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## Warehouse Performance Measurement Using Balanced Scorecard Method – A Case Study at PT. Multi Indocitra, Tbk

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**Abstract** Two of the fundamental aspects of a company's operations are the performance management and continuous improvement. Similarly, in the warehouse activity, performance measurement is required. This research is to develop a balanced scorecard model used for internal performance measurement warehouse at PT. Multi Indocitra, Tbk. In this study, it was carried out deployment strategy from business strategy to warehouse strategy. Balanced scorecard was used in this study because the developed basic concept translates a vision, mission and strategy of the company into determining scorecard objectives and measures. Measurement of performance should be monitored periodically. The results of this study showed that it was needed a handling related to four aspects of the balanced scorecard that exist in the KPI of a company.

**Keywords** Warehouse, balanced scorecard, deployment, KPI

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### Introduction

A consumer goods company in West Jakarta realizes that to compete in increasingly widespread similar industry growth, it is needed to increase accurate services and fast delivery time. In other words, this requires an improvement in the logistics sector in general and warehouse in particular.

How to determine the improvement in this sector? The way is to measure performance on a periodic basis. This can be one periodic monthly, 3-month, or 6 months. However, in the PT. Multi Indocitra, Tbk. (PT. MIC), the measurement is done every month so that deviations can be corrected and prevented.

To measure the performance of warehouse, KPI (Key Performance Indicator) is appropriated to be applied. By monitoring the KPI, a manager can determine the condition of the warehouse and take strategic steps to make improvements and to increase productivity. In addition, to determine its performance, KPI is also useful for comparing the expected value to the achieved actual value, to increase the target performance from period to period, to avoid the inconvenience of customers, and to maintain the quality of existing ones. KPI for each company can be same and different from each other. This is because each company has unique interests and different types of industries. This study uses a balanced scorecard approach to measure the performance of PT. MIC.

The concept of balanced scorecard first developed by Robert S. Kaplan and David P. Norton in his book called translating strategy into action: the balanced scorecard. Balanced scorecard is one of the method of measurement and management performance for factors internal and external of a corporation. Currently, most companies are still using measurement financial as the reference measurement of the company, so manager do not know how far the influence caused by they apply strategy [1].



## Materials and Methods

Performance measurement according to Gaspersz (2006) is the measurement of play a very important role on the increase in any progress (change) at better. relating to the measurement of performance, election known right performance of and related to strategic objectives the company is very important and determine [2].

Mardiasmo (2002) in general, the system of measurement performance was: a. untuk communicate strategy a better (are top-down or bottom-up) . B. For measuring financial performance non-finansial in equal so that it can be traced achievement growth strategy for accommodate understanding the interests of manager high level and bottom and motivate to achieve harmony purpose (goal congruence). It means to achieve approach satisfaction based on individual and collective ability rational [3].

It was examined that the use of information technology affects performance of warehouses. They conducted a survey including both public and dedicated warehouses. Their findings suggest that the use of information technology is related to several positive outcomes, such as improvement of quality, cycle times might be reduced as well as an increase in productivity. The Fraunhofer Institut for Materialfluss und Logistik examined a wide range of warehouse management systems [4]. They use more than 2500 criteria to examine whether a warehouse management system fits to the respective company. They assess among others indicators such as: product range, user environment and system characteristics, basic functions such as order processing, inventory management, means of transport and typology of storage.

The purpose of this study is to measure the performance of warehouse at PT. MIC using KPI referring to the Balanced Scorecard. According to Liviu Ilies (2009), the balanced scorecard includes four aspects. They are the financial, customer, internal process, and learning and growth aspects [5].

