System Dynamic Modelling to Evaluate e-Business System

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ABSTRACT

Internet and information technology has great impact in recent years. It can assist business system to run effectively and efficiently. A business system which applies internet as part of its business system is recognized as e-Business System. PT. Semen Gresik (Persero) Tbk as one of the multinational scale company has applied e-Business system as their supporting system. e-Business system applied in this company is e-Commerce. Until now, e-Business model applied in the firm has a role as of supporting activity which is not directly influence business value chain. This research will analyse the e-Business Model and measure its performance using e-Commerce Scorecard. The model will also develop in System Dynamic model to gather the best strategy in increasing its performance. System Dynamic approach is used in this research because of its flexibility and effectiveness in capturing variables within observed system.

Keywords: e-Business System, e-Business Model, System Dynamic, e-Commerce Scorecard.

1. INTRODUCTION
1.1 Case Study

The competition among firms nowadays become so tight. To become competitive, they need IT support. One of superiority that can be applied in order to cope these competition is applied business system using internet or well known as e-Business system. By means of e-Business, firm able to reduce its operation cost up to 20%. It also provides more profit about 25% of its common. In addition, firm also able to gain other intangible benefits such as: easy information acces, increase in image brand, etc.

PT. Semen Gresik (Persero) Tbk as one of the international scale company has been applied e-Business system as their supporting system, e-Business system applied in this company is e-Commerce. With this system implementation, the company have a lot of benefits such as Commerce cost reduction. Moreover it can increase employee satisfaction because it drive them to work more effective and efficient so they feel contented to their job. However, implementation of this system also have some barriers. To be appropriately implemented, these barriers must be minimized. Beside that, an appropriate e-Business strategy is also crucial factor in order to e-Business system applied could run as planned.

Until now, e-Commerce model applied in the firm has a role as of supporting activity which is not directly influence business value chain. Online commerce model that adopted by PT. Semen Gresik only exist in 60-70% of East Java distributor whereas their distributor exist not only in East Java but also in whole Java, Sumatera and Kalimantan. While online payment can be accessed by four distributor merely. Indeed, e-Business can be more than supporting activity in the firm which directed influence business value chain. Beside that, performance of e-Commerce system of PT. Semen Gresik have never been measured. They always assumpt if their e-Commerce system is success based on subjective appraisal.

In this research, e-Commerce objectives of PT. Semen Gresik are defined. Then, Business Model for e-Commerce in the firm is re-developed in form of framework model. Next step, performance of e-Commerce Business Model is measured using e-Commerce Scorecard. The worst KPI are improved using system dynamic modelling. Using this approach all variables that influence system modelling of e-Business are identified. Based on these variables, it can be seen any alteration that might occur while new business model proposed. Studying this phenomenon also give an understanding about what appropriate strategy can derived.
in order to increase the performance of the e-Business model

1.2 Research Question
The problem will be done in this research is "How to analyse e-Business model, measure its performance, and determine the best strategy in increasing its performance using system dynamic model

1.3 Research Purpose
The purpose of the research are develop e-Business Model and analyse its weakness, measuring the performance of the e-Business model, determine the best strategy in increasing its performance using system dynamic model

1.4 Research Boundaries
Boundaries applied in this research are the research only can be done up to policies and decision stages, within this research, e-Commerce is defined as subset of electronic business. While assumption applied in this research are there is no change in the e-Commerce system structure during the research period.

2 E-BUSINESS MODEL
Business model is a summary of how a company will generate revenue identifying its product offering, value added services, revenue sources and target customer. The business model gives sense to the various business processes by describing why certain processes are designed the way they are. In the electronic, business model has become more complex. New market environment, new technological environment and new relationship management has to be included in the business model then the business model become an e-Business model that defined as a conceptualization and formalization into elements, vocabulary, and semantics of the essential subjects.

E-Business model that used in this research are compiled from four pillars named Product Innovation, Customer Relationship, Infrastructure Management, and Financial. Product Innovation cover all aspect of what firm offer its customer. It is not comprise only its products and services but also the manner of how it differ from its competitors. Product innovation element consist of three sub element that are value proposition of the firm offers to specific target customer segment and capabilities of the firm to deliver the value. It is based on Infrastructure Management which provide resources for it.

