

# Feed Forward Control System, Organizational Learning and Business Unit Performance

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**Abstract**—Nowadays, organizations are demanded to develop a proper understanding on how the contemporary control systems work out in order to improve their capability. The drawback of interactive control system as a recognized control system which can improve organizational capability is its dependency on top management in an organization. Based on this reason, the study develops feed forward control system that can be used in sub unit level in an organization. This study is aimed to investigate the relationship between feed forward control system and organizational capability which is represented by organizational learning, composed of internal and external learning. Samples in this study are 50 business managers in manufacturing industry in Banten Province-Indonesia. This study uses PLS Software to solve any emerged problems in structural equation modeling application. The result from this study states that there is a positive relationship between feed forward control system and internal & external learning, there is also a positive relationship between internal and external learning with business' performance of manufacturing industry. The result from this study is expected to be a reference and guidance for management team in using control system, as a result it will influence the decision making system to exploit the organizational learning and improve the company's performance.

**Index Terms**— Feed forward control, learning, and business' performance.

## I. INTRODUCTION

Organizational learning is acknowledged as the main capability of an organization to reach its competitive advantage [1]-[3]. An organization which performs organizational learning is an organization which has a skill and competency to create and transfer its knowledge and modify its behavior in order to reflect its new knowledge and its new skill. An organization which is able to reach its competitive advantage is an organization which is able to manage and integrate its organizational learning [4].

In recently global competition era, a dynamic business environment demands an organization to develop its understanding on how to use the management control system properly in order to improve its organizational learning [4]-[6]. Organizational learning's function can be strengthened by the usage of a proper management control system [6]. Specifically, management control system in previous studies uses interactive control system.

The usage of interactive control system, however, still leaves a problem [7]. The problem can be explained by main reason. The usage of interactive control system tends to refer

the usage of control system by top manager in an organization [8], [9]. Therefore, an organization needs a certain management control system which can effectively improve organizational learning both in lower manager and upper manager of a business unit.

This study provides a clear explanation to solve the ambiguity in the previous studies by specifying the control system that is used by business unit management, that is feed forward control system and also specifying its organizational learning, that is internal and external learning as parts of capability.

The usage of feed forward control system enables the sub unit manager to focus their attention on the usage of a specific control without senior management's dependency [7]. Organizational learning is chosen to be investigated these recently years by a company, because they are demanded to have a greater orientation on organizational learning [6]. In the context of manufacturing industry, internal and external learning are the capabilities which are hard to imitate, as a result both learning form can be used maximally to improve its manufacturing's performance [6]. This study explicitly investigates the relationship between the usage of feed forward control system on organizational performance through internal and external learning in manufacturing industry.

## II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### A. The Influence of Feed Forward System on Internal and External Learning

Similar with the usage of interactive control system, the usage of feed forward control system also creates a double loop learning system, and it belongs to a learning system that is more complicated than single loop learning system [10], [11]. The purpose of feed forward control system is to improve the manager's ability in anticipating, managing, and directing the future uncertainty that probably emerges [10]-[12]; organizational learning is explained to be the learning process that comes from a previous experience.

Levitt and March [13] states that the lack of experience and the complexity in a certain situation can halt the learning process. Feed forward control system is aimed to involve the manager in scanning and searching any behavior that may result an emergent strategy (new behavior and experience). Feed forward control system will help the managers to solve a complex situation, in which manager may have a little experience.

Grafton *et al.*, [7], has specifically explained that feed forward control system is the facilitator for capability

improving process, and in this case feed forward control system will improve organizational learning. It is a system which is implemented by an organization to ease the information processing and facilitate the learning process by using a vertical information channel in an organization.

Communicating strategic aspects is a distinguished feature in feed forward control system. By keeping dialogues among persons in an organization will push the information exchange [9], as a result the usage of feed forward control system will provide a contribution such as knowledge distribution, information distribution, free communication flow and push the emergence of learning process both internal and external learning. By using this way, the usage of feed forward control system will provide a contribution to learning process. Based on RBV theory, the internal learning process and external learning process offered by this theory will have a unique shape and it naturally cannot be imitated by another organization and another manufacturers [14], [15]. The empirical result and literature review will lead into these two hypotheses as follow:

- H1: Feed forward control system positively influences the internal learning.
- H2: Feed forward control system positively influences the external learning.

