Green innovation and sustainable industrial systems within sustainability and company improvement perspective

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Abstract. This paper comprises discussion of Green Innovation and Sustainable Industrial Systems within Sustainability and Company Improvement Perspective of beverage manufacturing company (BMC). The stakeholder theory is the grand theory for the company improvement perspective in this paper. The data processing in this paper is conducted through software which are SEM-PLS with SmartPLS 2.0 and SPSS 19. The specified objective of this paper has focus on sustainability as one of 6 variables, in lieu of those 6 variables as the big picture. The reason behind this focus on sustainability is the fact that there are assorted challenges in sustainability that is ranging from economic, environment and company perspectives. Those challenges in sustainability include the sustainable service supply chain management and its involvement of society. The overall objective is to analyze relationship hypothesis of 6 variables, 4 of them (leadership, organizational learning, innovation, and performance) are based on Malcolm Baldrige's performance excellence concept to achieve sustainability and competitive advantage through company-competitor and customer questionnaire, and its relation to Total Quality Management (TQM) and Quality Management System (QMS). In conclusion, the spearheaded of company improvement in this paper is in term of consumer satisfaction through 99.997% quality standards. These can be achieved by ambidexterity through exploitation and exploration innovation. Furthermore, in this paper, TQM enables to obtain popularity brand index achievement that is greater than 45.9%. Subsequently, ISO22000 of food security standard encompasses quality standard of ISO9000 and HACCP. Through the ambidexterity of exploitation and exploration (Non Standard Product Inspection) NOSPI machine, the company improvement generates the achievement of 75% automation, 99.997% quality control standard and 80% of waste reduction.

Keywords: Green, Sustainable Industrial Systems, Company Improvement, Ambidexterity

1. Introduction

Green innovation (GI) is deemed indispensable to be intertwined with the sustainable industrial systems (SIS). In this paper, further discussion of both GI and SIS is elaborated within sustainability (SP) and company improvement perspective (CIP).

GI indicates minor segregation in definition among notions of green innovation, eco, sustainability and environment. Nevertheless, there are six indispensable different definitions, which are innovation object; market orientation; environmental aspect; phase; impulse; and level (Schiederig, Tietze and Herstatt, 2011).

Furthermore, the sustainability (SP) is intertwined with the company improvement perspectives as relate to intention to maintain market and eventually competitive advantage.

The specified objective of this paper has focus on sustainability as one of 6 variables, in lieu of those 6 variables as the big picture. Relationship hypothesis in the overall studies comprise 6 variables. Among those 6 variables, 4 of them (leadership, organizational learning, innovation, and performance) are based on Malcolm Baldrige concept to achieve sustainability and competitive advantage through company-competitor and customer questionnaire, and its relation to Total Quality Management (TQM) and Quality Management System (QMS). Hypothesis in this paper is arranged according to six components of Malcolm Baldrige's performance excellence variables. This paper elaborates those components and provides the conceptual research model of hypothesis relationship in strategic research as illustrated in Figure 1.

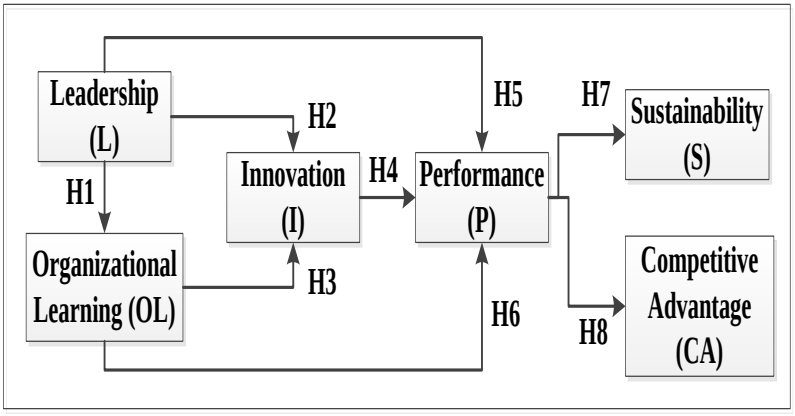

Figure 1 Conceptual Research of Hypothesis Relationship in Strategic Research

2. Methods

2.1. Data Collection

This session elaborates information on how to congregate data within process of data collection. The data are assembled randomly, as elaborated in the following processes. Prior to commence the research, observation and interviews are conducted to the unit of analysis, which is respondent within company. This process toward unit of analysis is conducted to obtain a clear view of business processes and policies within company.

