

A Conceptual Approach of 5S to Improving Quality and Environmental Performance of Malaysian Oil Palm Dealers

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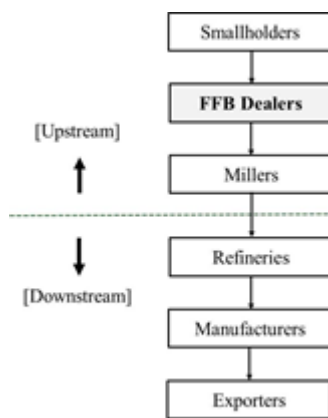
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Graphical abstract



Abstract

Global concerns on quality and environmentally sustainable products are giving extensive pressure on the competitiveness of Malaysian palm oil industry. As part of palm oil supply chain, the fresh fruit bunch (FFB) dealers play an important role in the development of the industry as well as contributing a significant impact on the environmental pollution. Despite the adoption of codes of practice (COPs) by dealers, recent studies reveal the problem of quality deterioration of FFB is caused by ineffective handling practices including poor housekeeping and delay in transportation. Empirical evidence shows that the quality and environmental performance of firms improve through 5S practices. Therefore, this conceptual study primarily aims to improve the existing practices for the handling of harvested oil palm by incorporating the 5S concept (sort, set in order, shine, standardize, sustain) into COPs. In this context, several propositions are formulated based on literature. The findings of survey and case studies within FFB dealer sub-sector shall be used as input to enhance the proposed improvement work. The propositions shall be validated by a panel of experts through the Delphi technique before it can be used as a reference by FFB dealers to simultaneously improve their quality and environmental performance.

Keywords: 5S; handling practice; fresh fruit bunches; palm oil supply chain

Abstrak

Keprihatinan global terhadap produk yang berkualiti dan lestari mesra alam sekitar banyak memberi tekanan kepada keberdayasaingan industri minyak sawit Malaysia. Sebagai sebahagian daripada rantaian pembekalan minyak sawit, peraih buah tandan segar (BTS) memainkan peranan penting dalam pembangunan industri ini, di samping memberi sumbangan yang signifikan kepada pencemaran alam sekitar. Di sebalik penggunaan beberapa *codes of practice* (COPs) oleh peraih BTS, dapatan kajian terkini menunjukkan masalah kemerosotan kualiti BTS adalah disebabkan oleh amalan pengendalian yang kurang efektif termasuk kelemahan amalan pembersihan dan kelewatan penghantaran. Bukti empirikal menunjukkan prestasi kualiti dan alam sekitar di kebanyakan firma berjaya ditambahbaik melalui amalan 5S. Oleh itu, tujuan utama kajian konsep ini adalah untuk menambahbaik amalan pengendalian BTS sedia ada dengan menggarap pengintegrasian konsep 5S (sisih, susun, sapu, seragam, sentiasa amal) ke dalam COPs. Dalam konteks ini, beberapa cadangan amalan pengendalian dirumuskan berdasarkan kepada kajian literatur. Keputusan daripada kajian tinjauan dan kajian kes yang dijalankan di sub-sektor peraih BTS akan digunakan sebagai input untuk menambahbaik amalan pengendalian yang telah dicadangkan. Cadangan ini kemudiannya akan ditentukan oleh beberapa orang panel pakar melalui teknik Delphi sebelum ia boleh digunakan sebagai rujukan oleh peraih BTS ke arah memperkasakan prestasi kualiti dan alam sekitar mereka.

Kata kunci: 5S; amalan pengendalian; buah tandan segar; rantaian pembekalan minyak sawit

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1.0 INTRODUCTION

World consumption for palm oil is going up annually [1]. Nowadays, consumers require quality, safety and environmentally sustainable palm oil [3]. Nevertheless, palm oil industry, such as in Malaysia, is treated as part of the national key economic areas

(NKEAs) [4]. The industry has received strong support from the government through various strategic policies. For example, several codes of practice (COPs) have been developed by the Malaysian Palm Oil Board (MPOB) as practical guidance to comply with the standard process that can fulfil customer requirements, which include safety, quality and sustainability

along the palm oil supply chain sector [5]. Currently, Malaysia is the main exporter of palm oil in the world [3]. Despite its success, the areas for improvement toward sustaining competitive advantage in the upstream level of palm oil sector, which comprise nursery operators, oil palm smallholders, fresh fruit bunch (FFB) dealers and estates, should not be neglected [7]. However, there are relatively few empirical papers emphasizing the issue of FFB dealers as compared to other sub-sectors [8].

As part of the palm oil supply chain, the FFB dealers play a vital role in the development of the industry. The FFB dealers are the middle sub-sector that connects smallholders and millers. They are responsible for the post-harvest handling of FFB including several business operations such as collecting, doing storage and transporting the FFB [8]. They are also accountable for producing a negative impact on the environment through pollution from transportation in their operations. From the perspective of supply chain, improving the efficiency of FFB dealers benefit other sub-sectors, and subsequently assist the industry in producing high quality of finished products at minimum cost of production [8]. Despite the implementation of current business practices and COPs, the sector faces important issues such as housekeeping [8] and transportation efficiency [9], and has a vital role in the improvement of environmental practice. Therefore, the practice toward continual improvement within the FFB dealer sub-sector is not to be excluded to ensure the sustainability and competitiveness of the supply chain.

As pointed up by numerous researchers, the 5S practices (sort, set in order, shine, standardize, sustain) could considerably improve quality [23] and environmental performance at workplace [28], and it has been widely used as housekeeping technique [11] by various sectors worldwide including supply chain [12]. In Malaysia, many firms have adopted the framework developed by the Malaysia Productivity Corporation (MPC) in implementing the 5S practice [13]. Although the implementation issue of 5S is not new, however, major efforts to improve workplace quality and environment are linked with housekeeping [14]. Thus, this conceptual study attempts to investigate the ability of 5S in improving the housekeeping system, and simultaneously reducing the environmental impact of Malaysian oil palm FFB dealers. The main concern is to improve the efficiency of FFB dealers through the integration of current COPs and 5S practice adopted from MPOB and MPC, respectively.

