

Factors Influencing the Implementation of Green Productivity Practices and its Effect on the Organisational Performance: A Comparison Study Between EMS 14001 and ISO 9000 Certified Companies in Malaysia

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Abstract: Considering the globalization of the economy and other associated trends, therefore it require a much broader conception of productivity and a fuller appreciation of the changing dynamics of the determinants involved in the process of its improvement. The increased competitiveness, internationalization and sophistication of markets, the globalization of manufacturing and the increased concern about social and ecological issues make productivity improvement more important. Productivity improvement through better utilization of the energy, materials, water, solvents, etc. is now seen as an effective tool in preventing pollution at source. Productivity improvement must therefore take into full consideration the impact of the production, distribution, consumption and disposition processes on the environment. While meeting the customer needs, products and services supplied and the processes used to produce and distribute them must have minimum negative impact on the physical environment. This study is therefore, mainly motivated by the quest to answer the question: How does GP enhance overall productivity and environmental performance??"

Key words: Green productivity, organizational performance, certified companies, globalization utilization, Malaysia

INTRODUCTION

The economic development policies of most developing countries have lead to industrialization and urbanization of its nation. This has resulted in major environmental crisis and becomes a challenging issue to the economy in recent years as a result through extraction, production and consumption of natural resources and generation of wastes. Furthermore, the demand for energy, initially through the burning of wood and charcoal and later by consumption of coal, oil, natural gas has resulted in a depletion of natural resources and has produce adverse effects to the globe.

In the case of Malaysia, however, three factors have been identified as the factors influencing the intensity of environmental crisis: the size of the population, the degree of affluence associated with increasing growth of economic activity and the tendency of productive technology to pollute. Silverman and Marian (2000) have studied on the "Perceptions of Environmental Problems by Malaysian Professionals". They found that air pollution and waste management were perceived of as key local environmental issues, with industrial air emissions and vehicular exhaust two of the major sources of local environmental degradation. However, air pollution may be the more difficult of these problems to solve, perhaps conflicting with economic development interests. For air

pollution, over the past few decades, it has been observed that there is an increasing atmospheric concentration of greenhouse gases such as Carbon Dioxide (CO₂) and other emissions that have a negative impact on the environment such as Sulfur Dioxide (SO₂), Nitrogen Oxide (NO₂) and Carbon Monoxide (CO). Consequently, Borhan and Ahmed (2008) have measured the relationship between economic growth and different indicators of air pollution in Malaysia, for instance; Carbon Monoxide (CO), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Ozone (O₃) and Particulate Matter (PM10).

These measures were found to be having positive effect of secondary industry share on pollution. Accordingly, loss of critical habitat, ozone depletion and climate change were also viewed as important to global-scale environmental conditions, although habitat destruction was seen as somewhat less important to the local situation. In addition, river pollution was identified as the major ecological problem in Malaysia, although drinking water quality was not seen as a critical issue. Malaysian environmental professionals' perceptions of global-scale environmental problems are consistent with much of the international environmental community (Silverman and Marian, 2000). Consequently, there is room for discussion on the environmental crisis and its effects on economic growth as Malaysia is a developing country.

Background of the study: Saxena *et al.* (2003) supported that current economic policies highlighted only productivity and economic growth, without addressing environment, have resulted in adverse and irreversible environmental impacts. As a consequence, these challenges and pressures push governments to seriously considering environmental impacts in its economic policies as that productivity is primarily a topic for the economists. Productivity is now should be viewed from the efficiency and effectiveness perspective. Effectiveness is focused on how the enterprise meets the dynamic needs and expectations of customers (buyers/users of products and services) i.e., how the enterprise creates and offers customer value. Considering the globalization of the economy and other associated trends, therefore, its require a much broader conception of productivity and a fuller appreciation of the changing dynamics of the determinants involved in the process of its improvement (Vogtlander *et al.*, 2002).

The increased competitiveness, internationalization and sophistication of markets, the globalization of manufacturing and the increased concern about social and ecological issues make productivity improvement more important. Liang-Hsuan *et al.* (2001) stressed that the important role that productivity improvement can play in the preservation, rehabilitation and enhancement of the environment is increasingly recognized. Productivity improvement through better utilization of the energy, materials, water, solvents, etc. is now seen as an effective tool in preventing pollution at source. Productivity improvement must therefore take into full consideration the impact of the production, distribution, consumption and disposition processes on the environment.