This paper provides research study of quality control and superior performance of beverage manufacturing company (BMC) in order to achieve worldwide company in perspective of sustainability and company improvement perspective. This perspective is achieved by ambidexterity approach in the exploration and exploitation operations which is based on the context of the global enterprise, known as a world class company.

Other than the objectives of as mentioned in the analyze relationship hypothesis of 6 variables, in more detail perspectives, the objective of this paper focus on how to solve the problems:

1. To determine the optimum setting of Non Standard Product Inspection (NOSPI) first generation to achieve the quality standards 99. 997% as required by Quality Control.
2. To analyze the 75% cost minimization achievement by feasibility testing of an economic point of NOSPI machine.
3. To analyze NOSPI engine placement position in the production line to reduce non-standard products number within the qualify level for the 80%.

All those problems are processed on the basis of the theory of organizational ambidexterity, implementation of automatic machine, straight line depreciation method and uniform series compound.

Organizational ambidexterity refers to the ability of the organization to augment efficiency by performing a static approach that demands involved company in the exploration and exploitation to simultaneously and balanced both approaches (Boumgarden, Nickerson, & Zenger, 2011, pp. 7-8).

Implementation of automatic machine is a matter that cannot be segregated from production system. Furthermore, automatic machine can be utilized as a means in lieu of human capital and physical labor (Lanvin & Evans, 2014, p. 29).

Straight line depreciation is derived from the decline that linearly happened within time base. Depreciation rate is equal (1 / n) each year of the period n. Straight line depreciation provides a very good representation of the assets values of NOSPI and manual selectors. It is used frequently for a number of years and are estimated by the following formula (Blank & Tarquin, 2012, p. 418).

$Dt = (B - S)\ dt = (B - S) / n$

Where: t = year

Dt = *annual depreciation charge*
B = initial cost
n = salvage period
dt = *depreciation rate* = 1/n

Straight line depreciation is used to calculate the annual worth of NOSPI within the range of 7 years.

Uniform series compound is used to obtain the value of futures worth of annual value worth by the following formula (Blank & Tarquin, 2012, p. 46).

$$F = A\left[\frac{(1+i)^n - 1}{i}\right]$$

where:

A = *annual worth*
F = *future worth*
i = *interest rate %*
n = *period*

2.2. Detailed Problems

2.2.1. Optimum Setting of NOSPI first generation

NOSPI engine performance can be identified through its ability to detect non-standard packaging (cap tilted, sagging, and less volume). Due to the defect number is deemed as the representation of engine performance level of NOSPI, it implies that the greater number of defects that escape, the worse the performance of the engine.

Table 1 Variable Value of NOSPI Machine

Variable	R Value
Conveyor speed	-0.10227
Left measurement (min) parameter, fix (+8.0)	-0.21302
Left measurement (plus) parameter, fix (-8.0)	0.63624
Right measurement (min) parameter, fix (+8.0)	-0.33619
Right measurement (plus) parameter, fix (-8.0)	-0.18600
Left measurement linear parameter	0.01098
Right measurement linear parameter	0.72698
Different measure parameter	0.79413

Based on all the scatter diagram test results, most states NOSPI inspection performance will improve when the setting value closer to zero the value of the interval narrower, due to more stringent inspections. But it would be a problem as well if the inspection capabilities too tight, because it can cause standard packaging is considered as non-standard. Thus, the researchers conducted an experiment by trial and error to obtain the optimal value for each parameter setting.

2.2.2. Economic point of NOSPI machine

MSE is calculated by summing the squares of all errors of forecasting at each period and dividing by the number of the forecast period. Mathematically, the MSE is defined as follows:

2.2.3. NOSPI engine placement position

MSE is calculated by summing the squares of all errors of forecasting at each period and dividing by the number of the forecast period. Mathematically, the MSE is defined as follows:

2.3. Research Methodology

The following is a flow diagram of research which is based on the methodology of the study (Kumar, 2014, pp. 36-37) and (Sanusi, 2011, pp. 166-199) researchers adjusted and adapted to the conditions of the beverage manufacturing company in this paper. The mentioned flow diagram is illustrated in Figure 2.