This paper outlines the proposed improvement work. The propositions are formulated based on literature related to the palm oil industry, supply chain and FFB dealers, COPs for the handling of the harvested oil palm, and 5S practices. An overview is also provided about the method of the enhancement and validation process for the proposed work. Then, this paper highlights the final consideration and conclusion of the study.

■2.0 THE IMPORTANCE OF PALM OIL INDUSTRY IN MALAYSIA

Global demand for oils and fats is increasing rapidly as the world population and energy prices continue to rise. The world population will grow from 7 billion in 2011 to 9 billion in 2043, which is an increase of 29% [16]. Therefore, food production must meet this upward trend. Presently, palm oil could be the most popular choice of edible oil in the world with its consumption in over 150 countries. In 2011, the palm oil contributed the highest percentage (28%) in the global oils and fats production share [3]. Palm oil will continue to be the most preferred edible oil of the world with expected consumption of 43.2 million tons in 2020 [17].

Nowadays, Malaysia is among major players in the global oil palm plantations [2], and export of palm products due to the rapid growth of the world oil palm industry [3]. For example, Malaysia contributed about 41.3% of world palm oil production, and became the second largest producer in 2007 [1]. As being part of the economic transformation program (ETP) under the NKEAs, the industry is a significant contributor for the Malaysian socio-economic development [4]. The palm oil industry contributed about 5 to 6 % of the Malaysian GDP and employment opportunities of 1.4 million workers in 2007. As of 2008, Malaysia has 4.7 million hectares of oil palm plantations, 434 mills, 40 crushers, 52 refineries, 18 oleo-chemical plants and 25 biodiesel plants [19].

The growing world population and increasing energy prices are among the major drivers for the rising importance of Malaysian palm oil in the global oils and fats market [3]. Furthermore, factors such as political stability, ideal climate and agronomic conditions also contribute to the success of Malaysian palm oil industry [6]. However, the environmental problems are becoming a global concern [18]. Subsequently, consumers now increasingly demand for high quality, safety and environmentally sustainable palm products [3].

■3.0 THE POSITION OF FFB DEALERS IN THE MALAYSIAN PALM OIL SUPPLY CHAIN

The palm oil industry in Malaysia covers the entire value chain from upstream to downstream activities. The private sector mainly drives its development, while it is still greatly inclined towards the upstream activities of supply chain, specifically the sub-sectors of nursery operators, oil palm smallholders, FFB dealers, estate owners and millers [7]. Each sub-sector has its own important role in the development of the industry. However, the issue of FFB dealers received little emphasis by researchers as compared to smallholders [8].

Apparently, the supply chain sector is quoted as having a significant impact in helping the Malaysian palm oil industry to achieve its current reputation [8]. In this context, the value chains for palm oil in Malaysia are probably best described by the study of the Palm Oil Research Institute of Malaysia (PORIM) and the Universiti Putra Malaysia (UPM) of Malaysian smallholders in 1998 [20]. As depicted in Figure 1, this study clearly indicates the position of FFB dealers in the Malaysian palm oil industry.

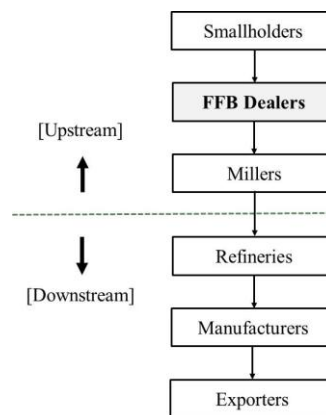


Figure 1 Market chains for Malaysian palm oil industry [20]

As of 2007, there were about 1860 registered dealers (in the MPOB's database) throughout the nation, which are classified

into sole proprietorship, partnership, co-operative and government-link firms [8]. Their main task is to collect the harvested oil palm crops from smallholders, and send it to the millers at the soonest possible time for further processing. In addition, they have to avoid mistakes in their business operation such as improper handling and delay in the delivery along these three sub-sectors to have an efficient flow of good quality FFB with minimum impact on the environment. Eventually, the concept of supply chain shall be satisfied [10]. A supply chain refers to the activity associated with the flow and transformation of goods from the primary production stage to the end users [8], therefore the FFB dealers are part of the chain, and they should be given attention as well.

■4.0 COPs FOR FFB DEALERS

With support from the government under several agencies such as the MPOB and the Malaysian Palm Oil Council (MPOC), the palm oil industry has experienced steady growth and increasing its share of global oils and fats market over the years [19]. These agencies conduct research and development, marketing and promotions, and give advice on the economic and technical aspects. In line with the important contribution of the supply chain sector in the Malaysian palm oil industry, MPOB developed several COPs that could be considered as a system tool to achieve higher quality, safety and sustainability of palm oil, specifically: code of good nursery practice for oil palm nurseries (NURSERY), code of good agricultural practice for oil palm estates and smallholdings (GAP), code of good milling practice for palm oil mills (MILLING), code of good refining practice for palm oil refineries (REFINING), code of good crushing practice for palm kernel crushers (CRUSHING), code of good practice for the handling, transport and storage of products from the oil palm (TRANSPORT), and code of good practice for bulking facilities of palm oil and palm kernel oil and their products [21].

Among the COPs, the TRANSPORT is probably the most relevant COPs for FFB dealers to follow. The TRANSPORT is launched with the objective to assure good hygiene, quality and safe oil palm products in the form of germinated seeds, seedlings, FFBs, palm kernel and bulk oils. In general, the scope of TRANSPORT covers the operations of handling, storage and transportation [5]. In the context of FFB dealers, the capacities of TRANSPORT specifically include two main activities of business operation [5]:

- 1) Post-harvest handling (from smallholders to the mills) by: collecting loose fruits without contamination such as stones and debris, sending FFBs to ramp without damage and contaminant, and sending FFBs and loose fruits to the mills without delay within 24 hours after harvested.
- 2) Transportation by compartment (e.g., lorry, tractor or rail cages) should be: dedicated compartment, dry and free from previous residue, undesirable odour and mineral oil, inspected for cleanliness before loading, covered to prevent entry of rainwater or any contaminants.

