Balanced scorecard performance evaluation in a closed-loop hierarchical model under uncertainty

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ABSTRACT

This study provides valuable support for successful decision making in network hierarchical structures. The balanced scorecard (BSC) is a measurement system that requires a balanced set of financial and non-financial measures. This study examined both qualitative and quantitative data for the proposed hybrid analytical method. Although numerous studies have been conducted in industry and academia for the development of BSC performance measures, few studies have explored a BSC hierarchical network structure and interdependence relations under uncertainty. This study proposed a set of hybrid approaches for the real case of a performance evaluation of a leisure farm and demonstrated a closed-loop analytical network process for the hierarchical and interdependence relations BSC to assist research improve practical performance and enhance management effectiveness and efficiency regarding qualitative and quantitative information. This study adopted the traditional BSC framework that considers importance weights, performance weights and norm values. The results indicated that the financial aspect is highly weighted and exhibits superior performance; however, the customer aspect exhibits a higher ranking when considering the importance weight and norm value. Managerial implications and concluding remarks are also included in the study.

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1. Introduction

Leisure farms need to develop a performance evaluation model to address future challenges due to the leisure farm aims to maintain competitiveness, in terms of performance evaluation, to cope with the new challenges of government tourism policy for mainland tourists in China [1,2]. Therefore, understanding, developing and integrating performance measures are primary concerns. The development of a model that improves importance and performance is currently a leading strategy of firms [3,4]. Performance evaluations affect all service activities and accelerate the development of growth. These evaluations enable leisure farms to achieve a competitive advantage and, thereby, expand their performance evaluation systems. Improving performance, assessment and reliability are essential for retaining customers in view of ever-increasing competition. Performance evaluation influences a firm's competitive advantage by retaining customer patronage, which leads to market sharing and, ultimately, profitability [5,6].

Efficient and accurate performance measurement systems serve as useful tools that enable managers to control, monitor and improve their firms' processes and performance. The performance perspective is usually composed of multiple aspects and criteria that support and reflect the complex relationships of management systems. Olson and Slater [7] showed that a competitive strategy and the balanced scorecard (BSC) can have a significant effect on a firm's performance. The BSC operates on the premise that no single performance measure can provide a complete prediction of performance. Each measure presents a partial view from a specific viewpoint and, therefore, is inadequate as the sole basis for management decisions. A popular performance measurement scheme, as proposed by Kaplan and Norton [8], is the BSC, which employs performance metrics from financial aspects, customer aspects, internal processes and growth. The BSC facilitates comprehension of the interrelationships and tradeoffs between aspects and criteria, which leads to improved decision making and problem solving.

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In the BSC model, there are hierarchical and interdependence relationships among four aspects and criteria. Because financial results are the ultimate goal of any business enterprise, learning and growth serve as the foundation, and the results from the financial metrics serve as lagging indicators, whereas the results from learning and growth, internal processes and customers are the leading indicators [9–11]. The BSC approach has been one of the most popular tools in previous decades; however, approaches for improving performance based on the correlation between non-financial measures and future benefits have not been demonstrated [12–14]. Prieto and Revilla [15] argued that an organization's learning capability not only enhances financial performance but also can have a direct and positive influence on other aspects. However, few studies have presented the hierarchical structure and dependence relationships among the aspects and criteria using qualitative and quantitative information. Most previous studies failed to combine linguistic preferences and quantitative data in an analytical model. This study aims to eliminate these gaps in the literature. The BSC has been well accepted as a reliable tool for performance measures of business operations, but the challenge of implementing the BSC involves identifying the measures that represent the most critical criteria of a firm's operations.