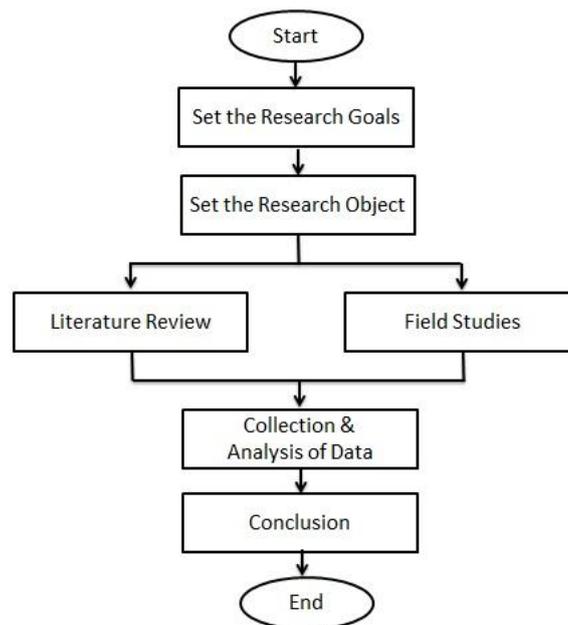


Figure 1: Research Methodology

The object of the research is the warehouse performance at PT. MIC for three months from June to August 2016. Aspects studied were aspects of the balanced scorecard, namely the aspect of financial, customer, internal, and learning and growth. Financial aspect is an aspect that contains things companies do to lower the company's cost so that profit increases. Customer aspect is the aspect of how well a company is seen from the outside environment. Internal process aspect is this aspect that contains steps that must be done by the company to answer aspects of the customers. The latter is the aspect of learning and growth which contain things that must be learned and innovated by the company so that the company continues to grow and develop. These aspects are called the aspect of continuous improvement. In this study, the researcher refers to the results of scientific research related to ways of measuring the warehouse performance.



In a field study conducted the following steps: (i) Observation of warehouse activity, (ii) Determining the goals to be achieved in the aspect of financial, customer, internal process and learning and growth, (iii) Determining KPI (Key Performance Indicator), (iv) Determining KPI targets and measuring the KPI realization.

In this stage, it was done a comparison between the realization of the target and the target set for 3 months, and then set out the steps (initiatives) to repair. After the data processing and analysis, the author provided suggestions that can be used in the next study. Next, it was made a conclusion on the results of this study in answering the research objectives that had been set.

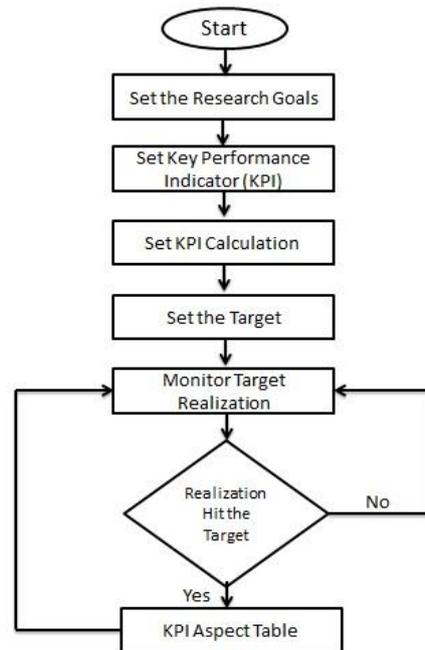


Figure 2: KPI Design and Monitoring

This research develops warehouse performance measurement based on the balanced scorecard. Thus, it is necessary to describe clearly the steps of model development. Model development performed in this study starts from the existing business strategy of the company. Thus, the resulting strategy is a strategy that is concerned with the existing strategy. The functional strategy must be aligned with business strategy. So, warehouse strategy should be in accordance with the business strategy. In connection with the above picture and linked objectives of this study, it was made a diagram of the deployment development process on 5 warehouse performances based on the balanced scorecard.

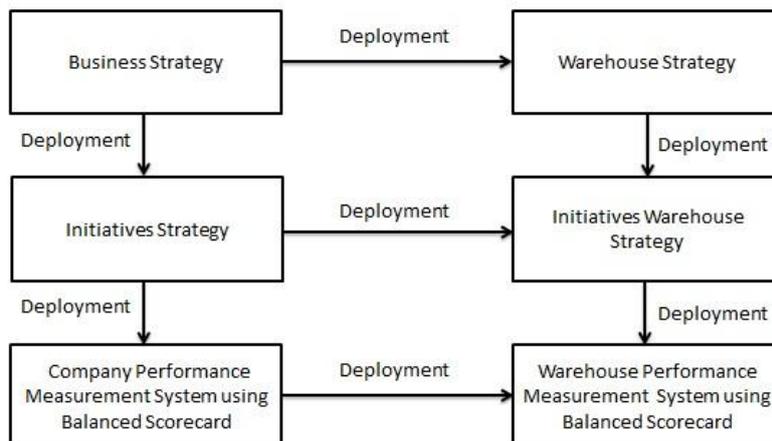


Figure 3: Warehouse Performance Deployment Model Using Balanced Scorecard

In the development model of warehouse performance measurement, the next step is to group warehouse key performance indicator into four perspectives of the balanced scorecard in accordance with the existing rules.