*B. The Influence of Internal and External Learning on Business Unit Performance*

Internal learning process covers employee learning in its multifunctional way and it becomes the process to integrate any suggestions and explanations expressed by the employees [15] to create a process and company's product development. Moreover, this practice is a routine activity that will lead to a new change, and furthermore it will explain the path dependent development which is rooted from the main process in a manufacturing industry [16].

In manufacturing context [15], it defines external learning process as a learning process among the organizations to reach the ability on how to solve the problems that probably emerge between customer and supplier. External learning in manufacturing context, is an inter organizational learning that runs through the problem solving that emerges from the interaction among the customers and suppliers to create tacit knowledge, which is hard to imitate by the competitor.

Technique certification in production method belongs to customer and supplier. The creation of continuous relationship between consumer and supplier will explain that consumer is the main source of a routine activity in an organization [15]. The formed relationship between customer and an organization will create implicit knowledge which is hard to imitate or duplicate by the competitor [17]. External learning process also occurs through long term contract relationship with the supplier [18]. External learning can be formed as an input from supplier or end product, design, quality and continuous practice improvement [15].

Organizational learning is closely related with performance improvement [13]. Tippins and Sohi [19] gave empirical prove which stated that organizational learning is positively related with organization's performance. They also investigated the information technology competence and they found out that the improvement of company's

performance will mainly be resulted from the organizational learning. Ismail [6], Jiang and Li [20], Raquel [21], tested the relationship between organizational learning and organization's performance. The result of their study stated that organizational learning significantly influenced the company's performance. Based on the above explanations, the study proposes two hypotheses below:

- H3: There is a positive relationship between internal learning and business unit performance.
- H4: There is a positive relationship between external learning and business unit performance.

To get a clear explanation of the four constructs relationship, it can be described in this theoretical model as follow (Fig. 1):

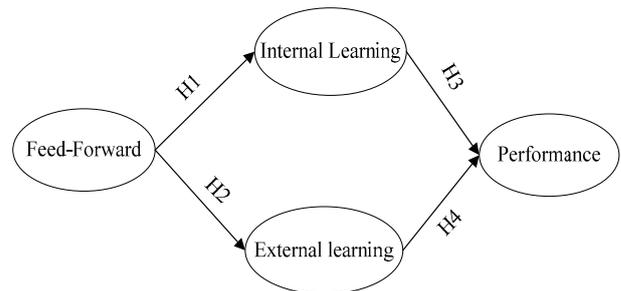


Fig. 1. Theoretical model.

III. METHOD

This study uses questionnaires as the instrument that is distributed to each unit business in manufacturers in Banten Province–Indonesia. The respondents in this study are managers who have worked at least 2 years. The managers used in this study are production manager, personnel manager, financial manager, marketing manager and sales manager.

Indicators used in this study to measure feed forward control system is based on previous study [7], [10], [12], [22]-[25]. Respondents are asked to quantify on how they: (f1) Apply the performance purpose, (f2), Guide the strategy implementation, (f3) Develop an action planning, and (f4) Communicate strategic aspects.

The usage of internal learning indicators are adapted from [15] Training on different unit (il1); Training with multitasking skill (il2); Suggestion to improve a serious process and product (il3); Implementing the suggestion (il4). the indicators to measure external learning are evaluated from [15] Building a proper long term relationship with suppliers (el1); Building a closed communication with supplier both on quality and design change (el2); Feedback on quality and delivery performance (el3), Customers are actively involved in product design process (el4). Meanwhile the indicators to measure performance business unit are adapted from [15]. Manufacturing cost as a percentage of sales (p1); Scrap rate (p2); Percentage of deliveries customers receive on time (p3); Number of days from receipt of raw materials to customer receipt (p4); Length of fixed production schedule (p5). Each questionnaire uses 7 point of Likert Scale. Scale 1 shows the evaluation of 'totally

disagree’ and scale 7 shows the evaluation of ‘totally agree’.