Numerous studies have focused on the modified fuzzy analytic hierarchical process and the analytic network process (ANP) as approaches to the BSC [10,16–18]. However, those approaches did not reflect entire system interdependence among aspects and criteria and, therefore, improvement indicators. Wang et al. [19] proposed the hierarchical BSC structure, which is integrated with a non-additive fuzzy integral for designing, developing and implementing high-technology firms relevant to performance measurement, to overcome interactions among the four BSC aspects and utilize the proposed hierarchical model. A fuzzy assessment of the decision makers and the interaction among various criteria can be focused on an evaluation of aggregation performance. Additionally, Wu et al. [20] proposed a corresponding fuzzy scale to consider linguistic preferences within closed-loop hierarchical BSC structures that can clearly reflect performance weights, importance weights and norm values. Chen et al. [11] proposed a DEMATEL-ANP (Decision Making Trial and Evaluation Laboratory – Analytical Network Process) to the hybrid multi-criteria decision making (MCDM) model for solving dependence and feedback problems and established a performance evaluation and relationship model that uses a BSC framework to evaluate the performance of hot spring hotels. Lin et al. [21] proposed a structure that is integrated with a fuzzy linguistic for measuring and improving service, which enables managers to meet multiple strategic goals, and a fuzzy linguistic method for evaluating OR performance. Therefore, this study proposes a closed-loop hierarchical ANP structure that is designed to address the BSC performance measurement system. The most important component of this proposed hybrid approach is providing information about "improvement indicators" within interdependences in closed-loop hierarchical structures using qualitative and quantitative information.

Revenue changes are highly contingent upon economic fluctuations in the recreation and leisure industry due to economic fluctuations in recessions. To prevail, leisure farms need to enhance their performance despite drastic competition. This study addresses the current status of the leisure farm and the complicated interdependence relationships of performance aspects and criteria. This study identifies the performance of the BSC model to establish appropriate improvement indicators; the results indicate the potential to excel in a competitive market. This paper develops a hybrid method and a set of criteria addressing the aspects of the BSC for a leisure farm. The intention is to provide a ready-reckoner framework and model for assessing BSC performance evaluation with existing interdependence relationships

and qualitative preferences. This study demonstrates a closed-loop hierarchical BSC structure for improving practical performance and enhancing management effectiveness and efficiency regarding qualitative and quantitative information. The existing hierarchical BSC performance measurement system is applied to overcome difficulties in performance measurement and to focus on presenting "improvement indicators" for measuring the performance of a leisure farm.

The remainder of the paper is organized as follows. In Section 2, the theoretical background of the BSC is presented. In Section 3, a literature review is provided. The method used to achieve the study's objective is presented in Section 4. Section 5 presents the results of the performance weights, importance weights and norm values. The implications of the results are discussed in Section 6. The paper is concluded in Section 7 by summarizing the results, implications and limitations of the study as well as potential topics for future research.

2. Theoretical background

The BSC was originally developed by Kaplan and Norton [8] as a performance measurement tool for managers to obtain a quick and comprehensive overview of their company's operational performance. The BSC combines non-financial performance measures and traditional financial metrics to gain a balanced view of organizational performance. It is used extensively to align business activities with the vision and strategy of an organization, to improve internal and external communications and to monitor business performance. The success of the BSC depends on clear identification of non-financial and financial variables, their accurate and objective measurement and a connection between performance and rewards and penalties. In addition, Kaplan and Norton [22] argued that the BSC program reflects a causal relationship among different measures within aspects and that a hierarchical structure exists in a BSC system.

The learning and growth aspect includes employee training and corporate cultural attitudes that are related to both individual and corporate self-improvement. The internal processes aspect refers to knowledge of a company's operational performance and whether its products and services conform to customer requirements. The customer aspect emphasizes the satisfaction of customers. Current management philosophy has shown an increased realization of the importance of customer focus and customer satisfaction in a business. There is a need for handling and processing financial data. However, the current emphasis on finances leads to an 'unbalanced' situation with regard to other aspects. There is an apparent need to include additional financial-related data, such as risk assessment and cost–benefit data [10,23].

The BSC scorecard aligns an organization's image of performance evaluation with business strategy, desirable employee behavior and daily operations. The BSC provides insight into an organization's performance by integrating financial measures with other key performance indicators of customer perspectives, internal business processes, organizational growth, learning and innovation, which enables organizations to track short-term financial and operational results while monitoring progress for future growth, development and success [24]. The BSC helps a firm not only to measure its performance but also to determine the strategies required for achieving long-term goals [10]. The BSC is a valuable tool that allows employees to understand the firm's situation and provides a useful theoretical framework for continual development of those measures. Hence, this study proposes to analyze both qualitative and quantitative information for this BSC model that are also reflected in real industry practices.