Despite the adoption of TRANSPORT by FFB dealers, some of them still have problems of delay in the delivery [9], and cleanliness [8]. The main responsibility of FFB dealer is to deliver the harvested FFB crop from the smallholders to the mills within 24 hours to retain the freshness of the fruits. Otherwise, the palm oil millers will receive poor quality of FFB, which, in turn, will affect the quality of palm end products [8]. Recent study highlights that a delay in the transportation of the FFB by dealers could be one reason for poor quality [9]. In addition, they are also liable for generating a significant impact on the environment

through wastage and pollution from post-harvest handling and transportation during their business operations.

Furthermore, a study conducted by the MPOB reveals the inefficiency of FFB dealers related to the practice of the housekeeping system when several of their ramps are unclean [8]. According to the study, about 54% (sample size = 119) of dealer ramps are not cemented. The condition of accumulated contamination of some foreign materials such as mud and soil on the ramps after rain could result in dirty FFB and deterioration, and eventual reduction of their quality before reaching the processing centres. The situation worsens if they do not well manage their transportation agents and sub-contractors [8]. Hence, an appropriate housekeeping system is needed to improve the cleanliness of their ramps and equipment.

Housekeeping is very important in ensuring a favourable workplace environment in most manufacturing and services firms. It is an approach to develop and to show concern about quality and environmental issues at workplace with proper system practice used. Major activity to improve quality [23] and environmental performance [28] is linked with housekeeping, whereas a proven technique for housekeeping is 5S practice [24]. Therefore, the integration of 5S into TRANSPORT could be one possible solution in improving their business practice, and subsequently increasing their quality and environmental performance toward achieving competitive advantage.

■5.0 5S PRACTICES

This section presents a review of the literature related to 5S practices. The review begins with the importance of 5S as competitive business strategy. The next part of the section discusses the relationship between 5S and quality performance. Finally, a brief discussion on the relationship between 5S and environmental performance is presented.

5.1 5S as Business Competitive Strategy

Competitive strategy means providing a distinctive mix of values [38]. The main competitive dimensions that constitute the competitive position of a firm include quality, cost and delivery speed [39]. Because of the global sustainability agenda, environmental factors are increasingly becoming a priority in the implementation of competitiveness strategies [40]. Today, many firms deal with these dimensions in offering a mix of products or services to stay competitive. Among the business improvement tools applied to obtain competitive advantage, the 5S practices play an important role initialising the development of other improvement philosophies [41] such as total quality management (TQM) [13], total productive maintenance (TPM) [42], lean manufacturing [43] and environmental management [28].

The practice of 5S primarily concentrates on the improvement of industrial workplace environment in the pursuit for high quality, low cost and rapid delivery of products or services. The theory of 5S is simple [11], and could be translated into practice without requiring a large investment [27] toward continual improvement [12]. Originally, it is a workplace housekeeping concept based on five Japanese acronyms [23]. Much of literature still declares 5S as housekeeping technique [24] or lean practice [25]. Others recognize 5S as a problem-solving method [26], an environmental improvement tool [28] and business improvement strategy [27]. For many years, many firms around the world have extensively adopted the 5S practice [22]. According to the survey conducted by Massey University, with over 500 respondents from over 20 countries around the world,

the 5S practice is among the top 20 popular business improvement tools, and it is implemented by 30.3% of firms worldwide [31].

The importance of 5S as business competitive strategy is highlighted in a number of studies, especially in manufacturing. For examples, 5S is considered as part of a: long-term strategy for many manufacturing firms [23], safety world-class strategy for an aircraft manufacturing company [44], strategic planning based on an integrated management system in an electrical manufacturing company [45], environmental improvement strategy in a small manufacturing firm [28], and strategy for green productivity in manufacturing small and medium enterprises (SMEs) [46].

Today, the practice of 5S has extended to the services sector such as education [22], banking [33], hotels [47] and supply chain [14]. Consequently, it is treated as basis for a: strategic business plan in a management consultancy firm [38], short-term strategy in public hospitals [48], business process strategy in a small engineering firm [43], business model and strategy in hotels [47], and supply and operation strategies in the supply chain sector [34]. In a related study, a number of logistic companies in the Malaysian supply chain sector have seen improved efficiency in its planning, scheduling and delivery processes as the result of a good housekeeping system through the implementation of 5S practice [14]. By taking these into account, 5S could be an appropriate business competitive strategy to improve supply and business operation of FFB dealers.

5.2 Relationship between 5S and Quality Performance

Many researchers promoted in their studies that the effective use of the 5S could bring potential benefits associated with having better workplace environment, and improving quality performance [30]. For examples, a survey within the Malaysian firms with certified 5S conducted by MPC confirmed major benefits of quality performance include the reduction in rework as reported by 83.7% of the firms. Meanwhile, 82.8% experienced improvement in visual management, 78.4% of respondents achieved improvement in employee creativity, teamwork and morale, and 68.8% of the firms reported reduction in customer complaints. As a result, the 5S practice contributed to higher sales and reduction in operation costs [15]. In addition, a survey carried out by the Universiti Teknologi Malaysia (UTM) reveals 5S is among the most popular choice of quality practices with high level of implementation in the Malaysian electrical and electronics firms [32]. Another study confirmed that 5S formed the basis for quality improvement activities toward TQM in the Malaysian manufacturing SMEs [11].

Although, some quality experts have used different words for 5S, they carry the same meaning and objective to establish, and to maintain quality environment in a firm [11]. In the context of this study, the authors refer the meaning of 5S as *seiri* (sort), *seiton* (set in order), *seiso* (shine), *seiketsu* (standardize), and *shitsuke* (sustain), which are adopted from MPC [29]. The first “S” represents sorting out and categorizing the items depending upon frequency of use with the aim of reducing the mess at the work area. The second “S” is set in order, which means to organize the items from the sort phase into a designated area for easy storage and retrieval purposes through proper visual control system. The third “S” is shine, which denotes systematic cleaning, maintenance, and inspection in ensuring a clean and conducive environment at workplace. The next “S” is standardize, which means to do standardization of best practices such as by documenting and updating the processes, work instructions, procedures, and manual. The last “S” is sustain, which refers to sustaining what was carried out [22].