This study uses data analyses by using Software Smart PLS. PLS is Structural Equation Modeling which is based on variance. PLS is a powerful analyses method [26], since it is not based on too many assumptions. For example, data does not have to be distributed normally, the size of the samples are not too large, Besides, PLS can be used to explain whether there is a relationship between latent variables or not, as well as PLS can analyze the formed construct with reflective and formative indicators.

IV. RESULT AND DISCUSSION

A. Statistic Descriptive

The distributed questionnaires are 300 questionnaires. Of the distributed questionnaires, there are 50 questionnaires which are filled and returned with response rate as 16.67%. The returned questionnaires rate is 83.33%. Therefore, the data in this study that can be managed to have a further analysis are 50 questionnaires.

Respondents in this study are the unit business managers in manufacturing industry in Banten Province. Of the returned questionnaires, the respondents who hold the post as Production Managers are 18 person (36%), Marketing Managers are 12 persons (24%), Sales Manager are 5 persons (10%), Financial Manager are 6 persons (12%) and Personnel Manager are 9 persons (18%).

B. Data Quality Testing

Table I shows the result of each construct (variable) which has AVE value above 0.5 [27]. It shows that each construct has proper validity value from each indicator in the relationship between feed forward control system, internal learning, external learning and unit business performance. Based on the result in Table I, it can be said that each construct or latent variable has composite reliability value above 0.8 [27] which signifies that there is a proper internal consistency among these variables.

TABEL I: PLS OUTPUT.

	original estimate	mean of subsample	Stan. Dev.	T-Statistic
FW -> PI	0.397	0.283	0.137	2.271
FW -> PE	0.624	0.644	0.12	5.218
IL -> Perf.	0.421	0.343	0.136	4.362
EL--> Perf.	0.552	0.527	0.125	4.885
	<b>AVE</b>	<b>√AVE</b>	<b>CR</b>	
Feed-for.	0.761	0.87235	0.935	
IL	0.671	0.81915	0.911	
EL	0.557	0.74632	0.910	
SBU Perf.	0.825	0.90829	0.903	

C. Hypotheses Testing

To test the proposed hypotheses, it can be seen from t-statistic value, in which there is a border to accept or deny the hypotheses from the proposed t-table at ± 1.96. If

t-statistic value is in the range between -1.96 and 1.96, the proposed hypothesis is denied. In contrast, if t-statistic values are higher than t-table value at 1.96, the proposed hypothesis is accepted. Estimation result of t-statistic value can be seen from the inner weight at Table I. According from the value at table 1, all hypotheses are accepted.

D. Discussion

The first result from this study states that there is a positive and significant relationship between feed forward control system and internal learning. The usage of feed forward control system highlights the interaction and dialogue among persons in an organization. It will open a greater opportunity to have information distribution and information exchange on market situation and customers’ needs. Interaction process will be improved at the same time as the employee got a multitasking training; each person tries hard to give a suggestion to improve the process and product development in a more serious way, and the employee can also implement the useful information. As a result, the process will finally produce double loop learning process.

The second result in this study states that the usage of feed forward control system positively relates with external learning. Interaction and dialogue are not only happened among the persons in an organization but also with the persons outside the organization. Interaction with the supplier happens when the company tries to build a good long term relationship with the suppliers; closed communication about quality and design change. Meanwhile the interaction with customer happens when the customers provide a feedback about quality and organization's performance; customers are actively involved in product design process. Interaction process between company, customer and supplier will finally create double loop learning.

In using this feed forward control system, a manager needs to analyze the main gap between predicted outcome and desired outcome, and they have to minimize the gap. Interaction and dialogue in an organization will open the distribution opportunity and information exchange which become parts of learning system that will deviate from the main problem, since everything will be based on fixed data and preset purpose.

It is in line with RBV theory, which states that each company will empower their unique control system to improve their unique capability, as well as RBV theory [15] which differentiates learning as part of capability and divided it into internal learning and external learning. The result of this study is supported by another result [7], which specifically explains that feed forward control system is a facilitator for capability improvement process. Capability which is used in this study is internal and external learning. Furthermore, both learning process will improve the business’ performance.

