

## Research Article

# Enhancing Organizational Performance Through Integrated ERP-Based Balanced Scorecard Systems: A Case Study

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**Abstract.**

Organizations must continuously thrive to remain successful in the highly competitive business landscape. An integral aspect of achieving this success is implementing an efficient performance management system (PMS) that regularly monitors organizational performance. Large companies often employ Enterprise Resource Planning (ERP) systems to integrate data and information across various departments and business units within the company group, providing easy, comprehensive, and structured data collection. However, despite the advantages of ERP systems, a considerable amount of valuable data goes to waste as it is not integrated with the company's PMS. This study aims to develop a balanced scorecard-based performance management system that utilizes the existing ERP system in a furniture company. In-depth interviews with the board of directors and general managers were conducted to assess the need for the PMS, formulate a strategic map and scorecard, determine scorecard weights, and establish targets for each category. During the implementation phase, it was observed that the financial indicators consistently fell below the baseline values, signaling an urgent need for management intervention. However, indicators from three other perspectives demonstrated relatively better performance than those from the financial perspective. This discrepancy emphasized the need to revise the strategic map, as solid performance in the other perspectives should translate into positive financial indicators. The management of the company validated the initial implementation results of the performance management system by noting a concerning decline in the company's liquidity. This study argues for the importance of integration between the ERP system and the BSC performance management system, where the implementation of the ERP system alone cannot indicate the critical conditions experienced by the company.

**Keywords:** Enterprise Resource Planning (ERP), performance management systems, balanced scorecard, case study

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## 1. Introduction

Companies now widely use ERP systems to integrate data and information between divisions or departments, even on a larger scale, to consolidate operations between several business units. ERP system implementation requires many resources and a strong commitment from the top level to all relevant users. In addition, its implementation also needs adequately trained personnel to guarantee success. However, very few ERP systems support the performance management system. Research on using ERP data to support companies' performance management systems, such as the Balanced Scorecard (BSC), is relatively scarce, even though the BSC has been among the most popular management frameworks in the past 20 years [1]. Even though the case study conducted by Couto, Vendrametto, Neto, Morais, and Brejão (2016) argues the importance of integrating ERP and BSC [2], few companies have succeeded in integrating their ERP system with their BSC. This study aims to develop BSC performance management supported by the ERP system in a make-to-order furniture company in Sidoarjo, East Java, Indonesia. The rest of the paper is organized as follows. Section 2 discusses literature reviews on ERP, BSC, and integration of ERP and BSC. Section 3 describes the research methodology followed in this study. Results and discussion of this study is provided in section 4, followed by the conclusion in section 5.

## 2. Literature Review

### 2.1. Enterprise Resource Planning

Increasing competition and business challenges force companies to look for the right solutions. Implementation of ERP is believed to provide a long-term competitive advantage by integrating production and manufacturing information [3]. ERP systems aid organizations in enhancing information exchange and operational effectiveness [4]. Because of the ability to integrate various business functions, ERP offers tangible and intangible benefits. The tangible benefits, among others, are reduced inventory, reduced costs, reduced number of personnel, increased productivity, better cash flow management, increased revenue and profits, reduced system maintenance, and improved delivery [5,4,3]. The intangible benefits include, among others, increased transparency of corporate information, improved business processes, improved responsiveness and flexibility, improved communications, unanticipated cost reduction, better integration

between systems, standardization of computing platforms, and improved business performance (Al-Mashari, Al-Mudimigh, & Zairi, 2003; Chand, Hachey, Hunton, Owghoso, & Vasudevan, 2005; Shen, Chen, & Wang, 2016). Shang and Seddon (2000) classify ERP implementation benefits into IT, operational, managerial, strategic, and organizational benefits [6].

Prior studies indicated that ERP adoption offers many benefits. However, there are still companies that are hesitant to implement ERP. Companies that want to implement ERP face challenges, such as high investment costs, complexity, and disruptive organizational changes [5,7]. The high investment cost comes from the ERP and can increase enormously if the company hires a consultant. Furthermore, Hwang and Min (2015) argued that companies also consider long payback periods, insufficient technological sales and operational planning, user-unfriendly interfaces, compatibility issues across various ERP versions, poor databases, challenges in creating a smooth interface for various business units, and the absence of measurable ERP performance indicators as inhibiting factors for ERP adoption [8]. Al-Mashari et al. (2003) suggested that companies that implement ERP need to 1) hire full-time workers to work on the implementation project, 2) install new hardware to run the ERP system, and 3) train the end-users [5].