While meeting the customer needs, products and services supplied and the processes used to produce and distribute them must have minimum negative impact on the physical environment (Liang-Hsuan *et al.*, 2001). This recognition led to the development of Green Productivity (GP) program of the Asian Productivity Organization (APO), which integrates environmental protection and productivity improvement (APO, 2009). Green productivity is defined by APO as strategy for enhancing productivity and environmental performance for socio-economic development (APO, 2009).

It is the application of appropriate technologies and process and management techniques to produce environmentally compatible goods and services for enhanced productivity and profitability (APO, 2009). In summary, the goal of GP is to attain a higher level of productivity for serving the needs of the society and to protect and enhance the quality of the environment. The concept of GP is drawn from the integration of two

important developmental strategies via productivity improvement and environmental protection. Productivity provides the framework for continued improvement, while environmental protection provides the foundation for sustainable development. Therefore, GP is a strategy for enhancing productivity and environmental performance for overall social, economic development. This study is, therefore, mainly motivated by the quest to answer the question: How does GP enhance overall productivity and environmental performance?.

Environmental issues: Studies have shown that the main cause of climate change is the emission of greenhouse gases especially Carbon Dioxide (CO₂), due to human activities such as the burning of fossil fuel and rapid deforestation in the pursuit of economic development (Mohanty and Deshmukh, 1998; Srinivasan, 2002; Parasnis, 2003; Tersine, 2004; Moharamnejad and Azarkamand, 2007). Nevertheless, the impacts of industries towards environment not only can be seen at the early stage of production but it is damaging the natural resources in every stage of a good or services production. Hur *et al.* (2004) elaborated on the issue. According to them, the soil degradation start the moments raw materials are sourced by mining and other extraction process which also leads to vegetation and contamination. This effect continues to the manufacturing process where emission and solid waste generation leads to pollutions. Finally, the use and disposal of products by consumers again contributes towards pollutions (Fatta and Marneri, 2004).

According to Al-Darrab (2000), green consumerism has begun to emerge in pressuring manufacturer and service provider to be more responsible in the process of manufacturing and delivering goods. Studies during the 1985 shows that 37.6% of consumers and demanding for eco-friendly products and they are also beginning to encourage by consuming products of manufacturer who take responsibility not only in their manufacturing process but also in the disposal of products such as batteries, computers and etc. (Al-Darrab, 2000). Thus, green is now becomes a common practice to portray the environmentally friendly image of products, processes, systems and technologies and the way business is conducted (Vachon and Klassen, 2006). Hur *et al.* (2004) have claimed that firms, engaging in the eco-efficiency revolution are thought to have long term advantages in terms of international competitiveness because it encourages business to become more competitive, more innovative and more environmentally responsible. On the business perspective, green is now becomes a common practice to portray the environmentally friendly image of

products, processes, systems and technologies and the way business is conducted (Vachon and Klassen, 2006). It should, therefore, be an important agenda for many companies towards commitment to the natural environment in enhancing their competitive advantage. The key challenge of global socio-economic development now is to integrate environmental protection with productivity enhancement. Productivity provides the framework for continuous improvement, while environmental protection provides the foundation for sustainable development.

Evolution of Green Productivity (GP): Productivity is above all a state of mind. It is an attitude that seeks the continuous improvement of what exists. It is a conviction that one can do better today than yesterday and that tomorrow will be better than today. Furthermore, it requires constant efforts to adapt economic activities to ever-changing conditions and the application of new theories and methods. It is a firm belief in the progress of humanity (APO, 2009).

The word productivity first time appeared in literature in 1766 used by French mathematician in his study (Sumanth, 1990). Fabricant broadly defines productivity as always a ratio of output and input (Afzal, 2004). This is the most common definition of productivity. Kendrick and Creamer have proposed two definitions of productivity which are: functional definitions for partial, total factor and total productivity and loose description of relationship usually in ratio form, between outputs and all of the associated inputs in real terms (Afzal, 2004). In these definitions, researchers have differentiated partial productivity from total productivity. Nevertheless, their focus is on relationship between the output and input. Mali has proposed the similar concept of productivity (Afzal, 2004). According to Mali, productivity is the measure of how well resources are brought together in organizations and utilized for accomplishing a set of results. Along with Mali's definition of productivity, it is believed that many organizations have defined productivity in different ways (Sumanth, 1990). Nonetheless, the task of defining productivity has been sufficiently difficult to make reaching agreement on the appropriate definitions as diverse meanings of productivity coined by different people and organizations in different periods will be presented. Productivity is the name of reaching the higher level of performance with the least expenditures of resources. Sumanth (1990) believes that productivity is a family of ratios of output to input. The living standard of the country is measured by the productivity. Productivity is measured by the goods and services produced by per unit of national resources.

