INTEGRATING ENVIRONMENTAL MANAGEMENT SYSTEM WITH ENVIRONMENTAL PERFORMANCE EVALUATION ACROSS THE SUPPLY CHAIN: A SYSTEMATIC AND BALANCED SCORECARD APPROACH

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Abstract

This research has explored environmental sustainability related literature and has performed a case study analysis on a timber and building material wholesale company relating to its environmental aspects. Published work focuses on either environmental management systems (EMS) or environmental performance evaluation (EPE). The integration of these two aspects has not been paid sufficient attention. It is important to consider the integration between EMS and EPE in pursuing environmental sustainability. This can be achieved by adopting a systematic approach and developing and applying a suitable EPE model. Balanced Scorecard (BSC) is a well applied performance evaluation and improvement approach. Some applications of BSC have been made to evaluate the overall sustainability performance, where environmental sustainability has been taken into consideration, but not the sole focus. Therefore, this research has generated a process flowchart framework which can be used for companies to achieve environmental sustainability. An environmental BSC model with identified environmental strategic objectives is also developed in this research. The links of these environmental strategic objectives across different levels are illustrated in an environmental strategic mapping. The developed process flowchart framework and the environmental BSC model with identified environmental strategic objectives can be used by other organisations to pursue their environmental sustainability development.

Keywords

Environmental Management Systems, Environmental Performance Evaluations, Environmental Sustainability, Environmental Balanced Scorecard, Supply Chain

1. Introduction

Sustainability has been an increasingly popular topic for management study and an important practical issue for many types of organisation. The three dimensions of sustainability have been established in the literature, which are economic, environmental and social. These three dimensions are interrelated in various ways. Historically the emphasis had focused on the economic performance, particularly for commercial types of business. Nowadays, the increased number of companies have realised that without a good performance on environmental related aspects, the economic performance cannot be sustained. Environmental sustainability is increasingly important and challenging for many organisations to achieve and for academia to research. Therefore this study focuses on environmental sustainability development related issues, but recognises the importance of social and economic sustainability to an organisation's overall sustainability performance.

Most published work discovered in this area focuses either on environmental management system (EMS) or environmental performance evaluation (EPE). EMS and EPE are two important aspects for a company to achieve its environmental sustainability. Without EMS and EPE being well developed, implemented and integrated, an organisation cannot achieve its environmental sustainability smoothly and fully. Therefore this study aims to generate a systemic approach and a measurement model to integrate EMS and EPE. This is achieved by exploring development and implementation of EMS and EPE in the literature, particularly on a balanced scorecard (BSC) approach for EPE, and performing a case study analysis.

Environmental sustainability development, EMSs and environmental BSC development for EPE are reviewed in the next two sections. It is followed by the company background information and research methodology. The case study company results and analysis are presented after the company background and research methodology section. The research outputs on the environmental process flowchart framework and the environmental BSC are then presented and discussed. The conclusion is drawn at the end.

2. Environmental sustainability and environmental management system

Organisations are increasingly concerned with their environmental sustainability development. This is reflected by the increased numbers of organisations putting more effort into producing sound environmental performance. Achieving environmental sustainability is arguably one of the greatest challenges for companies and societies in the near and long-term future (Shaefer, 2007). Different factors drive organisations to achieve an accredited EMS in order to develop and implement their environmental policies. These factors can be either institutional or performance oriented. Performance oriented factors can be economic,

environmental, or social. These factors are ranged from ‘meeting governmental legislation’ (Bansal and Roth, 2000), ‘reduction of costs, improved product quality, enhanced market position and reputation’ (Melnyk, et al, 2003), to ‘desire to improve environmental performance’ (Gonzàlez-Benito and Gonzàlez-Benito, 2005). These factors influence the establishment and development of a company’s environmental policy, which is an important part of EMS.

EMS is a ‘part of an organisation’s management system used to develop and implement its environmental policy and manage its environmental aspects’ (ISO14001: 2004, page 2). EMS is a useful ‘tool’ for environmental managers to have a systematic approach in place to manage environmental issues, implement environmental initiatives, and achieve environmental goals. The key elements in EMS include establishing environmental policy, planning environmental activities, implementation and operation, checking the environmental performance, and conducting management reviews (ISO14001: 2004). The results of the management review should feedback to the environmental policy to create a closed loop for the system and encourage continuous improvement (ISO14001:2004). It needs to emphasise that EMS is a systematic approach, like other management systems which consider organisational structure, planning activities, responsibilities, practices, procedures, processes and resources (ISO14001:2004).

In the strategic consideration of sustainability at a company level, including environmental sustainability, Robèrt and Schnudt-Bleek (2002) proposed a systems approach, which contains the following five steps. They are

- covering social and ecological sustainability on the basic principle level,
- converting the definition of sustainability to the institutional level,
- managing the strategic perspective through a step-by-step approach,
- developing indicators with a strategic perspective, and
- proposing various initiatives relating to such a sustainability perspective.

This approach shares the systematic point of view of a management system employing a step-by-step approach with developed initiatives to support achieving the sustainability. However, this approach neglects the importance of sustainability performance evaluation or assessment in a sustainability management process (Labuschagne et al, 2005). In ISO14001 (2004), the evaluation is reflected by the ‘checking’ element in the process. Environmental performance evaluation guidelines are detailed in ISO140031 (1999). EPE should be fully integrated in the environmental management process. It can be done through adopting and developing an appropriate measurement model and selecting appropriate

indicators and implementing effective initiatives. The literature on those aspects is explored in the next section.

The companies studied by (Schaefer, 2007) have gradually realised that an economic benefit has been gained from having a certified EMS as large customers increasingly demanded it and it was necessary when bidding for competitive contracts. In addition, those companies confirmed that improved economic performance was seen to come from customer demand, not through cost savings.

3. Environmental balanced scorecard and environmental performance indicators

The environmental performance evaluation is characterised by development and implementation of EPE models and environmental performance indicators (EPIs), and the use of EPE models and EPIs to monitor and evaluate the achievement of environmental goals of a company. Back more than a decade ago, encouraging the application of environmental performance as a successful approach to gain competitive edge was recognised (Johnson, 1998). There are different types of EPE models in the literature. One valuable method for developing EPE model and EPIs is the balanced scorecard (BSC) approach in a slightly modified format (Johnson, 1998).