In the context of Malaysian firms, the implementation framework for 5S practice has been adopted from MPC. MPC has

been working in helping many firms to achieve the 5S practice certification as public declaration for their commitment in continuous quality improvement [15]. By 2009, a total of 431 firms from various industry sizes and sectors have received the certification [15]. The framework (Figure 2) has been developed by MPC for better implementation of 5S practice throughout the PDCA (plan-do-check-action) cycle [29]. Although, there is lack of empirical evidence related to 5S implementation in the oil palm dealer sub-sector, there are a number of firms in various sectors around the globe where they do implement 5S without being aware of its existence as a formal tool for TQM to improve quality performance [49].

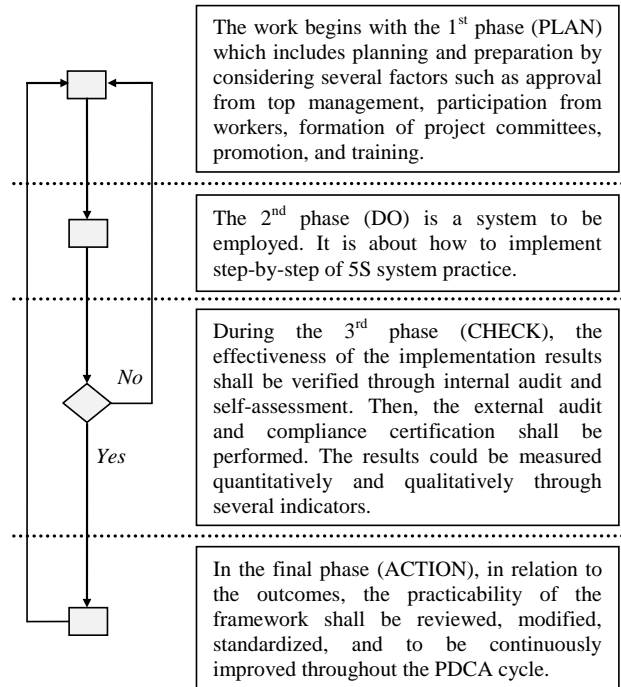


Figure 2 5S implementation framework [29]

5.3 Relationship between 5S and Environmental Performance

In a business context, the improvement in environmental performance is relates strongly to housekeeping [28]. Furthermore, the main effort to improve housekeeping system is relies heavily on 5S practice [24]. However, the study on the relationship between the effective use of 5S and environmental performance is uncommon. A case study done by O’hEocha is considered to be one of the most complete empirical studies that rigorously examine the links between 5S and environmental performance [28]. Findings of the study show that 5S are effective in improving environmental performance at a production level by means of reduction in waste (e.g., water, oil and energy). The practice of 5S motivates tidiness in the storage area of items (e.g., oils and chemicals) to minimize the risk of environmental pollution. The study concludes that 5S is a useful tool to improve housekeeping, safety and health, and environmental performance.

Findings from another study also suggests that 5S can be used to simultaneously improve quality, safety and health, and environmental performance through an integrated management approach [45]. In addition, the practice of 5S provides discipline for the prevention of the seven wastes (unnecessary motion, defects, overproduction, waiting, transport, inventory,

inappropriate processing) [50], which could influence the environmental performance of a firm, including FFB dealers.

6.0 RESEARCH DESIGN AND METHODOLOGY

This section explains the research design used as a guide in collecting and analysing data in this study. The explanation also includes three types of research methods that are identified as being suitable to achieve the aims of the overall research. These are literature study, survey and case study.

6.1 Research Design

Research design refers to an organised plan and scientific investigation into a specific problem, undertaken with the objective of finding solutions to it [51]. Choosing a research design depends heavily on the type of information desired, the availability of resources, and the capability of researcher to manipulate the independent variables [52]. Therefore, a good research design enables the authors to address the right questions, and to present meaningful findings.

Research design can be grouped into experimental and non-experimental design [53]. The experimental design is concerned with manipulating the independent variable so that its causal relationship with the dependent variable may be established. The experimental research design is associated mainly with the research in physical and biological sciences. On the other hand, in non-experimental design, the researcher does not manipulate the variables under study, and this type of design is mainly used in social science studies. However, as this study sets out for FFB dealer sub-sector rather than individuals, it was not possible to manipulate the independent variable. Thus, a non-experimental design was chosen for this research work.

6.2 Research Methods

Research method is a procedure for conducting the research process [54]. In this research work, quantitative and qualitative methods are adopted. Quantitative method of data collection in this study mainly deals with a postal survey while qualitative methods deal with case studies. The combination of both methods shall be used as a triangulation strategy to enhance and create a compliment between the two methods.

The process of triangulation is important in ensuring the validity of research work [55]. Triangulation is defined as the use of more than one method of data collection in the study of some aspects of behaviour [56]. The fundamental of triangulation is the combination of quantitative and qualitative methods in the study of the same phenomenon [57]. Basically, the methods for data analysis in this study can fall into three broad categories: secondary data analysis, quantitative data analysis and qualitative data analysis. It must be stated that the methods used in this research is not new; the novelty claimed is in the field of the study rather than the methods employed.

6.3 Overall Structure of Research Activities

The overall processes for this study comprise several phases of research activities. The first phase of the overall research work started with a theoretical review of previous study. In the second phase, a postal survey shall be conducted within the sub-sector of FFB dealer. Then, a case study of selected FFB dealers shall be carried out in the next phase, and finally these findings shall be used as input to enhance the post-harvest handling practice of FFBs. Figure 3 illustrates the process flow of the overall research activities involved in this study.