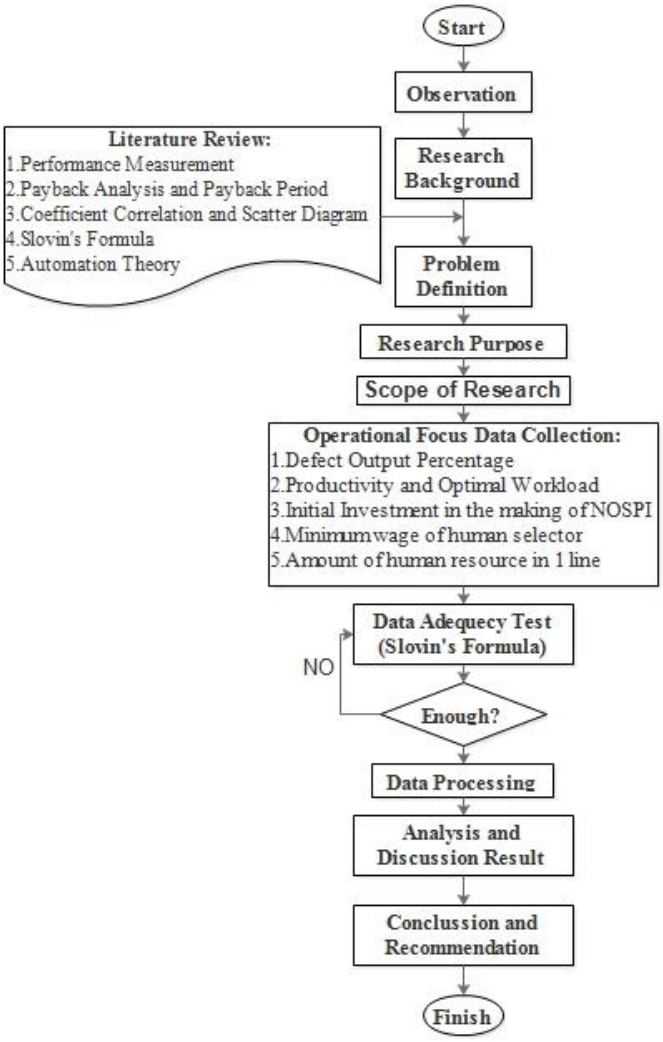

Figure 2 Flow diagram of research methodology

3. Data Processing

The data processing in this paper is conducted through software which are SEM-PLS with SmartPLS 2.0 and SPSS 19. Partial least squares structural equation modeling (PLS-SEM), or also known as Partial Least Square Path Modeling (PLS-PM) is a structural equation modeling approach utilized to confirm the empirical indicators. Furthermore, it confirms the construct of the measurement model and depicts the structure of causality among variables in the structural (Sanusi, 2011, p. 167).

Generally, there are two genres of covariance-based SEM, known as structural equation modeling (CB-SEM) and Partial Least Square Structural Modeling (PLS-SEM). CB-SEM is represented by software that are known as AMOS, EQS, LISREL, PLS-SEM Mplus while PLS-SEM is represented by software that are known as PLS-Graph, SmartPLS, VisualPLS, XLSTAT-PLS. CB-Subsequently SEM is a genre that involves constructs, in which their indicators are correlated in a structural model. In the specific consideration, PLS-SEM is the genre that utilized a variance in the iteration process. This process does not require a correlation among indicators and its latent constructs (Latan & Ghozali, 2012, pp. 20-21).

4. Discussion

The beverage manufacturing company (BMC) in this paper has been established since 1974. This company has maintained its high quality process of tea leaves. Those tea leaves are transformed into a ready to drink tea.

As indicated in the title of this paper, there are two major discussion components, which are green innovation (GI) and sustainable industrial systems (SIS). Both GI and SIS are elaborated within sustainability (SP) and company improvement perspective (CIP). This perspective is achieved by ambidexterity approach in the exploration and exploitation operations which is based on the context of the global enterprise, known as a world class company. Subsequently, the mentioned perspective comprises strategic point of view and the more details operational point of view in term of 3 problems to be solved and improved pertaining NOSPI.