Sink (1985) has further clarified productivity with reference to time and application of generic system of calculation. In its broadest sense, productivity is a relationship between outputs from a given system during or over a given period in time and inputs to that system during that same period, should be generic and universal Sink (1985). Lawlor (1985) has also given two concepts of productivity. According to Lawlor (1985), productivity is a comprehensive measure about how efficiently and effectively organizations satisfy the following five aims: objective achievements, efficiency of the process, effectiveness, comparability with other organizations and trend productivity measured over a period. According to APO (2009), productivity improvement means improvement in QCDMS:

- Quality (Q) = Higher quality that meets or exceeds customer requirements
- Cost (C) = Lower cost
- Delivery (D) = Delivery-timely delivery as desired by the customer
- Morale (M) = Morale-boosting morale of all concerned
- Safety (S) = Safety-improving the safety of every aspect of the product and process

Campbell and Campbell (1998), however have viewed this issue in a different manner. According to them, productivity is a concept that has captured the imagination and energy of managers and behavioral scientist for decades. In this statement, productivity looks a concept more than a definition. Baig (2002) has defined productivity in the following words; doing things right at the least possible cost in least possible time with the highest possible quality and to the maximum level of satisfaction of the customers and employees. Similarly, Liang-Hsuan *et al.* (2001) define productivity in the following words, productivity is often used to evaluate the aggregate performance of a business unit, generally defined as the ratio of outputs to inputs.

However, for different applications and research domains there are different definitions of productivity. This definition supports the established fact discussed in previous paragraphs that productivity has different meanings in different situations. In today's business world, therefore, the term productivity has been interpreted in many different ways, yet there is still no agreement on what actually constitutes productivity. Vittal (2002) has attached another concept with productivity and that is the objective of the organization. Vittal (2002) says that productivity, at a very element level can be defined as output by input. But mere increase in output is of no value unless the output also has a bearing

on the objectives of the organization or the environment under which the transaction takes places. In this context, productivity is associated not only with output and input but also with the value of environment.

In an extension of Vittal (2002) definition, Srinivasan (2002) is looking productivity with another angle. Alternatively, Srinivasan (2002) argued that the concept of productivity has undergone a sea change with the advent of the e-Age and in the new business paradigm, the traditional definition has to be modified; in fact it has already been redefined in this knowledge era. Srinivasan (2002) has further stated; it has become to be recognized that there are several intangible, nevertheless vital ingredients that constitute the sum of productivity.

In these arguments, it is clear that simple output and input ratio is not the true meaning of productivity, firms produce some intangible things, which are also vital. In addition, there is a need to measure intangible out put too while measuring productivity. According to Sink (1985), engineers, psychologists, economists, politicians, sociologists, organizational behaviorists and managers all have different perception on the concept of productivity. Baig (2002) has defined productivity in another way. According to Baig (2002), productivity has different meanings to different people as such:

For employers: Improve competitive position in the market.

For employees: An increase in compensation, development of skills and other capabilities.

For customers: Lower price, high quality, timely delivery.

For society: Low inflation, improvement in living standards, environmental protection.

For government: More revenues, more resources for social services.