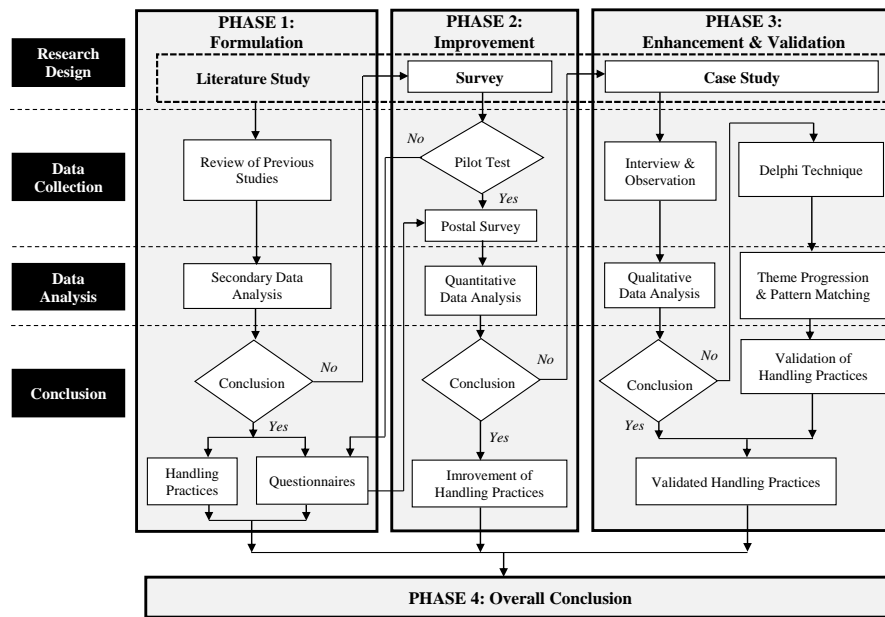


Figure 3 Process flow of the overall research activities

6.4 Formulation of Propositions for the Handling Practice of Post Harvested Oil Palm based on Literature

As an initial stage of the overall research processes, this conceptual study focuses attention on the formulation of propositions that contribute preliminary work related to the improvement of handling and environmental practices of harvested oil palm for FFB dealers. This stage involves an extensive reading of the theoretical literature based on secondary data related to palm oil industry, palm oil supply chain, oil palm FFB dealers, COPs for the handling of the harvested oil palm and 5S practices. Analysis of secondary data refers to research findings based on data collected by other investigators. In this study, the sources of secondary data includes government publications, newspapers, articles and journals. In the propositions (P1-5), the COPs of TRANSPORT shall be enhanced by incorporating the concept of 5S:

P1: Incorporating *Seiri* into TRANSPORT

Sorting out and removing all the unneeded materials, equipment, and supplies from the ramps and vehicles include the process of:

- 1) Separating the FFBs harvested by smallholders into unripe and ripe FFBs, and ensuring only ripe FFBs shall be sent to the millers [5].
- 2) Segregating unnecessary items (e.g., stones and debris) from the loose fruits to ensure only uncontaminated loose fruits shall be sent to the millers [8].
- 3) Sorting out several types of solid waste (e.g., papers, plastic, glasses, and metal scraps) from unnecessary items at ramp/office through 3Rs (reuse, reduce, recycling) concept.
- 4) Doing red tagging process of the unripe FFBs and the unneeded items for further processing of disposal or recycling.
- 5) Carrying out sustainable graphic design (e.g., printing on recycled paper, utilizing low volatile organic compounds ink, and saving energy through energy efficient equipment) for printed materials (e.g., red tags and disposal tags) of red tagging process during *seiri* phase.

P2: Incorporating *Seiton* into TRANSPORT

Organizing the materials, equipment, and supplies at the ramps and vehicles include the process of:

- 1) Storage location of FFBs, equipment, and vehicles should be labelled for easy storage, retrieval, and identification purposes to further help in unloading and loading FFBs.
- 2) Labels should also be attached on items that bring potential waste of energy if unwisely used (e.g., switches of lights, fans, and air-conditioners), and items that bring potential environmental risks (e.g., toxic and hazardous chemicals) to human safety and health.
- 3) Use of the storage system should use first-in-first-out (FIFO) methodology at the ramps. This process could assist in identifying which FFBs should be sent to the millers soonest.
- 4) Organizing parts and waste by using containers made from recycled, reusable, and disposable materials.
- 5) Organizing and keeping documentation by using files made from recycled and non-toxic materials.
- 6) Organization of smallholders or sub-contractors should be categorized into their holding size [34], quantity of harvested FFBs, and distance between smallholders to the ramps. This process could optimize the transportation routes and scheduling of the delivery of the FFB.
- 7) Carrying out sustainable graphic design (e.g., printing on recycled paper, utilizing low volatile organic compounds ink,

and saving energy through energy efficient equipment) for printed materials and visual aids products (e.g., labels, stickers, signage, pictures, information sheets, and graphs) when applied to 5S corner during *seiton* phase.

P3: Incorporating *Seiso* into TRANSPORT

Cleaning and doing maintenance and inspection of materials, equipment, and supplies at the ramps and vehicles include the process of:

- 1) Cleaning the ramps and vehicles properly could avoid contamination of the FFBs, and subsequently sustain good quality FFBs to be received by the millers [5].
- 2) Choosing and using the most environmentally appropriate cleaning material such as non-toxic materials and detergent that can be recycled or decomposed in the presence of air, water, and common soil organism during housekeeping and cleaning.
- 3) Conserving water by reducing waste water and water pollution in general cleaning (e.g., toilets and urinals), or in the case of cleaning of vehicles by avoiding leaking and dripping faucets and pipes.
- 4) Using proper methods for keeping the cleaning tools to increase its life span, to make them longer-lasting and better-functioning.
- 5) Doing maintenance and inspection of material handling equipment and vehicles regularly could enhance its life span and durability, while the good condition of the equipment and vehicles will subsequently help to transport the FFBs smoothly and without any damage.
- 6) Preparing the ramps with cemented floor and roof could prevent FFBs from contacting dirt due to the accumulated contamination of some foreign materials such as mud and soil after rain, which will subsequently sustain the quality of FFBs before they are sent to the millers [8].
- 7) Covering the FFBs during transportation could prevent them from getting dirt, contaminants, and rain, which will avoid quality deterioration [5].
- 8) Optimizing the use of natural air fresheners such as natural potpourri, fresh flowers, herbs, or *pandan* leaves [35], instead of hazardous chemical of air fresheners for cleaning indoor air and getting better smell in the workplace and vehicles.
- 9) Carrying out sustainable graphic design (e.g., printing on recycled paper, utilizing low volatile organic compounds ink, and saving energy through energy efficient equipment) for printed materials (e.g., cleaning check sheets and housekeeping duty rosters) during *seiso* phase.