PT. Semen Gresik e-Commerce system enabling customer to gather much information about their order, make online order, and payment also using internet. With function named account management online, the customer is able to gain information about aging, invoice, and balance guarantee. Also with this function, customers can handle their account online and receive their statement electronically. Table 1 below are summarize of value proposition in PT.Semen Gresik.

<table>
<thead>
<tr>
<th>Description</th>
<th>Online Account Management</th>
<th>Order &amp; Payment Online</th>
<th>Order Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Customer can handle their account online and receive their statements electronically. At every moment they have an up to date overview of their account history</td>
<td>Customer can make an order and pay their order electronically. It gives customer new convenient way in buying and paying order, less time, less cost</td>
<td>Customer can monitor about their order status, it give customer more trust in order fulfillment</td>
</tr>
<tr>
<td>Reason</td>
<td>Customer can conveniently manage their account from their PC</td>
<td>Customer can save time and cost. But the most important is customer can increase the turnover of their money</td>
<td>Increasing customer trust and loyalty by inchoing them in monitoring business process related with their needs</td>
</tr>
<tr>
<td>Lifecycle</td>
<td>Value Creation</td>
<td>Value Consumption</td>
<td>Value Creation</td>
</tr>
<tr>
<td>Value Level</td>
<td>Innovation</td>
<td>Kne-Taa</td>
<td>Excellence</td>
</tr>
<tr>
<td>Price Level</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
</tr>
</tbody>
</table>
Figure below are summary of the business model PT.Semen Gresik (Persero), Tbk

Information output of the business model then being used to indicate relevant measures in the e-Commerce Scorecard. According to the e-business model mentioned above there are any measure that must be done to gather information which are need to be improved : Information Strategy, Partner Network, Resources and Assets, Capabilities and Trust\&Loyalty. All of this measure together with additional measure must be inputted in the objectives or key performance indicator in the scorecard. The translation of each measure to objectives explained in the next section.

3 E-BUSINESS MEASUREMENT
3.1 Strategic Objectives Derivation
Before the performance measurement system developed, first strategic objectives of the e-Commerce system must be defined. This strategic objectives have been derived from the corporate vision and mission and it is also represent measurement in the business model. This strategic objectives also support the corporate strategic objectives and have linked with it. As result of the business model there are element must be involved in the scorecard that are : Information Strategy, Resource and Assets, Trust and Loyalty, Partner Network, and Capabilities. The determination of the strategic objective is done by interview with related division and staff that understand the system it self. There are 3 division are interviewed named information system, sales, and corporate development.

3.2 Strategic Mapping
From the objectives that have been developed, that relationship among objectives formed into causal relationship that communicate strategic objectives of the whole organization.

3.3 Designing Key Performance Indicator (KPI)
After objectives of each perspectives have been identified, then indicators that able to measure reaching index for all objectives is choosen. This indicators will be Key Performance Indicator ( KPI ).
### 3.4 e-Commerce System Measurement

Weighting is done by fill closed questionnaire by Manager. This weighting process consists of 3 levels that are:

- Performance weighting of each perspectives into enterprise performance.
- Weighting each performance (objectives) into each perspectives.
- Weighting of each KPI into objectives

Grade of each indicator is determined by management with considering its strength and organization preparation to achieve target that have been determined.

As PT.Semen Gresik are one of the best corporate in Indonesia, its grade for indicator achievement can be said as high. Grade determination of each colour indicator by the management are as follow:

- **Green**: With score 76-100
- **Yellow**: With score 51-75
- **Red**: With score 0-50

Scoring system and traffic light analysis for all KPI in the performance hierarchy of PT.Semen Gresik can be viewed in the next section.