BSC was initially proposed by Kaplan and Norton (1992) to be used to develop a set of business performance measures with the consideration of four perspectives instead of simply focusing on financial measures previously used to evaluate a company's performance. The four perspectives are 'learning and growth or learning and innovation', 'internal process',' customers', and 'financial'. BSC has become a most popular tool for different business units, companies, organisations, and industries to develop their performance measures and facilitate communication for the performance evaluation purposes. It is the principle of the BSC approach, which includes a set of balanced perspectives to be counted as the critical value of the approach and not to exactly copy these four proposed perspectives for developing a BSC for a company to use. Within the BSC framework, the strategic mapping (Kaplan and Norton, 1996) should be applied by identifying cause-effect relationships among strategic objectives, selecting measures and initiatives associated with each of strategic objectives in these four perspectives to ensure the successful development and implementation of a BSC approach.

BSC has been used by organisations to implement a sustainability strategy in modified formats. When applying BSC to environmental performance evaluation, Johnson (1998) extended 'learning and growth' or 'learning and innovation' perspective to 'learning, innovation, growth, and people' and included 'external stakeholders' in 'customer' perspective, and kept other two perspectives from the original BSC. He emphasised that an

environmental BSC model should illustrate links between certain types of environmental performance and the strategic and financial objectives of a company. In addition, an environmental BSC model should link corporate environmental sustainability objectives with appropriate corporate actions and performance outcomes (Epstein and Wisner, 2001). Some companies or studies created the fifth perspective for environmental sustainability performance or simply including environmental sustainability measures in the process perspective. These may isolate environmental sustainability issues and give insufficient attention to it if the links between environmental sustainability measures and measures in other perspectives are not clearly established. Jones (2010) emphasised that it would not work by simply adding an extra perspective to include environmental sustainability in the BSC because what matters is cause and effect relationships among strategic objectives in the BSC.

Dias-Sardinha, et al (2002, 2007) proposed the four perspectives in a BSC format with modifications to evaluate sustainability performance. In order to focus on achieving sustainability performance, the financial perspective becomes the sustainability perspective which emphasises sustainability goals and objectives of a company. The learning perspective is still fundamental to their proposed BSC model and both internal and internal processes have been considered. Customer perspective is extended to stakeholder perspective. The proposed four perspectives by Dias-Sardinha, et al (2002) opened up the possibility of applying BSC to measure sustainability performance. However, when the three dimensions of sustainability, environmental, social and economic, are considered together to be measured in a single BSC format, the BSC model becomes over complicated and somehow lost its focus. This might deter companies from applying BSC to evaluate their sustainability performance. The international organisations for standardization issued environmental management and EPE guidelines-ISO14031 (1999), which allow the company to focus on its environmental performance by evaluating it independently.

It needs to be emphasised that the links among the environmental BSC model, social and economic sustainability, and the business strategies and goals must be established and communicated. An environmental BSC model does not operate alone to achieve a company's long term environmental sustainability. This needs to be specified in the EMS of a company. Otherwise, the value of achieving environmental sustainability cannot be communicated to other departments and across different levels of the organisation and environmental sustainability through implementing EPE is unlikely to be successful.

It is critical to develop and select appropriate performance measures/indicators in a performance evaluation model in order to measure the right things. EPIs developed and chosen for the balanced scorecard should be quantifiable (Epstein and Wisner, 2001) in

order to be measurable. ISO14031 (1999), issued by the International Organisation for Standardization, classifies two types of indicators for EPE. They are environmental condition indicators (ECIs) and environmental performance indicators (EPIs). ECI is defined as 'specific expression that provides information about the local, regional, national or global condition of the environment' (page 1). EPIs are further classified into operational performance indicators (OPIs) and management performance indicators (MPIs). OPI is defined as 'EPI that provides information about the environmental performance of an organisation's operations' (page 2). MPI is defined as 'EPI that provides information about the management efforts to influence an organisation's environmental performance' (page 2). ECIs are 'not measures of an organisation's impact on environment' (ISO 14031, page 10), but provide external environmental conditions to which an organisation operates in and has impact on. An organisation which pursues the reduction of its impact on its environment or aims to meet the governmental legislation needs to develop and select relevant measures of OPIs and MPIs. Organisations are encouraged to consider ECIs in their EPE models which are specified in ISO14031. 'An organization that has identified a specific condition in the environment that results directly from its own activities, products and services may wish to select EPIs (MPIs and OPIs) that link management efforts and operational performance to changes in environmental conditions.' (page 11)

ISO 14031 further classifies OPIs into five types: (1) input including materials, energy and services; (2) the supply of inputs; (3) the design, installation, operation and maintenance of the physical facilities and equipment; (4) output including products, services, wastes and emissions; and (5) the delivery of outputs.

In terms of MPIs, they 'should provide information on the organization's capability and efforts in managing matters such as training, legal requirements, resource allocation and efficient utilisation, environmental cost management, purchasing, product development, documentation, or corrective action which have or can have an influence on the organization's environmental performance' (ISO14031, page 9).

The selection of EPIs by a company depends to some extend on the size and type of the company and the industry in which it operates; proximity to environmentally sensitive consumer markets; the time horizon involved; type and degree of external environmental regulation; and the corporate culture of the organisation (Olsthoorn, et al, 2001). Therefore, this paper does not aim to provide standard EPIs for an environmental BSC model. Instead, strategic objectives in each of the four perspectives in the proposed environmental BSC framework are proposed which can be used as a template for companies to further develop corresponding measures and initiatives.

A strategic mapping tool must be applied based on strategic objectives proposed in the environmental BSC to demonstrate the relationships between these environmental strategic objectives. In a strategic mapping, measures, targets, and initiatives are also needed in order to make the environmental BSC model applicable and valuable to the company which aims to improve its environmental sustainability performance. Examples on measures and initiatives are provided associated with each strategic objective for the case study company to illustrate the necessity and importance of what a complete environmental BSC model should be, and hence its value.

4. The background of the case study company and research methodology

4.1 Company background

For the confidentiality, the name of the case study company is not mentioned in this paper, and referred as the company. The company is a UK & Ireland leading supplier of timber and building materials to the trade, with more than 900 branches nationwide. The company provides its customers with access more than 400,000 products and precisely tailored logistic. The company has a European parent company which has been ranked in the Global 100 list of the most sustainable companies in the world.

The company started to be concerned with sustainability issues in 2003. Up to 2006, its sustainability development strategies had been reactive to governmental legislations. In 2006, the sustainability management team started to proactively drive environmental sustainability issues across the company. The company has gradually developed a much more environmental oriented culture than before. At the first step, a simple one page policy regarding the environmental sustainability was produced which focused on the reduction of the business impact on the environment. However, at the beginning, they had very little knowledge regarding how to achieve it. The key aspiration comes from ISO14001 which specifies the environmental impact of a business they would like to focus on. This helped them to develop and achieve an accredited EMS which drives the environmental activities in the company.