P4: Incorporating *Seiketsu* into TRANSPORT

Doing standardization of best practices for *seiri*, *seiton*, and *seiso* at the ramps and vehicles include the process of:

- 1) Formalizing the best practices through scheduling, work instructions, procedures, and manuals, and ensuring the implementation of *seiri*, *seiton*, and *seiso* does not weaken over the time [29].
- 2) Carrying out sustainable graphic design (e.g., printing on recycled paper, utilizing low volatile organic compounds ink, and saving energy through energy efficient equipment) for printed materials (e.g., pictures, photos, posters, buntings, banners, work instructions, standard operating procedures, and manual) during *seiketsu* phase.

P5: Incorporating *Shitsuke* into TRANSPORT

The process includes:

- 1) Sustaining good habits of 5S practice as work culture among the FFB dealers.
- 2) Carrying out sustainable graphic design (e.g., printing on recycled paper, utilizing low volatile organic compounds ink, and saving energy through energy efficient equipment) for printed materials (e.g., minutes of meeting, and audit report) during *shitsuke* phase.

6.5 Improvement of the Proposed Handling Practices through a Survey

A survey approach is often used to collect information from a large number of respondents that is representative of the population. The results are then used to describe a phenomenon about population. In the research process, the term surveys refers to “anyway of making examinations where the indicators of variables are the answer to questions presented either verbally or in writing” [58]. There are three types of gathering data in survey approach, which include postal survey or mail questionnaires, personal interviews and telephone interviews.

A questionnaire is a set of pre-formulated and written questions to which respondents record their answer [51]. The questionnaire is an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variables. Furthermore, the use of questionnaires is popular in quality management [59] as well as in environmental management [60].

In this study, a pilot test of questionnaire will be conducted on two dealers to obtain useful comments and feedback from them in enhancing, rectifying and improving the questionnaire. Then, a postal survey shall be conducted by mailing a set of questionnaires to FFB dealers, in both English and Bahasa Malaysia languages for clear understanding. The list of the dealers shall be obtained from the MPOB’s database. The main objective of the survey is to identify current status and level of COPs as well as 5S implementation within the FFB dealer sub-sector. A mail questionnaire is regarded as an impersonal survey approach [54], and considered to be the most economical among methods of data collection [61].

Data collected by the questionnaires will be analysed mainly by computer in order to minimise errors and to facilitate handling. Data analysis will be done by using descriptive statistics to measure central tendency, mean and median, dispersion, standard deviation and percentage. In performing this data analysis, the Statistical Package for the Social Sciences (SPSS) software shall be employed. Results from the questionnaire will create the basis for the improvement of the proposed handling practices.

6.6 Enhancement of the Proposed Handling Practices through a Case Study

A case study can be used when attempting to understand complex organisation behaviours. The case study is especially appropriate when trying to answer the “how” and “why” questions in exploration of the research problems. The case study typically involves a small number of cases which are not necessarily represented of the larger population. Data collection for case studies may come from various sources such as interviews, observation, company documents, archival records and physical artefacts [37]. In the context of this study, a case study of three FFB dealers through interviews and observation shall be performed.

Interviews can be unstructured or structured, and can be conducted through various means such as face-to-face communication, telephone or computer online [51]. An

unstructured interview will be conducted by the authors, because the authors do not enter the interview setting with a planned sequence of questions. The objective is to express some issues, so that the study can formulate a good idea of what variables need further in-depth investigation [51]. Whereas, observation is one of the philosophical roots of research work [54]. It is a method to gather data without asking questions to respondents but by observing people in their work environment and recording their behaviour [51].

Further in-depth interviews will be held in this study with selected dealers to gain a richer understanding about how the Malaysian oil palm dealers are using COPs, 5S and other quality and environmental practices. Each interview session will be planned for two to three hours. In addition, several field visits or direct observations will be carried out to each dealer’s ramp.

In this study, parallel mixed analysis shall be employed as data analysis technique. Each of the interview will be transcribed and analysed by using Nvivo8 software. Each individual case study consists of a whole study, in which convergent evidence will be sought regarding the facts and conclusions for each case. Comparison or pattern-matching will be made between the results of qualitative interviews to enhance the interpretation of significant findings of the study [37].

6.7 Validation of the Proposed Handling Practices through the Delphi Technique

There are a number of validation methods available. One of the approaches is seeking inputs from an expert. In the context of this study, the Delphi technique shall be employed to validate the proposed handling practices because this technique does not require all the experts to meet physically (e.g. at the same place and time). The Delphi technique is a broadly recognised method for collecting data from respondents within their field of expertise. The technique is constructed as a group communication process which aims to achieve a merging of opinion on a specific real-world issue [62].

Basically, the Delphi process comprises selection of expert panel, questionnaire design and scoring methods, number of iteration rounds and data analysis. Both qualitative and quantitative data can be used for data analysis [62]. Concerning the number of iteration round, a two or three iterations are often sufficient in most cases [63]. Meanwhile, the approximate size of a Delphi panel is generally under 50 [64], but majority of Delphi studies have used between 15 and 20 respondents [65]. Therefore, a total of 15 experts which comprises at least five policy makers from government agencies, five industrial practitioners and five academicians will be chosen in this study based on their knowledge and experience in quality or environmental management to do the validation process.

7.0 CONCLUSION

Some of the major competitive dimensions that form the competitive position of a firm include quality and environment. Today, these dimensions are putting huge pressure on the competitive advantage of the palm oil industry in Malaysia. The industry, which comprises several interrelated sub-sectors including FFB dealers, plays an important role in the Malaysian economic development. However, mistakes during business operation such as improper practice of post-harvest handling of FFBs by dealers could affect the overall efficiency of the industry and its supply chain. This paper emphasizes on the propositions that provide initial effort related to the improvement of post-harvest handling of FFBs. In the propositions, the concept of 5S

practice is incorporated into COP of TRANSPORT to optimize benefits of the housekeeping system at the level of the FFB dealers toward improving their quality and environmental performance. This stage aims to pursue high quality, low cost and rapid delivery of FFBs in an environmental friendly manner. A survey and case studies shall be employed to enhance the proposed work. The propositions shall be validated through the Delphi technique. It is hoped that the empirical data to be collected could augment the propositions and provide new information toward continual improvement for post-harvest handling and business practices of FFB dealers.