The GP program is the concerted effort by the Asian Productivity Organization (APO) to address this challenge. The program was started by APO in 1994 with the primary focus had been the application of GP to SMEs as these have been identified as major contributor to environmental issues. Green Productivity is defined by APO as a strategy in which appropriate tools, techniques, technologies and management system are applied to produce environmentally friendly goods and services (APO, 2009). In the context of GP, improvements in productivity can be seen when less utilization of resources are achieve by means of using as much

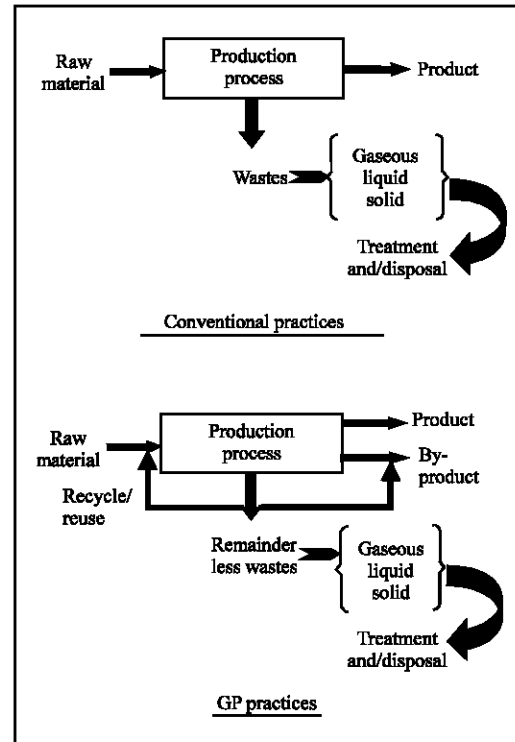


Fig. 1: Conventional versus GP practice (APO, 2009)

renewable energy as possible and also by utilizing more eco-friendly chemicals in the manufacturing process (APO, 2009). The APO view is that green productivity involves a concern with using a customer focus (i.e., quality) to achieve the appropriate balance between profitability and environmental performance (Tuttle and Heap, 2008) (Fig. 1) According to APO (2009), there are three ecological principles that are guiding GP, which are:

Sustainable use of natural resources: Under this guidance the readily available natural resources should not be used up at a rate faster than they can be renewed or regenerated. In the event that the natural resources could not be renewed or regenerated, the use of such resources shall not be faster than a substitute is available. GP's objective is to ensure that our natural resources and used very efficiently which will result in its conservation and sustainable use of our mother nature.

Protection of ecological balance: Protection of ecological balance can be achieved when pollution is controlled within the capacity of the environment to treat this waste and pollution. Pollution will disrupt the ecological process by contaminating our food chain that provides us with our food. With this objective, GP focus in preventing and

reducing pollution and this in turn will protect the ecological process that is important in maintaining ecological balance of the environment.

Protect plant and animal species: Plant and animal are also important towards the long term survival as they contribute in maintaining the ecological balance of the environment. They are also the basis for the food and other products. The genetic composition of these plants and animals are essentials as it helps improve the food crops and also being sources of the medicine. When the above two objective of GP is maintained, it will also contribute towards survival of these species.

There is substantial business benefits associated with green productivity strategies that more than offset additional costs associated with assuming responsibility for the societal costs associated with a given business. Green productivity is at the heart of the concept of sustainable development (Miyai, 1997). Willard (2002) suggests that there are seven types of business benefits that can be achieved from adopting a sustainable business strategy. These areas of benefit are:

- Easier hiring of the best talent
- Higher retention of top talent
- Increasing employee productivity
- Reduced expenses in manufacturing
- Reduced expenses at commercial sites
- Increased revenue/market share
- Reduced risk, easier financing

Willard (2002) makes a strong case at the firm level for how green productivity initiatives lead to improved business results. As profitability is a key factor in business, GP would not be taken serious without its integration with profitability. Looking at this, GP is a strategy also leads towards organization profitability. This is because excessive use of resources means low productivity and less efficiency. When resources are use wisely by reducing it and recycling, it is also a form of saving to the organization.

Problem statement: Improvement in the quality of life is often associated with an increase in demand for goods and services. Production of these goods and services, however, often has two negative aspects on the environment, in a way it depletes the natural resource and generates pollutants which, if dumped into natural bodies, often cause environmental damage. Even though such techniques may sometimes be economically attractive but are not sustainable because of their potential threats to society. Economic policies emphasizing

productivity and economic growth alone, however may lead to an adverse and irreversible environment.

The problem of industrial environmental pollution is particularly serious in developing countries where the enforcement of environmental regulations is not strictly enforced. Environment protection is seen by industries as only an added cost which reduces competitiveness and profits of the enterprises that strictly follow such environmental regulations. Environment protection needs to be accompanied by productivity and quality improvements if it is to be more widely accepted and practiced by the industries.

