harbor

After a SWOT analysis, we can plan and design the BSC for Keelung Harbor as follows:

Identify the overall strategy: The structure of BSC begins with the business's overall strategies. The strategies are based on the analysis of a competitive operating environment as well as the vision and mission of the harbor. As revealed in SWOT analysis, Keelung Harbor faces fierce competition from foreign international ports as well as domestic ports, especially Kaohsiung and Taipei Harbors. In addition, the further development of Keelung Harbor is restricted by geographical limitations. Thus, Keelung Harbor's improvements must be through performance, i.e., operations efficiency. In order to maximize profit, Keelung Harbor can start by mitigating operating costs, increasing revenue from customers by improving services and increasing market share possibly by offering a competitive port tariff. Therefore, the three strategies, as shown in the first part of Figure 7, are (i) minimize cost, (ii) increase market share, and (iii) increase customer satisfaction.

Convert overall strategy into department's strategy: Following the identification of Keelung Harbor's overall strategies, the next step is to convert these strategies into sub-strategies for each department. These department strategies must be linked to operation and guide the efforts of department staff members toward the overall port strategy. In this study we emphasis the role of the Stevedoring and Warehousing Department. The sub-strategies for these departments are the rationalization of terminal tariff (to obtain more revenue) and the control of expenses, as shown in the last part of Figure 7.

Development of BSC for Stevedoring and warehousing: In order to rationalize the terminal tariff and control expenses, we developed strategic goals for each perspective of the BSC that is applicable in the Stevedoring and Warehousing Departments. These strategic goals are key factors that indicate steps that should be taken for staff members that would lead toward success. To reach the strategic goals, we should select measurement indicators that guide the staff members in the right direction. The strategic goals and related measurement indicators of financial, customer, internal process, study and growth perspectives of BSC are self-explained in the first three columns of Table 1.

Establish short-term goals: The final step in applying BSC is to establish short-term goals of each strategic measurement indicator for the next period based on ABC conceptual technique. Short-term operating goals are different from strategic goals in that strategic goals are long-term in nature which the business via its vision. Short-term operating goals are the performance realized in the short-term. Through each subsequent period of short-term goals, the business can obtain its strategic goals gradually. The set of short-term operating goals

Table 1. Strategic goals, measurement indicators and short-term goals of every measurement indicator.

Perspective	Strategic goals	Measurement indicators	Short-term operating goals
Financial perspective	Mitigating operating cost	To reduce operating cost	Decrease operating cost through increasing operating efficiency
	Staff downsized	To reduce personnel cost	Decrease personnel cost through increasing staff efficiency
	Enhancing staff productivity	To increase staff efficiency	Perform above the average value of the highest three months of last year
	Competitive terminal tariff	To determine the reflection on real cost	Calculate the real cost of activities correctly
Customer perspective	Simplifying operation process	To shorten processing time	Perform at 12 units per hour
	Increasing cargo sources	Growth rate of cargos	Aim at 15% (Assumption)
	Centralized service for specific customers	To increase specific customers satisfaction	Seek 80% satisfaction ratio
Internal Process perspective	Reducing operation error rate	To decrease operation error rate constantly (the number of error/units)	Aim to be below the error value of 0.04%
	Automating of information system	Overall process	Reach rate: 70%
	Planning for specialized wharf and privatization	To increase load and unload efficiency (TEUs/per hour)	Aim for 33 TEUs/per hour
	Enhancing environment management	Determine the number of environment accidents	Aim to be below 5 incidents
Learning and growth perspective	Individual target management	To establish a management assessment of operating quality	Provide a monthly evaluation
	Motivation	To establish reward system	Provide a monthly evaluation
	Arrange of personnel data	To revise and add individual data	Provide a monthly evaluation
	Promote professional technique	To test professional knowledge via examination	Establish a passing grade (for example, 80)