References

- [1] Oil World. 2008. *Oil World Database*. Hamburg: ISTA Mielke GmbH.
- [2] Borrás, S. M., McMichael, P., & Scoones, I. 2010. The Politics of Biofuels, Land and Agrarian Change: Editors Introduction. *The Journal of Peasant Studies*. 37(4): 575–592.
- [3] Basiron, Y. 2007. Palm Oil Production through Sustainable Plantations. *European Journal of Lipid Science and Technology*. 109: 289–295.
- [4] Performance Management and Delivery Unit, Prime Minister's Department, Malaysia (PEMANDU). 2011. *Economic Transformation Program: The Road Map for Malaysia – A Special Report*. Putrajaya, Malaysia: PEMANDU. <http://www.pemandu.gov.my> [26 August 2012].
- [5] Tang, T. S., & Baharuddin, R. 2008. *Code of Good Practice for the Handling, Transport and Storage of Products from the Oil Palm*. Bangi, Malaysia: Malaysian Palm Oil Board (MPOB). <http://www.mpob.gov.my> [26 August 2012].
- [6] Majid Cooke, F., Toh, S., & Vaz, J. 2011. *Community-investor Business Models: Lessons from the Oil Palm Sector in East Malaysia*. London/Rome/ Kota Kinabalu: IIED/ IFAD/ FAO/ Universiti Malaysia Sabah.
- [7] Ab Rahman, A. K., Abdullah, R., Mohd Shariff, F., & Simeh, M. A. 2008. The Malaysian Palm Oil Supply Chain: The Role of the Independent Smallholders. *Oil Palm Industry Economic Journal*. 8(2): 17–27.
- [8] Ab Rahman, A. K., Abdullah, R., Simeh, M. A., & Mohd Shariff, F. 2009. Management of the Malaysian Oil Palm Supply Chain: The Role of FFB Dealers. *Oil Palm Industry Economic Journal*. 9(1): 20–28.
- [9] Malaysian National News Agency (BERNAMA). 2010. *Ministry Investigates Report of Poor Supply of FFB*. Kuala Lumpur: BERNAMA. <http://www.bernama.com> [19 August 2012].
- [10] Handfield, R. B., & Nicols, E. L. 1999. *Introduction to Supply Chain Management*. New Jersey: Prentice-Hall International.
- [11] Ab Rahman, M. N., Khamis, N. K., Mohd Zain, R., Md Deros, B., & Wan Mahmood, W. H. 2010. Implementation of 5S Practices in the Manufacturing Companies: A Case Study. *American Journal of Applied Sciences*. 7(8): 1182–1189.
- [12] Merino, J. 2003. Factors Relating to the Adoption of Quality Management Practices: An Analysis for Spanish Manufacturing Firms. *Total Quality Management & Business Excellence*. 14(1): 25–44.
- [13] Ab Rahman, M. N., & Tannock, J. D. T. 2005. TQM Best Practices: Experiences of Malaysian SMEs. *Total Quality Management*. 16(4): 491–503.
- [14] National Productivity Corporation, Malaysia (NPC). 2007. *Transportation and Logistics (Volume 4)*. Petaling Jaya, Malaysia: NPC. <http://www.mpc.org.my> [10 January 2012].
- [15] Ministry of International Trade and Industry, Malaysia (MITI). 2010. *Weekly Bulletin (Volume 80)*. Kuala Lumpur: MITI. <http://www.miti.gov.my> [10 January 2012].
- [16] U. S. Census Bureau. 2011. *International Database - World Population: 1950-2050*. <http://www.census.gov> [26 August 2012].
- [17] Oil World. 2006. *Oil World Annual 2006*. Hamburg: ISTA Mielke GmbH.
- [18] United Nations Environment Program (UNEP). 2011. *UNEP Year Book 2011: Emerging Issues in Our Global Environment*. Nairobi: UNEP.
- [19] Malaysian Palm Oil Board (MPOB) & American Palm Oil Council (APOC). 2010. *Palm Oil Development and Performance in Malaysia*. Bangi, Malaysia: MPOB. <http://www.mpob.gov.my> [26 August 2012].
- [20] Palm Oil Research Institute of Malaysia (PORIM) & Universiti Putra Malaysia (UPM). 1998. Oil Palm Smallholder Survey in Peninsular Malaysia. In Ab Rahman, A. K., Abdullah, R., Simeh, M. A., & Mohd Shariff, F. Management of the Malaysian Oil Palm Supply Chain: The Role of FFB Dealers. *Oil Palm Industry Economic Journal*. 9(1): 20–28.
- [21] Kuntom, A. 2007. *MPOB Codes of Good Practice*. Bangi, Malaysia: Malaysian Palm Oil Board (MPOB). <http://www.mpob.gov.my> [26 August 2012].
- [22] Wan Abdul Aziz, W. A., & Che Mat, A. 2011. The Effectiveness of Implementation of 5S on Employee Motivation. *Business and Social Sciences Review*. 1(1): 41–52.
- [23] Ho, S. K. M., Cicmil, S., & Fung, C. K. 1995. Japanese 5S Practice and TQM Training. *Training for Quality*. 3(4): 19–24.
- [24] da Silveira, G. J. C. 2006. Effects of Simplicity and Discipline on Operational Flexibility: An Empirical Re-examination of the Rigid Flexibility Model. *Journal of Operations Management*. 24(6): 932–947.
- [25] Hines, P., Holwe, M., & Rich, N. 2004. Learning to Evolve: A Review of Contemporary Lean Thinking. *International Journal of Operations & Production Management*. 24(9/10): 994–1011.
- [26] Hyland, P., Mellor, R., O'Mara, E., & Kondepudi, R. 2000. A Comparison of Australian Firms and Their Use of Continuous Improvement Tools. *The TQM Magazine*. 12(2): 117–124.
- [27] Kobayashi, K., Fisher, R., & Gapp, R. 2008. Business Improvement Strategy or Useful Tool? Analysis of the Application of the 5S Concept in Japan, the UK and the US. *Total Quality Management*. 19(3): 245–262.
- [28] O'hEocha, M. 2000. A Study of the Influence of Culture, Communication, and Employee Attitudes on the Use of 5Ss for Environmental Management at Cooke Brothers Ltd. *The TQM Magazine*. 12(5): 321–330.
- [29] Malaysia Productivity Corporation (MPC). 2010. *Amalan Persekitaran Berkualiti (5S): Buku Panduan Pelaksanaan Langkah Demi Langkah*. Petaling Jaya, Malaysia: MPC.
- [30] Khanna, V. K. 2009. 5S and TQM Status in Indian Organizations. *The TQM Journal*. 21(5): 486–501.
- [31] Global Benchmarking Network (GBN). 2010. *Global Survey on Business Improvement and Benchmarking*. Germany: GBN. <http://www.globalbenchmarking.org> [10 January 2012].
- [32] Ahmad, M. F., Mohd Yusof, S., & Mohd Yusof, N. 2007. Comparative Study of Quality Practices between Japanese and Non-Japanese Based Electrical and Electronics Companies in Malaysia: A Survey. *Jurnal Teknologi*. 47(A): 75–89.
- [33] Yadav, Y., Yadav, G., & Chauhan, S. 2011. Implementation of 5S in Banks. *International Journal of Research in Commerce, Economics & Management*. 1(2): 135–149.
- [34] Bullington, K. E. 2005. Lean Supply Strategies: Applying 5S Tools to Supply Chain Management. *Proceedings of the 90th Annual International Supply Management Conference*.
- [35] Charoenkul, N., Laohakuljit, N., & Uttapap, D. 2002. Air Freshener Gel Production Using Extracted Fragrance from Pandan Leaves. *Research and Development Journal*. 25(2): 185–201.
- [36] Crals, E., & Vereeck, L. 2005. The Affordability of Sustainable Entrepreneurship Certification for SMEs. *International Journal of Sustainable Development and World Ecology*. 12(2): 173–84.
- [37] Yin, R. K. 2003. *Case Study Research: Design and Methods*. 3rd Ed. London: Sage.
- [38] Ablanedo-Rosas, J. H., Alidaee, B., Moreno, J.C. & Urbina, J. 2010. Quality Improvement Supported by the 5S, An Empirical Case Study of Mexican Organisations. *International Journal of Production Research*. 48(23): 7063–7087.
- [39] Stevenson, W. J. 2009. *Operations Management*. 10th Ed. Boston: McGraw-Hill.
- [40] Roy, M. J., Boiral, O. & Paille, P. 2013. Pursuing Quality and Environmental Performance: Initiatives and Supporting Processes. *Business Process Management Journal*. 19(1): 30–53.
- [41] Liker, J. K. & Hoseus, M. 2008. *Toyota Culture: The Heart and Soul of the Toyota Way*. New York: McGraw-Hill.
- [42] Gapp, R., Fisher, R. & Kobayashi, K. 2008. Implementing 5S within a Japanese Context: An Integrated Management System. *Management Decision*. 46(4): 565–579.
- [43] Thomas, A. & Barton, R. 2006. Developing an SME based Six Sigma Strategy. *Journal of Manufacturing Technology Management*. 17(4): 417–434.
- [44] Ansari, A. & Modarress, B. 1997. World-class Strategies for Safety: A Boring Approach. *International Journal of Operations & Production Management*. 17(4): 389–398.
- [45] Bamber, C. J., Sharp, J. M. & Hides, M. T. 2000. Developing Management System towards Integrated Manufacturing: A Case Study Perspective. *Integrated Manufacturing Systems*. 11(7): 454–461.
- [46] Johansson, L. 2006. *Handbook on Green Productivity*. Tokyo: Asian Productivity Organization.
- [47] Gürel, D. A. 2013. A Conceptual Evaluation of 5S Model in Hotels. *African Journal of Business Management*. 7(30): 3035–3042.