The third result in this study states that internal learning is positively related with unit business’ performance. One distinguished feature in internal learning process which is run by an organization is that the organization will receive valuable feedback and useful input from every level in management team to improve the company’s progress. In

addition, an organization will not only receive input but it also applies or performs the suggested idea. These inputs don't have to be aimed at innovation progress which creates patent ownership, but it will be formed as simple input which is able to improve the manufacturing process which results in appropriateness production time and punctual goods delivery. As a result, these customers will be more satisfied and repeat their order.

The fourth result in this study states that external learning positively relates with unit business' performance. It means that the information flow will be properly facilitated by feed forward control system which occurs in the company, supplier, and consumer. In addition it will make the consumer and supplier will be more responsive to give an input or feed back to the company. These simple ways will be formed as timeliness goods delivery that will satisfy the customer. Feedback from the customers is aimed to improve the quality and performance, and it becomes the measurement indicator of external learning, along with product timeliness as the indicator of company's performance.

The results are in line with RBV theory [15], which discusses two kinds of capability belong to an organization, and they are built in manufacturer's function. This result is empirically supported with this study's result [6], [20], [21] which test the relationship between organizational learning and business' performance. It also empirically supports the result from the study which tests the relationship between organizational learning and innovation to business' performance. The difference from previous study is that previous study used organizational learning variables; meanwhile this study uses internal learning and external learning.

## V. CONCLUSION, IMPLICATION AND LIMITATION

This study describes the importance of feed forward control system that is used by management. This study adopts resource based view theory and proposes some hypotheses which state the impact of feed forward control system on organizational capability to exploit internal and external learning that will also influence the business' performance.

The result in this study is in accordance with previous literatures which discussed the usage of required control system to expand the importance of evaluation at the same time as the increasing usage of management control system. This study finds out that there is a positive relationship between the usage of feed forward controls system which is positively related with internal and external learning whereas feed forward control system will open the chance for any ideas that are resulted from the business unit interaction. Each internal and external learning has its own influence on unit business' performance.

Theoretically, the result from this study is expected to provide a clearer explanation to academics on how to solve the ambiguity in former studies, and the result is also expected to improve the knowledge reference for management accounting, especially in discussing the management control system, performance measurement

system and the exploitation of company's capability. Practically, the result from this study is expected to be a reference of management team in using and controlling the performance measurement that will influence the decision making process and it is aimed to exploit the company's capability, furthermore it will influence the business' performance to maintain organization's competitive advantage.

This study also has some limitations. The first limitation is the sample size which is relatively too small, only 50 respondents in Banten Province, and this study only focuses in manufacturing sector without considering another entity such as service and trading company that may have also implemented the feed forward control system. The third limitation is that the study only uses two capabilities that is to say, internal and external learning.