Several studies have investigated the critical success factors of ERP implementation [9,10,7]. ERP implementation's success is paramount because of the high investment costs and risks. Unsuccessful projects to implement ERP systems have been known to cause organizational bankruptcy [9,11]. In addition, through case studies, Holland and Light (1999) discovered that top management commitment, a well-defined business vision, legacy systems, the strategy for ERP implementation, business process change, and software configuration are critical to the success of ERP implementation [9]. Markus, Axline, Petrie, and Tanis (2000) argued that success depends on how you measure it [10]. For instance, success means on-time and within-budget project completion for ERP project managers and consultants, but it can mean a smooth transition to the new systems and achieving better business results for the end-users. Markus et al. (2000) highlighted two things [10]. First, successes of ERP implementation can be classified into several viewpoints, namely technical, financial, strategic business, smoothness of business operations run, the companies' managers and employees, and the companies' customers, suppliers, and investors [10]. Second, while Markus et al. (2000) classified the ERP implementation into three phases, namely the project phase, the shakedown phase, and the onward-upward phase, they emphasized that success at one phase might have a limited connection to success at another [10]. Motwani, Subramanian, and

Gopalakrishna (2005) suggested that a cautious, evolutionary, bureaucratic implementation process supported by careful change management, network relationships, and cultural readiness are the critical factors for ERP implementation's success [7]. Hwang and Min (2015) argued that the success and failures of ERP systems primarily relied on top management commitment, project management, organizational culture changes, data accuracy, user training, user involvement, multi-site applications, ERP software vendor support, perceived usefulness, and perceived ease of use [8].

## 2.2. Balanced Scorecard

A well-structured Performance Management System (PMS) holds immense significance in contemporary companies as it drives employee engagement, enhances organizational performance, and facilitates strategic alignment. Kaplan and Norton (1992) introduced the balanced scorecard (BSC) 1992 to provide top management with a dashboard that gives top managers a fast but comprehensive view of the business [12]. The goal was to enhance managers' mindfulness of real-time performance, enabling them to make quicker and more efficient operational adjustments, leading to improved effectiveness in implementing strategies and overall financial performance [13]. Through BSC, the management can look at the financial, customer satisfaction, internal process, and innovation and improvement measures.

The balanced scorecard (BSC) is the performance measurement framework most widely adopted by companies [1]. The BSC gains its popularity because it maintains a balance between short-term and long-term objectives, between financial and non-financial measures, between lagging and leading indicators, and between internal and external performance perspectives [14]. A survey conducted by Rigby and Bilodeau (2009) asserted that BSC was adopted by 53% of companies worldwide [15]. Even though the users of the BSC have dropped to 29%, the BSC is still the only PMS on the list of the top 25 most popular management tools [16].

There are still conflicting opinions about the impact of the BSC adoption on the firm performance. While 88% of IMA members confirmed the impact of the BSC on the firm performance, KPMG consultants claimed that 70% of the BSC adoption projects failed [17]. Tawse and Tabesh (2023) argued that three issues may contribute to these conflicting results [13]. First, there is a lack of consistency in how advanced the BSC has been applied. Second, there is no clarification on whether the participating organizations have implemented a causal model. More than half of the companies implementing the

BSC consider the BSC simply as a performance measurement system [18]. Third, using perceptual performance measures may cause bias because the respondents only use information that can confirm their prior beliefs [13]. Through the meta-analytic study, Tawse and Tabesh (2023) found that the relationship between BSC adoption and firm performance is much more potent if the companies implement a strategy map with the BSC [13].

### 2.3. Integration of BSC and ERP

Several studies have reported using the BSC to measure the impact of ERP implementation [4,19,3]. Rosemann and Wiese (1999) adopted a Balanced Scorecard approach to measure the performance of the ERP software [19]. They added one more perspective, the project perspective, to the BSC's four main perspectives in the strategy map. However, Rosemann and Wiese (1999) only used performance measures for the financial, customer, internal process, and innovation and learning perspectives [19]. Chand et al. (2005) proposed an assessment of ERP systems' strategic impact based on the balanced scorecard framework [4]. The ERP valuation framework, which they called the ERP scorecard, confirmed the impacts of ERP systems on business objectives. Shen et al. (2016) developed the hierarchical balanced scorecard (HBSC) to measure the impact of ERP system performance the critical firm performance by utilizing the non-additive fuzzy integral [3]. Through their survey on auditors and senior managers in six Taiwan high-tech firms, they demonstrated the effectiveness of their framework in measuring the ERP systems' post-implementation performance.