### 4 System Dynamic Model

#### 4.1 Variables Identification

Before entering system dynamic modeling, first we must identify variables that will have affect in the e-Commerce system. This variables have its own interdependency to each other and also have causal relationship. The variables used in the system dynamic model must derived from the e-Commerce scorecard that have been developed before. Not all of the variables in the scorecard are modeled in this system. Only variables that great influence to the objectives are involved in the model. The main variables modeled in the system is explained in the next section.

Variables identification process is made by having an interview and survey with related authorities in PT.Semen Gresik. The final result to determine important factors is made by brainstorming process in a group. These main variables will be modeled in system dynamic: `Online Distributor`, `Staff`, `Investment`, `Profits`, `e-Commerce Quality`, `Amount of Information`, `Third Parties Logistic Performance`, and `Customer Satisfaction`.

Within the model only a small part of the elements of real enterprise is shown in detail. Therefore some assumption have to be made for the enterprise. With these assumptions complex circumstances of variables identification process is made by having an interview and survey with related authorities in PT.Semen Gresik. The final result to determine important factors is made by brainstorming process in a group. These main variables will be modeled in system dynamic: `Online Distributor`, `Staff`, `Investment`, `Profits`, `e-Commerce Quality`, `Amount of Information`, `Third Parties Logistic Performance`, and `Customer Satisfaction`.

Within the model only a small part of the elements of real enterprise is shown in detail. Therefore some assumption have to be made for the enterprise. With these assumptions complex circumstances of
reality are simplified. The substantial assumptions can be summarized as follows:

- The skills of staffs will be measured by points
- The actual standard productivity considers employee's time away job
- Each training takes 7 working day and reduces the staff working time
- All worker have to be trained in equal way
- The skill lost and information lost rate is constant
- All worker have nearly the same skills. So an average value can be used
- Skills points for promotion is based on assumption made by stakeholder
- The initial value of each variables are based on actual condition during the research made
- Non linear relationship made with assumption of the stakeholder
- Variable cost used in the model given as percentage of the sales
- The model only emphasize four main sub system compiling e-Commerce system PT.Semen Gresik
- Any further cost and revenue can be ignored for calculating profit
- The model only emphasize staff, revenue and cost model, customer, customer satisfaction

4.2 Model Formulation

In order to easily understand the whole system, the system is divided into 5 part. The purpose of this division because each submodel in this part is being affected by different variables but still have connection among each other.

4.3 Policy Experiments to Improve Performance of e-Commerce System

In the following, there are analysis of three simple scenarios or strategies relative to a base run situation, with focus on the dynamic system.

<table>
<thead>
<tr>
<th>Table 3. Policy Strategy</th>
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<tbody>
<tr>
<td><strong>Strategy</strong></td>
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<tr>
<td>We want to maximize profit from e-Commerce activities within 10 years</td>
</tr>
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</tbody>
</table>

Figure 2. Simulation Result
A quick inspection in the graph and table listed above, indicate that the second scenario has the best value. For maximize the profit through e-Commerce activities the corporate have to increase their investment from 2% to 7% of their profit. But the percentage invesment only has great impact until the fifth year. After the fifth year pass, the increase is not as high as before.

5 SUMMARY AND CONCLUSION
Combining three tools in any different level can be powerfull in defining, measuring, and improving e-Business system. In the research that have been done, show that each of this tools has a relationship and among each others. The business model tried to depicted to logic of the business model and its element. The business measurement system tried to determine which of the element are need significant improvement. The last, the system dynamic model tried to solve the problem and shows the relationship among each variables.

There are three simple strategies and transformed these into an analytical models based on simple assumption cause and effect relationships between various performance measures. A relatively simple strategy, the model already becomes relatively complicated as does its dynamic behaviour. As have been mentioned, combination between three tools are essential in modeling, measuring, and improving the e-Business model. The base scenario shows that the company have any problem in gathering sales through their e-Commerce system. Else, they face problem in persuating their customer to use the online system. It is causes slow increase in their net income. According to the scenarios that have been set up, shows there are any significant improvement in the profit, online sales, and number of customer online. These three scenarios will be choosen which one posses greatest value. The best scenario are scenario to with action increasing investment from 2% become 7%.

6 References
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