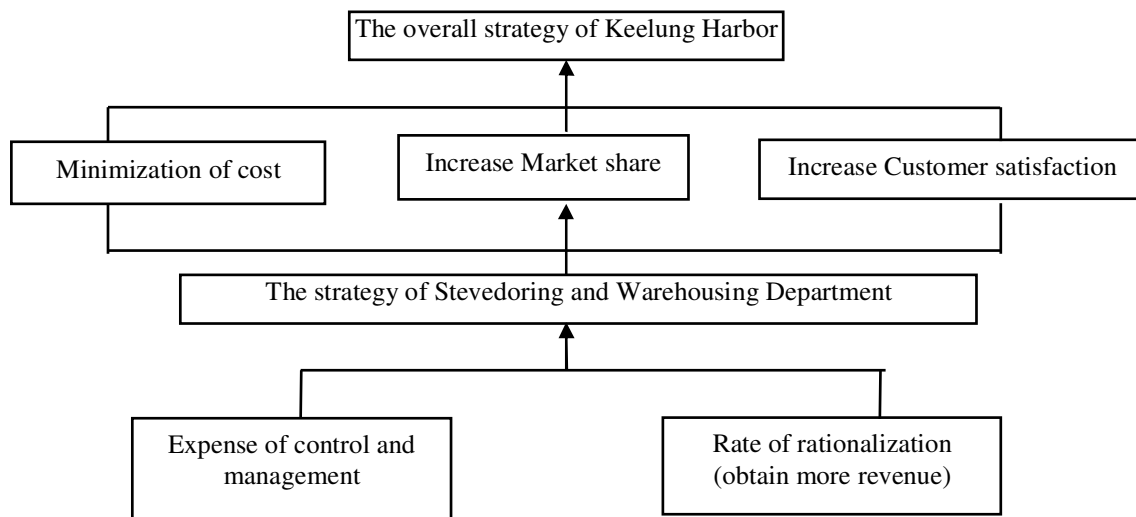


Figure 7. The overall strategy of Keelung Harbor and Stevedoring and warehousing department.

exhibited in the last column of Table 1.

Applying ABB to Stevedoring and Warehousing of Keelung Harbor

The four perspectives and activities that drive BSC and

are identified in Table 1 can be attained through AHP. This study presented three procedures of application of ABB and BSC, as follows:

1. Using BSC performance evaluation framework through expert AHP questionnaire, we attain short-term operating goals (denoted as 1 in Figure 8).



Figure 8. The overall process from strategy to budget of Keelung Harbor Bureau.

2. The additional management tool is obtained through the short-term operating goals setting (denoted as 2 in Figure 8).
3. The study applies ABB methodology to perform cost allocation and plan the department budget (denoted as 3 in Figure 8).

Through the three procedures and the integration of ABB with BSD, this study help the Stevedoring and the Warehousing Departments to reach the short-term goal of the BSC financial perspective. The procedures of Keelung Harbor's budgeting and overall performance evaluation under ABC and BSC are shown in Figure 8.

DISCUSSION AND CONCLUSION

The economy of Taiwan depends heavily on sea transportation. Port planning and development are related to the trade growth and changes in industrial structure. Many ports in Asia have devoted resources to improve port facilities and invest in new equipment. To cope with the global competition and remain competitive, the government must provide some strategies for the future. The combination of Balanced Scorecard (BSC) and Activity-Based Budgeting (ABB) follows the organization's need to budget. It can help the firm reach the performance

target that BSC sets. In order to evaluate the overall performance of Keelung Harbor, we designed an evaluation system that integrates BSC with ABB in order to control cost and examine the achievement rate of targeted performance. We conducted the linkage between BSC and ABC through expert AHP methods.

The empirical results are summarized as follows:

1. ABB methods can assist in conducting rational cost allocation and budget planning with respect to profit planning and cost control.
2. ABB methods can assist in increasing the benefits of strategies management decisions. Research usually employs ABB to increase benefits of BSC in strategic management decisions if an expert AHP method is applied.
3. This study develops the BSC framework for the Stevedoring and Warehousing Departments of Keelung Harbor. A good operating strategy is critical for Keelung Harbor success's. Obviously, better strategies will lead the organization to future success.
4. Following the BSC methodology would assist the firm in operating optimally, which in turn would link fundamental indicators to advanced indicators. In addition, BSC creates a goal to follow.
5. In order to reach the goal, budgeting should

based on the target and reflect the strategy of the organization.