The sustainability management was driven by a director and a senior manager. They were appointed because of their combination of understanding of the company's culture from top to bottom and competence of technological skills. They drive the environmental initiatives by liaising with the various functional areas within the company. Their key role is to encourage the decision makers involved in functional activities of the business such as ‘transportation' or ‘procurement’ to include ‘environmental consideration’ in their decision processes.

The company focuses on the four key areas for reducing carbon footprint, which are clearly specified in its environmental policy: (1) diesel used by lorries, (2) gas/electricity, (3) waste, and (4) environmental aspects along the entire supply chain, such as pallet reuse. The company has achieved some positive results in reduction relating to the first three areas and admitted that the last one is the most important but the most challenging one. They are starting to consider it and aim to put much more effort into it in the near future. The company has realised its key role in its supply chain, which links the manufacturers, building material suppliers, and contractors in the construction industry and their final customers.

In order to achieve reductions in the first three of the four areas listed above, the company has established related strategies which are integrated into its EMS. These strategies include:

1. training, formal and informal, to raise the awareness of the environmental sustainability throughout the company, from the top management to the branch level,
2. measuring where they were in 2003 regarding these four key areas for reduction, then setting up simple and clear targets that they would like to achieve by 2012, and
3. implementing the EMP developed based on ISO14001, which drives environmental activities across the company.

The company has more than 900 branches. Therefore, a single branch's contribution to the total is very small. However, each branch's contribution is significant in order to achieve the overall target. Therefore, the company has set up an effective system to allow internal benchmarking. No single branch would like to be on the bottom of the list in relation to achieving targets. This is also applied to achieving the environmental targets. If a branch or an individual have realised that they are at the bottom 10% of the list, they would like to make every effort to ensure that they will move up the list at the next performance evaluation review. Learning from the best performing branch has become a part of the company's culture. However, in terms of achieving better environmental performance, the company has not performed any external benchmarking.

The company has not employed any performance evaluation models to assess its environmental effort. Instead, they use the following indicators to set up its environmental sustainability targets and measure their achievement. The indicators listed in their most recent annual Corporate Responsibility Policy are (1) carbon dioxide (CO_2) emissions, (2) water consumption, (3) timber certification, (4) waster to landfill, and (5) inbound packaging. Each indicator has been specified in terms and targets for the coming years have been set up to 2012. The measurement focuses on the final outputs regarding the impact on the environment. No measures have been developed or considered to measure other

environmental aspects which are related to the processes of achieving the final environmental targets.

4.2 Research methodology

In order to achieve the research aim which is to generate a systematic approach and to propose a measurement model to assist an organisation to achieve environmental sustainability, learning from the literature and conducting multiple interviews in the case study company have been conducted. Separated interviews were carried out with the Sustainability and Quality Director of the company and the Quality and Sustainability Manager who reports to the Sustainability and Quality Director having responsibility for the implementing sustainability initiatives, particularly waste and energy reduction programmes in the company.

An initial process flowchart framework for achieving environmental sustainability was proposed. It was based on the understanding of the environmental sustainability issues coming from the initial learning from the literature and relevant documentation regarding environmental standards and various company reports relating to this matter. The company's most recent corporate responsibility policy document was obtained along with other relevant documentations. In addition, a number of informal interviews and telephone communications were accomplished with the Quality Manager during the generation of the initial flowchart framework. The formal interview was conducted with the Sustainability and Quality Director at the company's headquarter, which lasted two and half hours. Prior to the interview, the initial process flowchart and the intended interview questions were sent to the Director. The twenty interview questions (see appendix 1) are intended to explore the following aspects:

- possible factors driving the company to achieve its environmental sustainability,
- the process of implementing the environmental policy and strategies,
- the role of international standardization guidelines, such as ISO 14001,
- development and use of the accredited EMS, EPE models, and EPIs,
- the role of staff learning and training,
- decision criteria for capital investment relating to environmental initiatives,
- engagement of branch level employees in proposing and implementing environmental initiatives,
- change of the company's environmental culture,
- sourcing and developing environmental friendly goods,
- supplier involvement in environmental activities,

- customer requirements regarding environmental friendly products, and
- the role of the company along its supply chain regarding environmental improvement activities.

At the beginning of the interview, the Director introduced the journey which the company had taken to achieve its present position in terms of environmental sustainability goals and the culture development. This was followed by in-depth discussions regarding the interview questions. The Director expressed great interest in these discussions and was willing to provide further interviews and feedback regarding this research project.

The process flowchart framework has been modified after the interview with the Sustainability and Quality Director and further critical analysis of published studies in related areas. The modified process flowchart was sent to the Sustainability and Quality Director for further feedback and the feedback obtained from the Director was very positive. The analysis of the interview questions is presented in the next section. The finalised environmental process flowchart framework is presented in section 6.1.

Furthermore, an environmental BSC model has been developed with proposed four perspectives and environmental strategic objectives within each perspective, which are mainly from critical learning from the literature. This can serve as a template for the company which aims to pursue and develop a deep environmental cultural awareness through the implementation of an environmental BSC. The strategic mapping associated with the BSC approach is generated for the case study company with examples of EPIs and examples of initiatives for implementation. This aims to encourage the company to consider adopting an environmental BSC or other environmental evaluation models in the future.

A single case study is limited for producing the findings for generalisation. However, it is useful to provide valuable feedback to a framework or a model synthesised from the literature from a practitioner's point of view. The combined methodology of critical learning from the literature and documentation and conducting multiple interviews within a single case study is therefore proven valuable to the purpose of this study.

5 The case study results and analysis

The analysis is performed mainly based on discussions on the twenty formal interview questions. The information gained from other informal interviews, telephone communications and the company's documentation are also used for the analysis. Answers from some of these formal interview questions are part of the company background information which was included in the previous section, and therefore they are not repeated here.

It is important to understand what drives a company's environmental policy. It explains a lot about a company's environmental sustainability position. If a company conducts

environmental activities mainly for meeting governmental legislation, the effort would be very limited. If a company pursues a good environmental performance because it desires to do so for the well-being of the company and the society, the effort will be considerable. The interview confirms that innovation mainly drives the company's environmental policy currently, besides legislation and internal benchmarking which play less significant roles. The company hopes that in the near future, benchmarking will contribute to its environmental policy more significantly because they believe it is an effective method for improvement. Initially they were mainly for meeting governmental legislation regarding environmental requirements and employed reactive strategies.