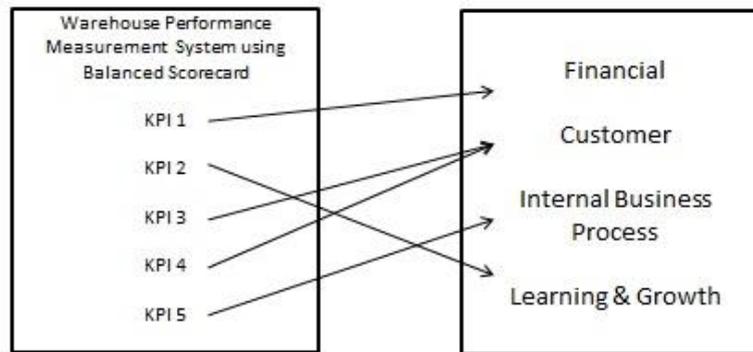


Figure 4: Warehouse KPI Grouping

On the financial perspective, the decision in the grouping is based on the strategic issues that arise include: (a) Labor Cost, (b) Inventory Cost, (c) Delivery Cost. For grouping into the customer's perspective, there are several things that must be considered, namely: (i) On Time Delivery, (ii) Order Fulfillment.

As for the process of grouping into internal business process perspective, the processes that need to be noticed are: (i) Storage Process, (ii) Delivery Process, (iii) Productivity, (iv) Warehouse Utilization. Learning and growth perspective focuses on the organization's ability to do continuous improvement in order to improve customer satisfaction for the company's future, continue to learn, grow, and thrive. The company must continue to hone the competencies, sharpen excellence, as well as provide a conducive atmosphere for working.

After making observations and studying literature, the researcher designed the KPI by using a balanced scorecard as shown in Table 1, 2, 3, and 4. For the target, of course, it was discussed with the competent local employees. The balanced scorecard is monitored every month in order for obstacles to be fixed on overall warehouse performance. The data from June to August 2016 are presented in Table 5, 6, 7, and 8.

Table 1: Design of Financial Perspective, Goal, Measurement, and Target

Aspect	Goal	Measurement	Target
F-1	Reduce Labor Cost	Overtime Duration / Troughput	0.03%
F-2	Reduce Variance Inventory Cost	Total Quantity by Actual / Total Quantity by System	100%
F-3	Reduce Delivery Cost	Cost Distribution / Sales Achievement	2%

Table 2: Design of Customer Perspective, Goal, Measurement, and Target

Aspect	Goal	Measurement	Target
C-1	On Time Delivery	Achieved Delivery / Total Delivery	95%
C-2	Order Fulfillment	Achieved PO / Total PO	98%

Table 3: Design of Internal Process Perspective, Goal, Measurement, and Target

Aspect	Goal	Measurement	Target
IP-1	Storage Process Improvement	Total SKU Hit / Total SKU System	100%
IP-2	Delivery Process Improvement	Loading Time Average per Ritase	Max. 20 Minutes
IP-3	Productivity	Troughput / Working Hour per Month	1,025
IP-4	Warehouse Utilization	Average Pallet Storage / Max. Warehouse Storage	95%



**Table 4:** Design of Learning and Growth Perspective, Goal, Measurement, and Target

Aspect	Goal	Measurement	Target
LG-1	Knowledge Improvement	Total of Training Conducted	Min. 2x per year for Supervisor
LG-2	Reduce Alpha	% Alpha / Sick per Month	Max. 3 days per Month
LG-3	Reduce Turn Over	Total of Employee Out / Total of Employee	5% per Semester
LG-4	Reduce Tardiness	Frequency of Employee's Late	Max. 5x per Month
LG-5	5S Implementation	Total of 5S Activities that have been implemented	5S Activities everyday

Validation is the process of a request for approval or endorsement of the suitability of the model created with the needs of the company. To get recognition, validation is done by involving the experts in accordance with the related field or those who use the model. Validation is necessary to obtain comprehensive and objective feedback on the models that have been developed. The important things obtained from the validation process are: (i) Correspondence between the warehouse performance measurement model and the company's business strategy, (ii) Correspondence between obtained key performance indicator and the demands of the company warehouse, (iii) Flexibility for the development of key performance indicators in accordance with the needs and development of the company.

### Results and Discussions

Before collecting data, the researcher along with a team of the warehouse of PT. MIC designed objectives, KPI, formulas, and targets related to aspects of the balanced scorecard. Objectives, KPI, formula, and the target should be done by a team at the company's warehouse. By determining these, it will be very easy to monitor the targets to be achieved, even if there are deviations or there are factors that hinder the achievement of these targets. Everything is designed to progress together and can perform continuous improvement. For example, in arranging the financial aspect, all goals are to reduce the associated costs in the warehouse department, such as the labor costs, the costs of inventory/supplies, and the shipping costs.