Green Productivity (GP), therefore has been launched in 1994 in line with the 1992 Earth Summit. It laid stress on economic development and environmental protection to be the key elements of sustainable development. It was initiated in Japan as APO (Asian Productivity Organization) with an objective to enhance productivity and simultaneously reduce the negative impacts on the environment. The concept of GP shows that for any development strategy to be sustainable, it needs to have a focus on environment, quality, and profitability, which form the triple focus of GP (Hwa, 2001). Accordingly, Tuttle and Tebo (2007) have introduced the concept of the three productivities economic, social and environmental as a means of further elaborating a comprehensive view of competitiveness and societal value creation from both the enterprise and national perspectives. While these terms mirror the elements of the triple bottom line approach to measure organizational performance, there are key differences. First the focus on productivity involves consideration of both inputs and outputs and the three productivities also through the focus on perceived value have a customer perspective that is missing from the triple bottom line paradigm.

GP goes beyond compliance. EMS and ISO are document oriented, while GP is practice oriented. EMS and ISO does not include health and safety aspects, while GP includes. With these obstacles in mind, questions arise about to what extent green productivity practices exist in practice? What are the differences between green productivity with EMS and ISO? What factors influence these certified companies to implement green productivity practices? And what are the actual outcomes realized by the adopting organizations? The main objective of this study is to ascertain the factors that influence EMS 14001 and ISO 9000 certified companies in Malaysia to adopt green productivity in their operation and also to what extend does this GP is being practice in those organization. In addition, the relationship between the green productivity practices with the organizational performance will be investigated. The study is also

interested to examine the difference in terms of implementation of green productivity practices between EMS 14001 and ISO 9000 certified companies.

Scope of study: The study focuses on ISO 14001 and ISO 9000 certified manufacturing firms in Malaysia. The manufacturing sector was selected because it is the largest sector in terms of sales, employment and contribution to the economy. Moreover, the sector has tremendous contribution to the quality and environmental problems in Malaysia. Thereby, any effort to improve environmental performance of this sector can produce substantial benefits. Within the manufacturing sector, the study focuses on EMS ISO 14001 and ISO 9000 certified companies. These companies were selected because they are expected to have the highest level of green productivity implementation.

Literature review

Productivity improvement: GP techniques are used to bring about the changes that will result in better environmental performance and improved productivity. They range from simple house keeping techniques to designing "green" products (Table 1).

Good housekeeping: GP techniques include awareness programs and the 5S management techniques which focus on keeping processes, equipment, workplaces and work forces organized, neat, clean, standardized and disciplined. Other good housekeeping techniques relate to measures that prevent the loss of materials, minimize waste, conserve and save energy and improve operational and organizational procedures.

Design change: The environmental impact of a product is to a large extent determined by its design. By taking environmental considerations into account during product planning, design and development and so designing environmentally compatible products a company can minimize the negative impact of its products and process on the environment.

Table 1: Example of productivity and environmental impact at product level

Productivity	Environmental impact
Production rate	Potential environmental impact
Total number of product/time	Life cycle (CO ₂)
Total mass of product/time	Life cycle (energy)
Mass of product/mass of raw materials	Life cycle (water consumption)
Price cost ⁻¹	Total material consumption
Profit cost ⁻¹	Total material intensity
Total sales year ⁻¹	Total energy consumption
Total profit year ⁻¹	Total energy intensity
Return of investment year ⁻¹	Land use

Hur *et al.* (2004)

Process modification: Process modification is a key GP technique which encompasses both simple and more complex changes from replacing inefficient or old processes with new technology to totally changing the production process used. Such alterations can also involve energy conservation techniques such as the use of efficient appliances and the re-use and recycling of heat.

Waste management: Waste stream segregation and the promotion of recycling, reuse and recovery are two broad techniques used to reduce the amount of waste a company produces and to improve waste disposal. Off-site recycling is often implemented if on-site recovery and reuse of resources is not feasible. Often substantial improvements can be made in the nature and quantity of waste produced by the substitution or purification of some material inputs.

Factors influencing the implementations of green productivity practices: GP is driven by forces both external and internal to the organization. External forces are typically: pressure from regulations, national and international, demands from various stakeholders such as consumers and suppliers. Regulations may be in the form of increasingly stricter and more complex national regulations and standards, fiscal instruments such as taxes and penalties and judicial directives. Many of the national regulations are a reflection of the international regulatory developments in environmental and natural resource protection. Evolving global and industry standards are serving as driving forces for the move towards GP.