From 2003, it took the company three years to change from reactive strategies to proactive strategies towards environmental issues. In addition, the company has realised what a good marketing image means to a business and therefore pursues a marketing strategy like 'to become the Sustainable Builder's Merchant'. They used four directly environmental related measures to set targets and monitor the reduced impact of its business on the environment. The four measures and some associated initiatives are:

- Diesel usage. Diesel is used by lorries to distribute goods to customers. They have achieved 15% reduction on this measure over the last four years through the following initiatives:
    - replacing more efficient engine type for the new lorries,
    - training and educating lorry drivers through the following ways: defence driving skills, monitoring engine operation via telematic device and making improvement on fuel efficiency accordingly, and switching off engines when the lorry is idle.
    - providing a better planned route for planned deliveries. However, for a special need raised by the customer, the company will delivery it whatever the cost will be. The company believes that the customer's need is always the first to be considered, otherwise there is no business in the long run.
- Electricity usage. Electricity is used by every branch to operate the business. They admitted that it was not easy to make saving on electricity. Replacing the normal lighting to energy saving ones had been done across the branches. The installation of smart metres recently for branches will help to achieve the saving targets on the electricity in the near future.
- Gas usage. Gas is used by every branch to operate the business. Currently the company are piloting the use of an automatic control system which allows for central control.
- Waste reduction. It should be considered in all the possible areas. The company has reduced packaging by involving suppliers and customers. It is the current legislation that

makes companies to register the amount of packaging they have used and it is a cost incentive to reduce waste through less packaging. The company operates a pallet reuse scheme with its suppliers and green 'Timber' procurement, which is monitored by WWF. In addition, some customers, e.g. local governments, insist on the use of sustainable wood.

In order to achieve the targets, everyone is involved and shares the responsibility and there is no hierarchy. Everyone's contribution is important. The targets are set as simple as possible. No cash reward system is used. However "praise" is applied and the information on the amount of saving which the branch has made is provided to the branch. At the management level, which is more profit-driven for measuring performance, the rewarding system involving cash bonus is used. The different methods used to motivate the involvement of employees and managers in environmental improvement activates need to be justified for its fairness.

The environmental sustainability initiatives are totally driven by the ISO 14001 in the company, particularly at the branch level. The EMS developed based on ISO14001 requires external auditing which focuses on branch performance. Therefore, the targets are set at the branch level. Soft and more achievable targets are used and one measure is only introduced at one time, such as setting the target for recycling - waste reduction at the branch level in 2010; whilst introducing 'electricity usage' target in 2011. The performance of each branch is used to generate the company's league tables. Most of these targets are coming from the top management decisions.

The company does not have any measures measuring its processes and other business areas relating to environmental sustainability. However, quite a few environmental improvement initiatives for improving some of those areas have been implemented. Even though the company replies on informal learning to get many environmental messages to individual employees, formal training on job related skills have been provided within the company. Furthermore, training delivered by external specialised companies has been undertaken. For example, training has been performed regarding 'timber trade academy', but this was not at the branch level. Biffa, a specialised waste disposal company, has provided the company training for employees at the branch level. Other companies, such as the energy company E.ON, would provide branch level training, however the cost could prove too expensive for the company. Training, learning and employee development towards environmental issues are important to achieve environmental strategic targets and build an eco-efficiency culture.

An effective EPE is important to achieving the environmental performance targets. At the branch level, the environmental performance targets are monitored monthly by third parties,

such as Biffa for waste reduction, and E.ON for electricity. At the corporate level, the report is produced once a year. In addition, the company holds environmental review meetings every six months with regional managers and branch managers where environmental issues are evaluated, and the minutes of those meetings are provided to the branches. The effective EPE requires effective and balanced measures to measure related areas towards achieving environmental strategic objectives and goals on the reduction of business impact on the environment.

The company has gradually realised financial benefits gained by operating these environmental initiatives. Firstly, the saving is greater than the investment cost. Secondly, some forms of previous waste become products, such as producing garden gates from wood that previously went to landfill, gaining extra revenue and profit for the company. Thirdly, it increases the company's marketing image and increase the customer demand for environmental friendly goods. A significantly positive relationship between a good environmental performance and a high economic performance is confirmed in the literature.

The company realises the importance of an eco-efficiency culture to the achievement of its environmental performance targets. Before 2003, there is no such a culture. The environmental culture has been gradually developed and developing such a culture is challenging, but rewarding. Aiming to achieve the best environmental culture is gradually established at the corporate level in the company. The company believes that it currently has achieved 5 or 6 in a 0-10 grading of 10 for the best. However, they are aiming for the best. The currently established environmental culture is reflected by the fact that no branch or individual would like to be the one who stop or slow down the business improvement. They are competitive and would like to achieve a top position in their internal league tables.

Sourcing and stocking environmental friendly goods are mainly driven by the customer's customer requirements. New graduates from universities and colleagues and young employees coming to the business are more interested in green aspects of the business and they are people who are making changes. The company is absolutely committed to increase its environmental product range. They would like to become 'the reference point' and set a good example in the industry regarding this aspect. They have developed thousands of environmental friendly products and have a specific brand name for these environmental friendly products. When coming to assess the eco-efficiency of a product, the life cycle assessment is applied, from the product's design stage to its termination.

Suppliers' environmental credentials are important to the company, which are consistent with guideline in ISO14001. The company has 15,000 suppliers across the business. But they have measured the top 200 using the criteria of product price, quality, and environmental aspects of products. These top 200 suppliers have long term relationships with the company

and help the company to obtain the information by periodically completing the company's questionnaires on environmental aspects.

The company is very active in relation to environmental issues along its supply chain.

The company believes that its business creates the critical link along its supply chain, linking the manufacturers to their direct customers and customers' customers and feedback the customers' requirements to manufactures and suppliers. They said they had long way to go in terms of achieving environmental sustainability along its supply chain and the company intends to be more proactive in the near future.

6 Achieving environmental sustainability through integrating EMS and EPE

The literature provides rich content on EPE and some discussions on EMS. These are two important aspects in relation to achieving environmental sustainability. However, the importance of the integration between EMS and EPE to the success of a company's environmental goals has not been clearly addressed in the literature. In most cases, a study either focuses on EMS or EPE with the development of EPIs. Therefore, a process flowchart used for understanding how to achieve the environmental sustainability is developed and presented in this section.

In the literature, BSC has been applied to evaluate sustainability and a few studies attempted to evaluate eco-efficiency for a company. The different perspectives which can be used in an environmental BSC have been reviewed in the literature but no single BSC model is exclusively designed for evaluating environmental performance and for achieving environmental sustainability. Therefore, an environmental BSC is proposed in this study and presented in this section.