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## REFERENCES

- [1] G. T. M. Hult and D. J. Ketchen, "Does market orientation matter: A test of the relationship between positional advantages and performance," *Strategic Management Journal*, vol. 22, pp. 899-906, 2001.
- [2] R. F. Hurley and G. T. M. Hult, "Innovation, market orientation, and organizational learning: an integration and empirical examination," *Journal of Marketing*, vol. 62, pp. 42-54, 1998.
- [3] M. A. Hitt, R. D Ireland, S. M. Camp, and D. L. Sexton, "Guest editors' introduction to the special issue strategic entrepreneurship: entrepreneurial strategies for wealth creation," *Strategic Management Journal*, vol. 22, 479-491, 2001.
- [4] J. F. Henri, "Management control systems and strategy: a resource-based perspective," *Accounting, Organizations and Society*, vol. 31, no. 6, pp. 529-558, 2006.
- [5] S. K. Widener, "An empirical analysis of the levers of control framework," *Accounting, Organization and Society*, vol. 32, no. 7-8, pp. 757-768, 2007.
- [6] T. Ismail, "Sistem pengendalian manajemen berbasis pengukuran kinerja untuk meningkatkan kapabilitas dan kinerja," Disertasi UNDIP, Semarang, 2012.
- [7] J. Grafton, A. M. Lillis, and S. K. Widener, "The role of performance and evaluation in building organizational capabilities and performance," *Accounting, Organizations and Society*, vol. 35, pp. 689-706, 2010.
- [8] R. Simons, "The Role of management control systems in creating competitive advantage: new perspectives," *Accounting, Organizations and Society*, vol. 15, pp. 127-143, 1990.
- [9] R. Simons, *Levers of Control*, Boston, MA: Harvard Business School Press, 1995.
- [10] C. Emmanuel, D. T. Otley, and K. A. Merchant, *Accounting for management control (2nd ed.)*, London: Chapman and Hall, 1990.
- [11] H. Nørreklit, "The balance on the balanced scorecard - A critical analysis of some of its assumptions," *Management Accounting Research*, vol. 11, no. 1, pp. 65-88, 2000.
- [12] R. Simons, *Performance measurement and control systems for implementing strategy*, Upper Saddle River: Prentice Hall, 2000.
- [13] B. Levitt and J. G. March, "Organization Learning," *Annual Review of Sociology*, vol. 14, pp. 319-340, 1988.

- [14] C. St John and J. Harrison, "Manufacturing-based relatedness, synergy, and coordination," *Strategic Management Journal*, vol. 20, no. 2, pp. 129-145, 1999.
- [15] R. G. Schroeder, K. A. Bates, and M. A. Junttila, "A Resource Based View Of Manufacturing Strategy And The Relationship to Manufacturing Performance," *Strategic Management Journal*, vol. 23, pp. 105-117, 2002.
- [16] R. R. Nelson and S. G. Winter, *An Evolutionary Theory of Economic Change*, Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1982.
- [17] A. Madhok and S. B. Tallman, "Resource, transaction and rents: managing value through interfirm collaborative relationships," *Organization Science*, vol. 9, pp. 326-339, 1998.
- [18] D. Gerwin and H. Kolodny, "Management of Advanced Manufacturing Technology: Strategy, Organization, and Innovation," New York, 1992.
- [19] M. J. Tippins and R. S. Sohi, "IT competency and firm performance: Is organizational learning a missing link?" *Strategic Management Journal*, vol. 24, pp. 745-761, 2003.
- [20] X. Jiang and Y. Li, "The Relationship between Organizational Learning and Financial Performance in Strategic Alliance: A Contingency Approach," *Journal of World Business*, vol. 43, pp. 365-379, 2008.
- [21] S. V. Raquel, J. C. N. Valencia, D. J. Jiménez, and L. P. Caballero, "Linking organizational learning with technical innovation and organizational culture," *Journal of Knowledge Management*, vol. 15 vol. 6, pp. 997-1015, 2011.
- [22] J. Bisbe and D. Otley, "The effects of the interactive use of management control systems on product innovation," *Accounting, Organizations and Society*, vol. 29, no. 8, pp. 709-737, 2004.
- [23] R. H. Chenhall, "Integrative strategic performance measurement systems, strategic alignment of manufacturing, learning and strategic outcomes: an exploratory study," *Accounting, Organizations and Society*, vol. 30, no. 5, pp. 395-422, 2005.
- [24] C. D. Ittner, D. F. Larcker, and T. Randall, "Performance implications of strategic performance measurement in financial services firms," *Accounting, Organizations and Society*, vol. 28, no. 8, pp. 715-741, 2003.
- [25] G. B. Sprinkle, "Perspectives on experimental research in managerial accounting," *Accounting, Organizations and Society*, vol. 28, no. 2-3, pp. 287-318, 2003.
- [26] I. Ghozali, *Structural Equation Modeling: Metode Alternatif dengan Partial Least Square (PLS)*, Penerbit Universitas Diponegoro, Semarang, 2006.
- [27] I. Ghozali, *Structural Equation Modelling Metode Alternatif Dengan Partial Least Square*, Penerbit Universitas Diponegoro, Semarang, 2008.



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