These include international conventions such as the Montreal Protocol and Climate Change Convention; Responsible Care of the Chemical Industry; Marine Stewardship Council for the food processing sector. Forest Stewardship for pulp and paper sector and codes of conduct for environmental and social responsibility. These trends have much greater implications for businesses in developing economies due to their technological and resource constraints. Opening up of world markets and the increased globalization has further intensified the pressures on these businesses, as they have to meet international expectations. Customer requirements usually focus on quality, cost, reliability, and most importantly, promptness of delivery. However, as environmental requirements are expected to become an integral part of business strategy, pressure from customers, particularly in industrialized countries is increasing on suppliers to provide environmentally sound goods and services. The need to obtain standards such

as ISO 14000 and SA 8000 certification is increasing pressure on suppliers to improve their environmental and social performance.

A number of multinationals are moving to green their supply chains and purchasing policies are reflecting the environmental requirements. To stay in the market, suppliers have to modify their business practices. Another dimension of this pattern of development has been the increasing, albeit slow, shift among consumers towards sustainable consumption. This has led to a demand for more eco-friendly products such as garments manufactured without azodyes, vegetable-tanned leather products, organically grown produce, coffee that has been obtained through fair trade practices, cosmetics manufactured through fair trade practices, etc.

This trend is prominent, particularly among consumers in North America, Europe and Japan. Green consumerism is fast becoming a driving factor for businesses to change their practices. This trend has put enterprises under pressure to adopt more environmentally sound, efficient manufacturing processes. This, however, must be done without compromising on the quality of the products in answering consumer needs. A very important issue pertaining to sustainability of consumption and production is resource pricing and availability. Policies favoring realistic resource pricing are an essential economic instrument to drive production towards resource conservation and efficiency.

Availability of a resource would typically govern its pricing and this in turn would be indicative of the priority that should be placed in the conservation of the resource. All these trends are also creating new market opportunities for goods and services produced in a more sustainable manner and promoting a sustainable lifestyle. Greening of the supply chain by corporations is forcing SMEs; an integral part both upstream and downstream in the supply chain to re-examine their business practices. Those organizations that take advantage of these trends and modify their business practices, making them more resource efficient, find themselves with a competitive edge in the marketplace. Such trends, new opportunities and changes in the perceptions of competitive advantage are serving to drive businesses towards practices like GP, which will help them to systematically strengthen their market positions.

Internal forces that affect GP are those that are integral to the enterprise such as: worker health and safety and internal efficiency. Establishment of standards such as SA 8000; adoption of the International Labor Organization's (ILO) standards for social welfare and social codes of conduct adopted by corporate and retail chains are driving businesses to recognize worker health

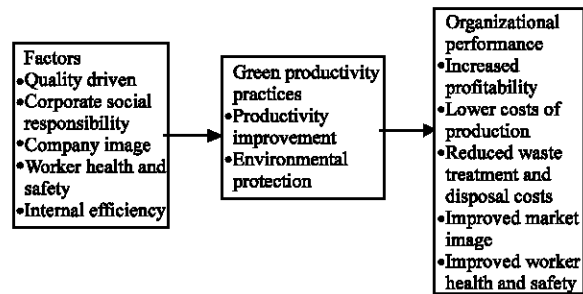


Fig. 2: Framework

and safety as a crucial issue in business. The advantages of ensuring worker health and safety include: reduced health and insurance costs; reduced absenteeism; lower liabilities and an increase in the morale of workers.

This is reflected as improved labor productivity, which is a strong driving force for the adoption of a strategy like GP. Internal efficiency of processes and operations in an organization that serve as a driving force for GP primarily involve resource efficiency, which typically results in, reduction of waste by improving process conversion efficiency and equipment efficiency, recycling and recovering useful raw materials and byproducts, thereby reducing off-spec product formation. Improvement in quality of products by increasing the proportion of Right First Time, using better and safer raw materials and reducing defects. Cost reduction as a result of the above measures.

Framework: The following framework is derived which purely focuses on green productivity practices, drivers and its effect towards the organization performance (Fig. 2).