6.1 Achieving Environmental Sustainability-the Process Flowchart Framework to illustrate the Entire Process

Figure 1 presents the process flowchart which can be used to understand the process of a company achieving its environmental sustainability. Several modifications have been made to the initial version of it, which are not detailed in this paper.

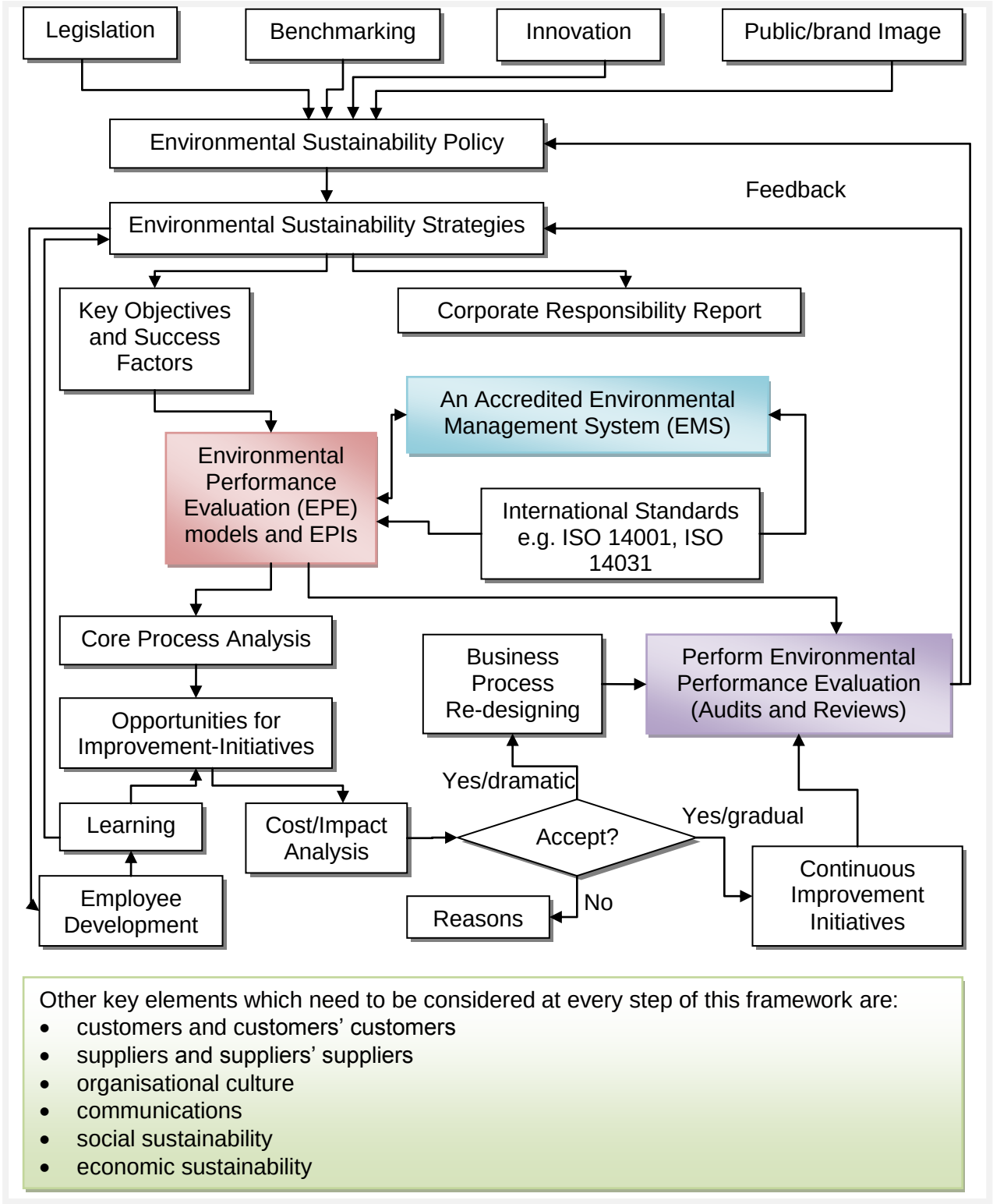

Figure 1: Achieving Environmental Sustainability - The Process Flowchart Framework

This model is intended to set the direction for an organisation to manage its processes in order to fulfil its environmental sustainability policy and achieve its environmental

performance goals. An organisation can move through the steps presented in the model to ensure the improvement to be made to its environmental sustainability related performance.

The establishment of the environmental sustainability policy of a company is likely to be informed by the following sources:

- local or governmental legislation,
- external and internal benchmarking,
- innovative ideas from individual or a team in the company, and
- public and brand image which the company pursues.

In order to materialise the environmental policy, there must be corresponding strategies to follow. When setting up strategies, the learning including employee skill training and management development programmes, which have already taken place in relevant areas, should have been taken into account. In turn, the environmental strategies should include the employee development aspect in relation to any environmental improvement in the company. At the next step, the environmental strategies need to be formulated into key objectives and success factors which should provide the measurable aspects that the company aims to achieve.

The key objectives and success factors need to be translated into key EPIs by applying appropriate EPE models which are available in practice and the literature. The selection of an EPE model and associated indicators should be influenced by the international standardisation guidelines for managing environmental issues, such as ISO14031 in particular for EPE. However, the other international standards, such as ISO14001 which focuses on EMS, should not be neglected because it has a critical step named 'checking' which is an EPE step nested in EMS. This creates a link which integrates EMS and EPE in the process for achieving environmental sustainability. There are many other international standardisation guidelines concerned with environmental issues which are valuable to any organisation which aims to pursue the continual improvement of environmental performance. These standardisation guidelines, in particular ISO14001, guide an organisation to develop and achieve its accredited EMS. The accredited EMS should also be linked to EPE, as specified previously through the 'checking' step in the five critical steps in EMS which were reviewed in section 2.

The key EPIs should be forwarded to perform EPE such as audits and management reviews at a later time and the targets should be set. Meanwhile, the key EPIs in the developed EPE model should be used for core process analysis to identify opportunities for improvement, which form the environmental improvement initiatives, which should also benefit from learning. For each proposed initiative, a cost and impact analysis should be undertaken. The results could be either accepted for implementation or rejected which needs to have the

reasons to follow and feedback to the individual or the branch where the initiative was proposed. For the accepted initiatives, there are two types. One involves the process re-designing and normally the scale is dramatic, whilst the other one is continuous improvement requiring incremental step by step change. Whatever type of initiative is approved for implementation, the results by implementing these initiatives should facilitate in conducting the EPE through audits and management reviews against the targets set for key EPIs. The improved environmental performance should come from both appropriately selected EPIs and the EPE model employed and the effective initiatives. For those initiatives which did not achieve intended improvement, an investigation should be conducted to identify the reasons. All these results should feedback to both the environmental sustainability policy and environmental sustainability strategies bodies, who produce the corporate responsibility report as well as reformulating policy and strategy, when necessary.