KPI is then determined with the objective of those costs do not exceed what is determined. KPI can be improved from period to period. If the 5% reduction can be achieved, there is the possibility of a subsequent period can be increased to 7.5%, and so on. The calculation of this assessment is a guide to calculate the existing data in order to avoid mistakes in the count because if it is not listed, there is the possibility of an accountant could forget. In the target column, the initial target was taken from the previous year's data. These data serve as the basis for determining the target in the next period. The chosen initial target was the average achievement in the last 3 months of 2014, i.e. October, November, and December.

**Table 5:** Financial Perspective of Balanced Scorecard

Aspect	Goal	Target	June Achievement	July Achievement	August Achievement
F-1	Reduce Labor Cost	0.03%	0.015%	0.02%	0.03%
F-2	Reduce Variance Inventory Cost	100%	99.8%	99.8%	99.8%
F-3	Reduce Delivery Cost	2%	1.99%	1.33%	1.41%

**Table 6:** Customer Perspective of Balanced Scorecard

Aspect	Goal	Target	June Achievement	July Achievement	August Achievement
C-1	On Time Delivery	95%	100%	100%	100%
C-2	Order Fulfillment	98%	100%	100%	100%



**Table 7:** Internal Process Perspective of Balanced Scorecard

Aspect	Goal	Target	June Achievement	July Achievement	August Achievement
IP-1	Inventory Management Improvement	100%	100%	100%	100%
IP-2	Delivery Process Improvement	Max. 20 Minutes	15 Minutes	15 Minutes	15 Minutes
IP-3	Productivity	1,025	980	894	899
IP-4	Warehouse Utilization	95%	100.22%	108.65%	113.41%

**Table 8:** Learning and Growth Perspective of Balanced Scorecard

Aspect	Goal	Target	June Achievement	July Achievement	August Achievement
LG-1	Knowledge Improvement	Min. 2x per year for Supervisor	-	-	1
LG-2	Reduce Alpha	Max. 3 days per Month	-	-	-
LG-3	Reduce Turn Over	5% per Semester	-	-	-
LG-4	Reduce Tardiness	Max. 5x per Month	-	-	-
LG-5	5S Implementation	5S Activities everyday	V	V	V

In Table 5, 6, 7, and 8, overall, the target previously set was enough achieved in the period January to March 2016. There are several things that need attention, i.e. the percentage of warehouse utilization. In those three months, it showed a fairly high percentage above 95%. This shows that the warehouse capacity overload due to the utilization of goods in and goods out not quite balanced. It should be taken an action because if this continues to happen every month, space in the warehouse will be full and the position of the goods will fall apart due to the limited warehouse capacity.

Furthermore, there should be treatment related to controlling employee overtime hours each month so that the percentage value of labor cost does not exceed 0.03%. It needs to be anticipated, such as implementing the qualified training to improve employees' skills, so that the productivity will increase and be practical. This will affect the reduction in overtime.

The percentage of delivery cost also need attention so that the value of cost distribution must be proportional to the value of product sales achievement that will be delivered. One of the strategies that need to be implemented is the use of models LGL (Less Container Load) if there is a small value of sales achievement and a large value of distribution cost, where there is a union of shipping for multiple delivery areas (multi-drop).

Controlling the expedition that does delivery should also be conducted so that the percentage of on time delivery will remain 100%. On the other hand, it would keep the percentage of warehouse order fulfillment to meet customer needs. With the number of existing human resources (11 people) and also the utilization of the goods in the warehouse that is high enough, the human resources are required to have enough activities on a daily basis so that the percentage of warehouse productivity in accordance with the set targets.

Percentage of learning and growth, so far, is not too problematic. Monitoring should be done every month for the next year so that the company can make an assessment and a response to what needs to be corrected concerning the training and development of employees in order to develop the existing potential.



## Conclusions

From research on the performance of warehouse PT. Multi Indocitra, Tbk. during the period June to August 2016 using balanced scorecard aspects, it can be summarized as follows: (i) Warehouse performance is already good in general and achieves the targets that have been determined, (ii) It needs more handling to control the utilization of warehouse overload, which is 113.41%, (ii) It needs a control so that overtime does not exceed the value of the existing targets in the future. Percentage of overtime vs. throughput in March 2016 is 0.03%.

Performance indicators are useful for identifying the problems because values of indicators are as a control system for a warehouse. In order to solve the problems, we have used a very simple methodology: identify the causes of the problems and the try to diminish their impact or just elimante the causes. It is a cause-effect approach, easy to be applied by any manager.

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