CONCLUSION

A study done by Phang Siew Nooi, A professor in University Malaya in the 1990s says that “in so far Green Productivity (GP) is concerned it is a very new concept that has been introduced by the APO through the NPC Malaysia. The proposed strategy seems to be promising as a two-pronged approach where productivity is enhanced with better environmental performance. In 2008, there is a book entitled Green Productivity: Applications in Malaysia’s Manufacturing written by Dr. Elsadig Musa Ahmed. Beside this there are very little facts available to researcher and policy maker in regards to Green Productivity in Malaysian manufacturing companies. This study identifies green productivity practices implemented in the Malaysian EMS 14001 and ISO 9000 certified companies and portrays their extent of

implementation. Given that knowledge about existence of green productivity practices in Malaysia and developing countries in general, is lacking, the study can add considerable knowledge in this area and provide a base for future studies about the issue.

The study also identifies factors for green productivity in the Malaysian context and reveals the influence of each factor on green productivity practices. This can add to the knowledge about how green productivity practices are diffused among organizations in Malaysian context. This knowledge can also enrich theories that deal with diffusion of innovations or initiatives among organizations, such as institutional theory. Furthermore, the study identifies the outcomes from green productivity practices and shows the influence of each type of green productivity practices on each type of the outcomes. This can add to the knowledge about the value and importance of green productivity practices to organizations and the society at large. This knowledge can also enrich theories about the value of green initiatives, especially the natural resource-based view of the firm (Hart, 1995).

Malaysia is a well known developing country with its robust economy activities and economy policies. Being economically active developing countries, Malaysia is changing from agriculture to manufacturing to support the demand of the global economic and directly contributing in depleting natural resources. Nevertheless, Malaysia government is also taking Green Issue as serious as other developed nation. In the recent Budget 2010 announced by our Prime Minister YAB Datuk Seri Najib Tun Razak Najib, Malaysia is serious in promoting Green Practice and Green Technology or Green Innovation.

In his speech, YAB Datuk Seri Najib Tun Razak has said, Green Technology has the potential to become and important sector in economic development. Towards this, the government launched the National Green Technology Policy in August. The objective of the policy is to provide direction towards management of sustainable environment. Beside this the government are also providing a total of RM1.5 billion as soft loans to companies that supply and utilize green technology. Looking at this Green Productivity is still relatively new concept in Malaysia especially to the SMEs. Mostly MNC companies that having their parents companies are practicing GP as a policy from their headquarters. Very commonly practiced activity in manufacturing companies in Malaysia in related to Green Practice is ISO 14001 which is designed to introduce environmental improvement into every aspect of a company's operations, offers an organized approach to manage environmental issues. This study discloses the innovation of green productivity, thus, it can advance managers' understanding of the

importance and value of green productivity practices. This understanding is very crucial due to the increasing environmental and economic importance of green productivity in addition to their role in enhancing competitive power of companies in international markets.

The study also shows the factors for the implementation of green productivity, thus, it can enhance the understanding of managers and policy makers about the motivators for the adoption of green productivity in organizations. This understanding can help managers design appropriate policies for the diffusion of green productivity in their organizations and other organizations based on the specified factors. The study also may help policy makers in developing countries in general and Malaysia in particular, in setting appropriate policies and strategies for improving environmental performance of business firms. The Malaysian National Policy on the Environment gives special emphasis to pollution problems of the Malaysian firms and encourages large firms to establish partnerships with the small ones to exchange experience in EMS. Therefore, concepts and results of green productivity, developed in this study, may be utilized by policy makers to improve environmental performance of business firms.

REFERENCES

- APO. (Asian Productivity Organization), 2009. Eco-Products Directory 2004. Asian Productivity Organization, Tokyo.
- Afzal, M., 2004. Measurement of productivity in the large scale manufacturing sector of Pakistan. Ph.D. Thesis, The University of Lahore, Pakistan.
- Al-Darrab, I.A., 2000. Relationships between productivity, efficiency, utilization and quality. *Work Study*, 49: 97-104.
- Baig, A., 2002. Your productivity is national prosperity. *Productivity Journal*, National Productivity Organization Pakistan, Islamabad, pp: 8-9.
- Borhan, H.B. and E.M. Ahmed, 2008. A simultaneous estimation of environmental kuznets curve: Air pollutants and economic growth in Malaysia. *The Int. J. Environ. Cult. Econ. Social Sustainabil.*, 5: 59-86.
- Campbell, J.P. and R.J. Campbell, 1998. Introduction: What Industrial-Organizational Psychology Has to Say about Productivity. In: *Productivity in Organizations*, Campbell, J.P. and R.J. Campbell (Eds.). Jossey-Bass Publishers, USA.
- Fatta, D. and M. Marneri, 2004. Industrial pollution and control measures for a foundry in Cyprus. *J. Cleaner Prod.*, 12: 29-36.
- Hart, S.L., 1995. A natural-resource-based view of the firm. *Acad. Manage. Rev.*, 20: 986-1014.