It needs to be recognised that there are other elements which cannot be directly included in the above process which have significant impacts on this process. These elements need to be considered at every step of the process for achieving environmental sustainability for its ultimate success. They include the influences coming from customers and suppliers along the supply chain, organisational culture and communication channels of the company, and the other two dimensions of sustainability which are social and economic sustainability. Environmental sustainability cannot be achieved alone without all these elements in the right place.

6.2 Developing an environmental BSC

In this paper, we mainly adopt the four perspectives proposed by Dias-Sardinha, et al (2002, 2007) for their sustainability BSC. Some modifications have been made in order to develop our environmental BSC to measure environmental performance for a company. For the stakeholder perspective, the focus is placed on customers and suppliers, and customers' customers and suppliers' suppliers. This is to emphasise the importance of an organisation's supply chain to its achieving ultimate environmental sustainability. The other three perspectives are kept as the same as those in the sustainability BSC model by Dias-Sardinha et al (2002), where the process perspective includes both internal and external processes. We therefore propose environmental strategic objectives relating to each perspective in Table 1, through synthesising the literature and the case study analysis. Table 1 can be served as a template for a company to develop its environmental BSC based on these environmental strategic objectives. These listed strategic objectives are not intended to be inclusive but key to achieving environmental sustainability. In order to fulfil these environmental strategic objectives, related measures and initiatives should follow.

Table 1: An Environmental Balanced Scorecard – Strategic Objectives

Perspectives	Environmental Strategic objectives
Environmental sustainability perspective ↑	• Improve environmental brand image • Reduce energy and water use • Reduce waste • Achieve the governmental legislation targets
Customer & supplier perspective ↑	• Satisfy the customer and the customer's customer requirements particularly concerning environmental friendly products and services • Involve suppliers and suppliers' suppliers in environmental improvement activities • Improve eco-efficiency of the supply chain
Process perspective ↑	• Improve eco-efficiency of the entire business process • Develop and improve an accredited EMS and an EPE model and their integration, and continuously improve them • Improve environmental communication channels across the supply chain
Leaning and innovation perspective	• Improve employee awareness and skills, particularly relating to eco-efficiency • Investigate and increase the use of new technologies which have positive impact on environment • Promote and enhance senior managers' knowledge and total awareness on environmental issues • Embed an eco-efficiency culture

In a traditional BSC approach, the learning perspective contributes to both internal process perspective and customer perspective, internal process also contribute to customer perspective, and all of these three perspectives contribute to the core perspective, which is financial in a BSC for measuring business performance. The links between these perspectives should be reflected by strategic objectives identified in these perspectives. The environmental BSC approach follows the same principles where the core perspective is environmental sustainability which contributes to a company's financial well-being in the end. Therefore, the explanations for Table 1 start from learning and innovation perspective and complete at the environmental sustainability perspective.

Four environmental strategic objectives are identified in the learning and innovation perspective. The importance of an eco-efficiency culture to the successful achievement of environmental sustainability goals has been documented in the literature (Olsthoorn, et al, 2001, Schaefer, 2007). It should be included in environmental strategic objectives for the company for the learning and innovation perspective, where a culture change requires learning and inputs of new ideas. The use of technology is always critical to dramatic

improvement in various areas of business activities. Without the adoption of new technologies, the learning is limited in culture change and improving skills and dramatic improvement is less likely to occur. The impact of the use of technology on environment should be measured and technology which reduces impact of business on environment should be encouraged for investment and implementation. Certainly, employee skill improvement and senior management knowledge updating relating to environmental issues should be measured because they are significant learning aspects for any company.

This leads to the process perspective. Firstly, the development and improvement of an accredited EMS and an EPE model used in the organisation and their integration are critical to achieving environmental sustainability. Therefore it should be measured. Improving the communication channels is a process improvement objective. In this case, the communication across the supply chain is emphasised. Without an effective communication channels established in a company, individual members of workforce are not being encouraged to understand the importance of achieving environmental sustainability to the company. Therefore they are less likely to participate in environmental activities. The other environmental strategic objective in this perspective focuses on the improvement of eco-efficiency of the entire business process. It implies the integration of environmental sustainability with social and economic sustainability in the entire business process. Environmental sustainability cannot be sustained in the long term without achieving other two dimensions of sustainability.

In the customer and supplier perspective, it includes the improvement made on the satisfaction of customer's requirements and supplier involvement in participating in all eco-efficiency activities and generating eco-efficient outputs. Ultimately, the decisions regarding any environmental issues should take the overall supply chain effect into consideration, rather than on a single company. The achievements in environmental strategic objectives in the process perspective should contribute to these environmental strategic objectives in this perspective.

Reductions of various business impacts on the environment are environmental strategic objectives in the core perspective of the environmental BSC. Therefore, reduction in energy and water usage and reduction in generating waste for landfill should be measured. The company needs to meet the governmental legislation targets, which should also be built into the core environmental strategic objectives. Finally, through all these environmental improvement efforts, the company should expect the improvement made in its environmental brand image. The achievement of these core environmental strategic objectives should contribute to the business financial goals.

By applying the strategic mapping tool within the environmental BSC, Figure 2 indicates the possible relationships between these environmental strategic objectives across these four perspectives.