Couto et al. conducted case studies on five companies to verify the possibility of ERP and BSC integration. All five companies implemented ERP first [2]. Those companies did not think to implement the BSC at first. Some years later, these five companies adopted the BSC. Their study asserted the need for customization and improvements of the ERP system to facilitate the BSC. This situation is very similar to the situation faced by companies in Indonesia, which still use manual data to support their performance measurement systems.

## 3. Methodology Research

This paper used a case study in a make-to-order furniture company in Sidoarjo, East Java, Indonesia, to illustrate how a company utilized its ERP data to support the BSC

system. The existing ERP records all business processes in the purchasing, marketing, production, finance and accounting, and inventory departments. The following steps were conducted to develop the BSC supported by the ERP system: a survey on BSC needs, development of the strategy map, development of scorecard, determination of scorecard's weights, setting scorecard's targets, and implementation. Members of the board of directors, general managers, and senior managers were involved as respondents of this study.

## 4. Results and Discussion

### 4.1. Survey on BSC Needs

At first, the company did not implement Balanced Scorecard. They utilized Excel dashboard to monitor the performance. Data was extracted from several databases manually. Niven (2014) recommended a survey on the need for BSC to ensure support for BSC implementation from the top management and senior managers [20]. A survey on the board of directors and general managers was conducted using a questionnaire developed by Niven [20]. Fifteen respondents completed the survey out of 18 people who were invited to complete it. The average score was 60.07. This score can be interpreted that the company may already have a performance measurement system, but it still does not benefit the company. Hence, a strategic management system, like BSC, would benefit the company [20]. Two items need to be highlighted. First, for item "Priorities at our organization are often dictated by current necessity or fire-fighting," 12 respondents answered "agree," and two respondents answered "strongly agree." This result demonstrated inadequate long-term planning, leading to urgent issues requiring immediate attention instead of prior preparation. Second, for the item "We face increased pressure from stakeholders to demonstrate results," seven respondents answered "agree," and four respondents answered "strongly agree". It can be said that some improvement initiatives are still externally driven, not from internal awareness.

### 4.2. Development of The Strategy Map

Three strategic themes are derived from the company's mission statement, namely 1) the best customer satisfaction in the market, 2) operational excellence, and 3) sustainable organizational growth. Based on the strategic themes, the executive team determined

the following strategies. On the financial perspective, the company's strategic initiative is to maximize shareholder value, which has four strategies: maximization of activity ratio, minimization of liquidity, maximization of profitability, and optimization of coverage ratio. The initiative on the customer perspective is to focus on big account customers and create one-stop shopping. Big account customers contribute around 60-70% of total sales. In addition, the company tries to meet all customer needs from the remaining regular production capacity. On the internal business, the company wants to increase productivity in all parts of production, improve production cost efficiency both in terms of the use of raw materials, use of labor, or use of other supporting facilities, and increase the number of new product types, including equipping production machines to support the development of new products. On the learning and growth perspective, the company wants to increase the competence of production and administrative employees and reduce employee turnover rates for both formal and personal reasons. The resulting strategic map is shown in Figure 1.

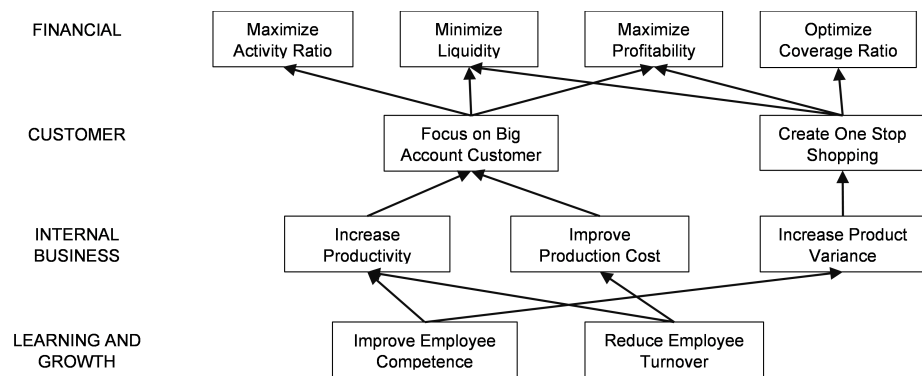


Figure 1: Strategy Map.

### 4.3. Development of Scorecard

Based on existing ERP data in the purchasing, marketing, production, and accounting modules, a scorecard was made for each strategic initiative from each perspective. Scorecard preparation would be different for each department. At the strategic level, the scorecard preparation corporately covered all departments. The indicators used to measure the performance of each strategic initiative are presented in Table 1.