- Hur, T., I. Kim and R. Yamamoto, 2004. Measurement of green productivity and its improvement. *J. Cleaner Prod.*, 12: 673-683.
- Hwa, T.J., 2001. Green productivity and supply chain management. *Greening Supply Chain: Enhancing Competitiveness Through Green Productivity*, pp: 23-28.
- Lawlor, A., 1985. *Productivity Improvement Manual*. Quorum Books, Westport, ISBN: 0899301487.
- Liang-Hsuan, C., L. Shu-Yi and C.Y. Shin, 2001. Using financial factors to investigate productivity: An empirical study in Taiwan. *Ind. Manage. Data Syst.*, 101: 378-379.
- Miyai, J., 1997. Green productivity, green productivity in pursuit of better quality of life. *Asian Productivity Organization*, pp: 151-155.
- Mohanty, R. and S. Deshmukh, 1998. Managing green productivity: Some strategic directions. *Prod. Plann. Control*, 9: 624-633.
- Moharamnejad, N. and S. Azarkamand, 2007. Implementation of green productivity management in airline industry. *Int. J. Environ. Sci. Technol.*, 4: 151-158.
- Parasnis, M., 2003. Green productivity in the Asia and Pacific region. *Int. Energy J.*, 4: 52-61.
- Saxena, A.K., K.D. Bhardwaj and K.K. Sinha, 2003. Sustainable growth through green productivity: A case of edible oil industry in India. *Int. Energy J.*, 4: 81-91.
- Silverman, G.S. and S.K. Marian, 2000. Perceptions of environmental problems by Malaysian professionals. *Environmental Practice*, Vol. 2, Issue 4, December 2000.
- Sink, D.S., 1985. *Productivity Management-Planning, Measurement and Evaluation, Control and Improvement*. John Wiley and Sons, Chichester.
- Srinivasan, C., 2002. *Productivity in the e-Age*. Proceedings of APO International Conference on Productivity in the e-Age, New Delhi, India.
- Sumanth, D.J., 1990. *Productivity Engineering and Management*. Tata McGraw-Hill, Delhi, India.
- Tersine, R.J., 2004. The primary drivers for continuous improvement: The reduction of the triad of waste. *J. Managerial Issues*, 16: 15-29.
- Tuttle, T. and J. Heap, 2008. Green productivity: Moving the agenda. *Int. J. Productivity Performance Manage.*, 57: 93-106.
- Tuttle, T.C. and P. Tebo, 2007. The three productivities: Achieving breakthrough social value improvement by linking economic social and environmental productivity. Tuttle Group International, Annapolis, MD, working paper. http://www.emeraldinsight.com/Insight/ViewContentServlet;jsessionid=4BD14FA5C8E7C926B599D726FAA32DB6?Filename=/published/emeraldfulltextarticle/pdf/0790570106_ref.html.
- Vachon, S. and R.D. Klassen, 2006. Extending green practices across the supply chain: The impact of upstream and downstream integration. *Int. J. Operat. Prod. Manage.*, 26: 795-821.
- Vittal, N., 2002. The productivity paradigms and strategies for the e-age: Focus government. Proceedings of APO International Conference on Productivity in the e-Age, New Delhi.
- Vogtlander, J.G., A. Bijma and H.C. Brezet, 2002. Communicating the ecoefficiency of products and services by means of the ecocost/value model. *J. Cleaner Prod.*, 10: 57-67.
- Willard, B., 2002. *The Sustainability Advantage: Seven Business Case Benefits of a Triple Bottom Line*. New Society Publishers, Gabriola Island, BC., ISBN: 978 0865714519.