6. Budgeting should be based on activity rather than based on department requests.

7. ABB can help organizations achieve their performance indicators as expressed in BSC. The activity-based cost system is used to control the business process, cost and performance.

8. As a result of the integration of the three procedures of ABB with BSC, we can also apply this system to other units of Keelung Harbor or private organizations.

DISCUSSION

Organizations must develop strategies and overall targets. Karakaya (2009) analyzed the accounting applications on agricultural activities of 1923-2007 in Turkey. The results indicated that many industries (in private and public sectors) can be formed and developed using the BSC or BSC application in any area of operating performance. Organizations meet difficulties when applying a BSC system. Cho *et al* (2001) explored problems when carrying out a BSC. The key success when applying a BSC system is the focus on attaining long-term and short-term goals. Our integration of a BSC system with an ABB system could solve and fill this gap. Furthermore, through an expert AHP methods survey, the organization could incorporate these strategic systems successfully. Saaty (1999) presented an AHP method which provides a rational decision-making process while examining the indicators' coherence of the user's preferences; including the determination of an overall consistency ratio.

This study incorporates the application of BSC and ABC to an international harbor. Keelung Harbor must allocate resources in order to meet its ultimate targets. The results of the study indicate that an organization's target and resources can be properly integrated by employing the BSC and ABB systems. The results of the study can be used as a reference for operation of Keelung Harbor in the future.

ACKNOWLEDGEMENTS

This work was supported by National Science Council, Taiwan, ROC under grant NSC 97-2410-H-231-010-SSS. The authors would like to thank anonymous reviewers for their helpful comments on this paper.

REFERENCES

- Cho, CW, Haddad, K, Wu, AN, Shi, ND (2001). Explore possible problems when carrying out a balanced scorecard, *Account. Res. Monthly*, 183: 63-74.
- Kaplan, RS, Cooper, R (1998). *Cost and Effect: Using integrated cost systems to drive profitability and performance*, Harvard Business

School Press, Boston.

- Kaplan, RS, Norton, DP (1992). The balanced scorecard measures that drive performance, *Harvard Bus. Rev.*: 71-79.
- Kaplan, RS, Norton, DP (1996). *The balanced scorecard translating strategy into action*, Harvard Business School Press. Boston.
- Maiga, AS, Jacobs, FA (2003). Balanced scorecard, activity-based costing and company performance: an empirical analysis. *J. Manage.* 4(3): 283-301.
- Matthew, J, Miller, T (1998). A framework for integrating activity-based cost and balanced scorecard into the logistics strategy development and monitoring process. *J. Bus. Logisit.* 19: 131-138.
- Karakaya, Mevlüt (2009). An overview to accounting applications on agricultural activities in Turkey within historical progress. *Afr. J. Bus. Manage.* 3(7): 294-304.
- Newing, R (1995). Wake up to the balanced scorecard, *Manage. Account.* 73(3): 22-25.
- Saaty, TL (1977). A scaling method for priorities in hierarchical structures. *Scand. J. Forest Res.* (15): 234-281.
- Saaty, TL (1991). Response to holder's comments on the Analytic Hierarchy Process. *J. Oper. Res. Soc.* 42(10): 909-914.
- Saaty, TL (1999). *Decision-making for leaders: The Analytic Hierarchy Process for decisions in a complex world*. Pittsburgh, Pennsylvania: RWS Publications.
- Shields, MD (1997). Research in management accounting by North Americans in the 1990s, *J. Manage. Account. Res.* 7: 148-166.
- Wegmann G (2009). The Activity-Based Costing Method: Development and Applications, *The Icfai University J. of Account. Res.* 8(1): 8-22.
- Wu, AN (2003). The execution of BSC and other management systems, *Account. Res. Monthly.* 207: 132-137.