#### 4.4. Determination of Scorecard's Weights

The weight on each scorecard at the beginning of BSC implementation was determined by top management by considering input from the relevant general managers. First, the top management determined the weight of each perspective. Next, they determined the weight of each indicator by assigning a value between 1 and 5, where one is for the least important and five is for the most important indicator. The weight is the relative importance of each indicator in the corresponding perspective. The value of each indicator is multiplied by the weight of the relevant perspective. The weights of indicators are presented in the last column of Table 1, while the weights of each perspective are provided under each perspective in the first column.

#### 4.5. Setting Scorecard's Targets

Determining targets for each scorecard was carried out by top management and the related general managers. The initial target for each scorecard was determined by considering the average data for the last three years, from January 2016 to December 2018. This loose target was selected at the beginning of implementation and would be improved later.

#### 4.6. Implementation of The Scorecard

The scorecard implementation was carried out from January to July 2019. The finance director was responsible for the financial perspective. The marketing director was responsible for the customer perspective. Meanwhile, the internal business process perspective and the learning and growth perspective were under the responsibility of the director of operations. During six months of implementation, most financial indicators had negative values, except for the average collection period and average payable days, which improved from negative to performance in the last three months. A negative performance value means the performance was much worse than the baseline. It can be said that the company needs to take immediate action so that its performance can be improved in the future, considering that financial factors were the most critical factor in the company's strategic objectives. The customer perspective had the best performance during the implementation period. It was above the minimum limit, even though it was still below the target.



TABLE 1: The indicators of each strategic initiative and their weights.

Perspectives	Strategic Initiatives	Indicators	Weights
Financial (20%)	Maximize activity ratio	Average collection period	9.30%
		Average payable days outstanding	6.98%
	Maximize liquidity ratio	Current ratio	6.98%
		Quick ratio	6.98%
	Maximize profitability	Gross margin	11.63%
		Operating profit margin	11.63%
		Return on equity	9.30%
		Return on assets	9.30%
	Optimize coverage ratio	Debt to equity ratio	9.30%
		Interest-to-sales ratio	9.30%
Cash interest ratio		9.30%	
Customer (30%)	Focus on big-account customers	On-time delivery	15.78%
		Sales ratio from big customers	26.32%
		Number of big customers	26.32%
	Create one-stop shopping	Number of new customers	21.05%
		New product sales ratio	10.53%
Internal business process (35%)	Increase productivity	Production lead time	12.00%
		Average inventory days outstanding	12.00%
		Purchase lead time	12.00%
	Improve production cost	Ratio of new raw material value	16.00%
		Ratio of miscellaneous overhead cost	12.00%
		Deadstock ratio	16.00%
Learning and growth (15%)	Increase product variance	Number of new products	20.00%
	Improve employee competence	Accuracy of factory overhead	66.67%
	Reduce employee turnover	Employee turnover ratio	33.33%

In the BSC final results for the 2019 period, there was a tendency for the three perspectives to obtain far better values than the financial perspective. It is an anomalous condition because all other perspectives should support the financial perspective. Based on this fact, the causal links, the scorecard, and the weights of the scorecard

needed to be revised in the next period to support the strategic map better. One example of this was the link between operating profit margin under the financial perspective that was highly dependent on operations costs, but these operations costs were not included in other perspectives. The other example was that the number of new products did not directly improve the financial performance because it would still require time for the products to be ordered by customers.

Management confirmed the results of the initial implementation because it was indeed found that the financial condition in 2019 had increasingly decreased liquidity. Indications, such as delays in debt payment, decreased sales turnover, and swelling of production costs proved this. Based on the initial implementation results, management concluded that it was necessary to develop scorecards immediately at the operational and tactical levels so that the assessment could be more accurate and extended to every relevant department at the beginning of 2020. As for the targets and baselines on the scorecard, they will be reviewed at the beginning of 2020. Management can also determine the priority of improvement in the financial and internal business process perspectives in accordance with the final results in this initial implementation period. If it has been implemented in sufficient time, with the appropriate scorecard and target, the BSC system can be further developed for management's reference in providing reward and punishment to each responsible person and related team.

## 5. Conclusion

This paper illustrates the use of data from the ERP system to support implementing a BSC performance management system in a furniture company that implemented the ERP system earlier. Through the implementation of BSC, which utilized data from the ERP system, top management identified deteriorating financial conditions that, otherwise would not be discovered through implementing an ERP system alone. The causal links, the scorecard, and the weights needed to be revised for the next period, especially on the customer and the internal business process perspectives. The accuracy of ERP data needed to be verified because outlier data was caused by inaccuracy of data entry. To obtain more benefits from BSC implementation, the company can develop a scorecard at the tactical and operational levels so that it will be easier to improve the corresponding section.

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