Within the strategic point of view, in order to maintain its high quality process, BMC has to proceed to CIP in order to obtain sustainability. Furthermore, this sustainability, known as hypothesis number 7, is part of 6 variables as indicated in figure 1. Precisely, in order to obtain sustainability, BMC has to involve leadership, organizational learning, and innovation through the bridge of performance. The mentioned innovation is elaborated through the notion of GI that is intertwined with SIS.

The study of Weng, Chen and Chen (2015) indicated the framework of research model in which GI has the precedents of external stakeholders (pressure from competitors and government pressures) and internal stakeholder (customer pressure, pressure from suppliers and employee conduct). Precisely, those three scholars refer to the stakeholder theory.

Within the operational point of view, the company improvement is translated into the solving of 3 problems pertaining NOSPI that are elaborated in the session of 2.1 data collection. Within the discussion of stakeholder theory, it refers to internal stakeholder through the company improvement, and originates from the customer pressure.

Combining both strategic and operational point of view, the customer pressure is deemed indispensable. This indispensability drives the effort of BMC to proceed to company improvement in order to achieve sustainability perspective Eventually both perspective is arching the green innovation and sustainable industrial system of BMC.

Furthermore, as a beverage manufacturing company, this company in this paper requires manufacturing strategy with several approaches according to each available literature review on the most common definitions of manufacturing strategy.

Taghavi (2015) elaborates several definitions as coined by several scholars which are (Hayes and Wheelwright (1984); Hill (1994); Marucheck et al. (1990); Platts et al. (1998); Skinner (1969); Slack and Lewis (2011); and Swamidass and Newell (1987).

5. Conclusion

The context of this paper constitutes the discussion of one of beverage manufacturing company, while the content of this paper surrounds its discussion around innovation and sustainability. Precisely, the discussion constitutes green innovation and sustainable industrial systems within sustainability and company improvement perspectives.

Sustainability is included in the content of this paper. Furthermore, sustainability is deemed indispensable in the hypothesis 7, known as H7, in the Figure 1, pertaining conceptual research. The sustainability has its antecedent, which is performance. In order to achieve the performance, the involvement of leadership and organizational are needed, in addition the performance as the mediating variable.

Furthermore, sustainability in the content of this paper can be applied within the context of this paper on beverage manufacturing company.

6. Recommendation

There are several recommendations in order to apply sustainability as the content of this paper into the context of beverage manufacturing company. This beverage manufacturing company is focusing on the tea leaves that are transformed into a ready to drink tea.

First, it is recommended to proceed to the company improvement perspective through the ambidexterity of the exploration and exploitation. The exploration constitutes the approach to not only transform tea leaves of this beverage manufacturing company into ready to drink tea, but also transform them into the breakthrough transformation. Furthermore, the exploitation constitutes the approach to transform those tea leaves into continuous improvement transformation.

Second, it is recommended to proceed to company improvement perspectives. Precisely, the mentioned perspective comprises strategic point of view and the more details operational point of view in term of 3 problems to be solved and improved pertaining NOSPI.

Improvement pertaining NOSPI constitutes the solving of the following problems:
1. To determine the optimum setting of Non Standard Product Inspection (NOSPI) first generation to achieve the quality standards 99. 997% as required by Quality Control.
2. To analyze the 75% cost minimization achievement by feasibility testing of an economic point of NOSPI machine.
3. To analyze NOSPI engine placement position in the production line to reduce non-standard products number within the qualify level for the 80%.

All those problems are processed on the basis of the theory of organizational ambidexterity, implementation of automatic machine, straight line depreciation method and uniform series compound.

Subsequently, in term of sustainability as future research; it is indispensable to further elaborates characteristics and approaches to the topic of sustainability as conducted by Satori, Da Silva and Campos (2014). These scholars elaborates and compiles other work of scholars in term of sustainability, within the scopes of study (empirical versus theoretical), dimension (environment versus economic versus social), and scale (specific versus global versus country versus regional). Those other scholars consist of the scholar works (Dahl (2012); Farla et al. (2012); Hak et al. (2012); Hosseini et al. (2012); James and Card (2012); Moldan et al. (2012); Mori and Christodoulou (2012); Porter and Derry (2012); Singh et al. (2012); Slimane (2012); and Urban and Govender (2012).

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