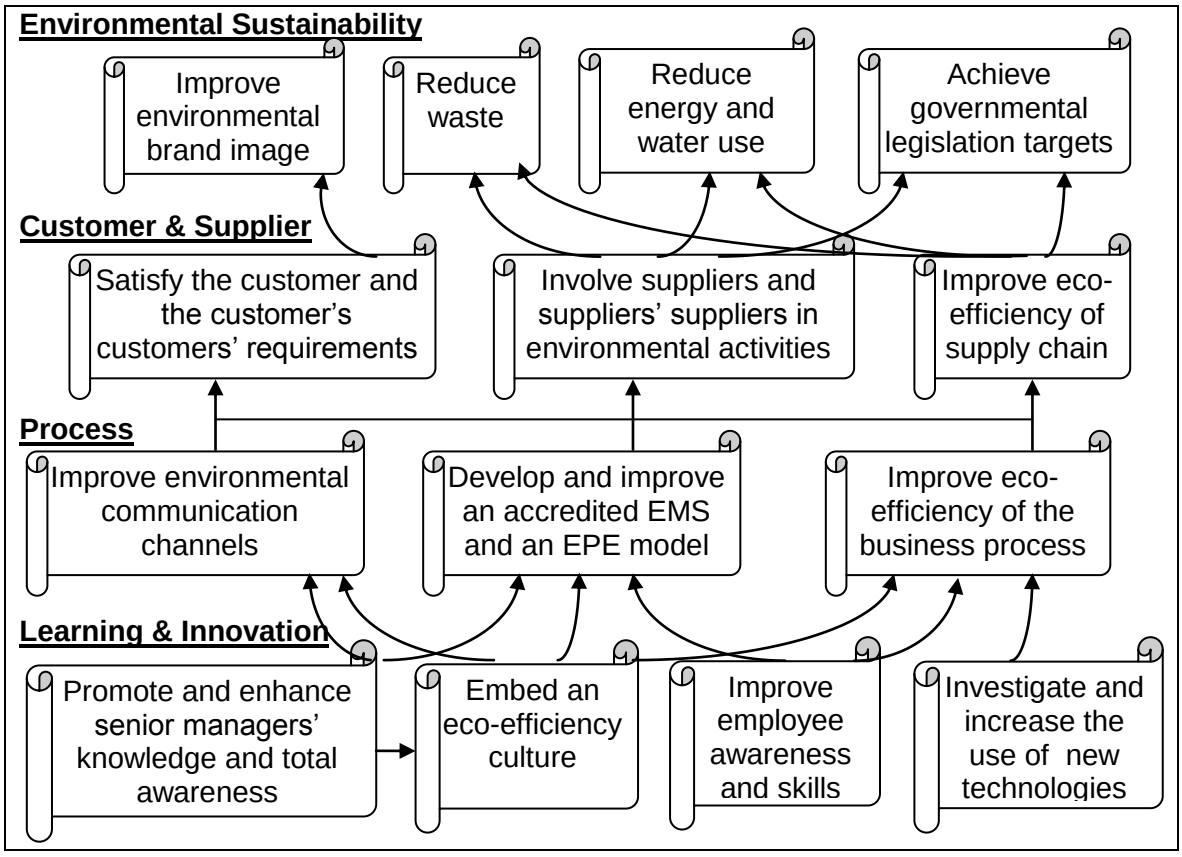

Figure 2: A General Environmental Strategic Mapping for Companies

The relationships between these environmental objectives are straightforward. Increased use of new technology, which has positive impact on environmental performance, should contribute to the business process eco-efficiency. By learning new skills, employees' competence has been improved. Therefore they can perform their jobs more efficiently and effectively, hence eco-efficiency of the business process can be improved. Improved skills associated with environmental activities should contribute to the achievement of targets set in the company's EMS and EPE. The enhanced environmental sustainability culture contributes to eco-efficiency of business process, improves the management system and the evaluation process for measuring environmental performance, and also encourages more dialogues in relation to environment issues.

Improved environmental communications across the supply chain, improved EMS and EPE, improved eco-efficiency of the business support the achievements of the three listed environmental strategic objectives in the customer and supply perspective. They are

satisfied customers and customers' customers, higher involvement of suppliers and suppliers' suppliers, and improved eco-efficiency of the supply chain.

Satisfied customers and customers' customers on their requirements relating to environmental friendly goods and services should present a better environmental brand image of the company. High involvement of suppliers and suppliers' suppliers with environmental improvement activities contribute to the achievement of environmental sustainability targets, including governmental legislation targets. Finally, improved eco-efficiency of the supply chain should also contribute to the achievement of reduction targets on waste, energy and water and governmental legislation targets.

Examples on measures and initiatives specific to the case study company have been developed which is not the focus of this paper and therefore attached in appendix 2 for interested readers. This paper focuses on the generally applicable areas which are illustrated in Table 1 and Figures 1 and 2.

7 Conclusions and the Way Forward

This research has employed a combined research methodology of critically learning from the literature and a case study analysis. The environmental sustainability related literature has been explored and a case study analysis on a timber and building material wholesale company relating to its environmental aspects has been conducted. This combined method is proven effective to achieve the research aim, which is to generate a process flowchart framework and develop an effective EPE model for implementation.

The generated environmental process flowchart illustrates the integration between EMS and EPE and provides a systematic approach for a company to improve its environmental sustainability. The use of this flowchart framework can also improve the understanding on how environmental sustainability can be enhanced in a company. The EPE model developed adopts the BSC format, in which the core perspective is the environmental sustainability instead of the financial perspective. The environmental strategic objectives such as embedding a good environmental culture, improving employee skills and awareness on environmental issues, and improving the use of new technologies are all critical to the improvement of different processes in an organisation for achieving environmental sustainability. Achieving these strategic objectives can also enhance the communication channels across the supply chain, which is a critical factor to satisfy customers and involve suppliers and improve the overall eco-efficiency along the supply chain. Without achieving these environmental strategic objectives, the targets set for reduction in energy, water and waste are unlikely to be achieved. All these contribute to an improved environmental image

of the company which benefits the company's financial gain and economic and social sustainability in the long run.

Developing performance evaluation models for social and economic sustainability by applying a BSC approach individually can be the future research areas. Exploring various types of company regarding the experiences on improving their sustainability performance to draw more general conclusions in terms of criteria for an effective EPE model is also valuable for exploration.

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Appendix 1 Interview Questions for Understanding how to Achieve Environmental Sustainability of a Company

1. Does your company set up your environmental sustainability strategies by considering relevant “legislations”, using “benchmarking” method or taking individual “innovative ideas”? If yes, which of these three is the key source for it?
2. What is the decision process for developing your company’s environmental vision, goals and strategies?
3. Within this strategy, what are the current key objectives to achieve environmental sustainability?
4. How does your company break down these key objectives into critical success factors?
5. At which stage of this process are the Performance Indicators (PIs) associated with environmental sustainability set?
6. What is the role of the ISO 14001 in achieving the key objectives?
7. Do these PIs cascade down to the branch level?
8. Is there a team that identifies opportunities for improvement relating to achieving environmental sustainability?
9. What and who determines a capital investment associated with environmental improvements in your company?
10. Does your company provide any opportunities for staff training relating to achieve environmental sustainability objectives?
11. If the answer of the above question is yes, at which stage does your company determine when the training starts and to which level of management is the training delivered?
12. In terms of the measurement of progress, how often is the actual performance checked against the PI?
13. Does the organisation appreciate the financial gains that can be derived from environmental improvement?
14. How well is environmental sustainability embedded in the culture of the company?
15. Do any of your customers insist on environmentally friendly goods?
16. Does your company consider your suppliers’ environmental credentials?
17. Does your company expect to increase its environmental product range?
18. To what extent does the competition and corporate image drive the organisational environmental policies in your company?
19. How active is your company in relation to environmental issues along the supply chain?
20. Looking into the future, are there any issues you expect you will have to address?

Appendix 2: Environmental strategic mapping on a BSC format with examples on measures and initiatives for the case study company

Perspectives	Environmental Strategic Objectives	Examples on Measures	Examples on Initiatives
Environmental sustainability perspective	1. Improve environmental brand image	1.1 The number of position improved on the media press regarding environmental brand image	1.1.1 Proactively engage with press to report their environmental improvement on various aspects
	2. Reduce energy and water use	2.1 % reduction of miles/litre of fuel used for transport over a time period	2.1.1 Standardise a few key skills of fuel efficient driving 2.1.2 Set up a praise system for individual lorry drivers for their achievements on fuel efficiency 2.1.3 Schedule more efficient delivery routes by applying new methods 2.1.4 Invest in fuel efficiency vehicles
		2.2 % reduction of units of electricity and gas used over a time period	2.2.1 Set up a praise system for individual branches for their achievements on electricity and gas usage 2.2.2 Install smart meters 2.2.3 Install energy efficient utility products
		2.3 % reduction of litres of water used over a time period	2.3.1 Engaged with employees in water saving activities 2.3.1 Install water saving devices
	3. Reduce waste	3.1 % reduction of packaging over a time period	3.1.1 Work with partners along the supply chain to reduce packaging
		3.2 % increase in reused materials	3.2.1 Set up new projects to analyse waste materials for reuse, e.g. the project of recycling pallets
		3.3 % reduction in landfill by tonnes/total sales	3.3.1 & 3.4.1 Engage with waste disposal specialist to reuse and recycle
		3.4 % increase in recycled materials by tonnes over a time period	3.3.2 Set up a process for generating less waste at the first place
		3.2 Ratio of the performance of each legislated indicator against	

	4. Achieve the governmental legislation targets	government legislation targets	4.1.1 Include legislation targets into EPE 4.1.2 Monitor the performance of these targeted indicators regularly
Customer & supplier perspective	1. Satisfy the customer and the customer's customer requirements particularly concerning environmental friendly products and services	1.1 % of customers happy with the eco-efficiency aspects of their purchases	1.1.1 Develop a system to receive and record customer's requirements particular on environmental friendly aspects 1.1.2 Source and stock more environmental friendly goods 1.1.3 Work with manufacturers or suppliers to reduce prices of environmental friendly goods 1.1.4. Work with suppliers to help them become lowest cost providers by reducing environmental costs
	2. Involve suppliers and suppliers' suppliers in environmental improvement activities	2.1 % of regular suppliers involved with environmental improvement activities	2.1.1 Engage suppliers in sourcing environmental goods and services 2.1.2 Engage suppliers in environmental improvement activities
	3. Improve eco-efficiency of the supply chain	3.1 The number of active parties involved in environmental improvement projects/activities	3.1.1 Consider each party's environmental credibility in environmental decisions 3.1.2. Agree waste reduction targets with partners along the supply chain
Process perspective	1. Improve eco-efficiency of the business process	1.1 The number of methods used for making the delivery process improvement, associated with its eco-efficiency	1.1.1 Analyse the entire delivery process on its eco-efficiency efficiency improvement using brain-storming and benchmarking methods
	2. Develop and implement an accredited EMS and an EPE model and their integration, and continuously improve them	2.1 The frequency of updating the EMS and the EPE models along with EPIs	2.1.1 Study various international standards and related literature on EMSs and EPE models in senior management team 2.1.2 Learn from other implementation processes of EMSs and EPE models

			2.1.3 Regularly review the environmental policy, strategies, and EPIs
		2.2 % of branches having achieved their environmental targets on these EPIs	2.2.1 Set up realistic small step improvement targets for each EPI for branches 2.2.2 Establish a system to 'praise' the branches having achieved their EP targets 2.2.3. Review the bottom 10% of performing branches to increase the overall average
	3. Improve environmental communication channels across the supply chain	3.1 The number of employees having accessed the environmental discussion forum or other media on this issue	3.1.1 Have a discussion forum on the company intranet on environmental issues 3.1.2 Issue regular company newsletters reporting good examples on environmental improvement across the company 3.1.3 Set up a system to provide updated information on environmental decisions
		3.2 % increase in the number of regular suppliers having received information and provided feedback on environment improvement activities	3.2.1 Establish a system to share the environmental improvement targets with suppliers
		3.3 % increase in the number of regular customers having received information and provides feedback on environmental friendly goods	3.3.1 Report the company's environment achievements with their regular customers 3.3.2 Establish an easy-to-access system to receive and record customers' feedback on their purchased environmental friendly goods and services
Leaning and innovation	1. Improve employee awareness and skills relating to eco-efficiency 2. Investigate and increase the use of new technologies which	1.1 % of employees having had environmental skill training over a time period 2.1 The proportion of branches where new technologies having been	1.1.1 Provide employee training on job related eco-efficient skills, e.g. defensive driving skills for lorry drivers 2.1.1 Invest in new technologies which improve eco-efficiency of business

perspective	have positive impact on environment	implemented for improving eco-efficiency of operating the business	activities, e.g. install smart meters for branches
	3. Promote and enhance senior managers' knowledge and total awareness on environmental issues	3.1 The number of senior managers having participated in environmental related short courses over the time period	3.1.1 Provide short courses for the development of senior managers on EMSs & EPE models
		3.2 The number of senior managers having been to external environmental related meetings and conferences	3.2.1 Provide opportunities and encourage senior managers attending external meetings or conferences on environmental sustainability
	4. Embed an eco-efficiency culture	4.1 The level of senior management support to environmental initiatives suggested by employees (1-10 scale)	4.1.1 Create value links between environmental achievement and economic performance 4.1.2 Involve senior managers in different departments with setting environmental policy and strategies 4.1.3 Engage senior managers with external environmental meetings or conferences 4.1.4. Introduce environmental issues as a fixed agenda item on management meetings
		4.2 The number of initiatives and their significance suggested by employees over a time period	4.2.1 Establish a non-financial rewarding mechanism to encourage employees to put forward their environmental improvement initiatives 4.2.2 Implement an employee suggestion scheme 4.2.3 Provide top management support and feedback to those having put forward their environmental improvement suggestions