- [48] Bryar, P. & Walsh, M. 2002. Facilitating Change–Implementing 5S: An Australian Case Study. *Managerial Auditing Journal*. 17(6): 329–332.
- [49] Ho S. K. M. 1999. 5-S Practice: The First Step towards Total Quality Management. *Total Quality Management*. 10(3): 345–356.
- [50] Moulding, E. 2010. *5S a Visual Vontrol System for the Workplace*. Milton Keynes: AuthorHouse.
- [51] Sekaran, U. 1992. *Research Methods for Business: A Skill Building Approach*. 2nd Ed. USA: John Wiley & Sons.
- [52] Balian, E. S. 1995. *The Graduate Research Guidebook: A Practical Approach to Doctorate/Master Research*. USA: University Press of America.
- [53] Herzog, T. R. 1996. *Research Methods in the Social Sciences*. New Jersey: Prentice Hall.
- [54] Nachmias, C. F. & Nachmias, D. 1992. *Research Methods in the Social Sciences*. 4th Ed. New York: St Martin’s Press.
- [55] Stake, R. E. 1995. *The Art of Case Study Research*. Thousand Oaks: Sage Publications.
- [56] Cohen, L. & Manion, L. 1980. *Research Methods in Education*. London: Croom Helm.
- [57] Amaratunga, D. & Baldry, D. 2001. Case Study Methodology as a Means of Theory Building: Performance Measurement in Facilities Management Organizations. *Work Study*. 50(3): 95–104.
- [58] Walizer, M. H. & Wienir, P. L. 1978. *Research Methods and Analysis: Searching for Relationship*. New York: Harper & Row Publishers.
- [59] Anderson, M. & Sohal, A. S. 1999. A Study of the Relationship between Quality Management Practices and Performance in Small Businesses. *International Journal of Quality & Reliability*. 16(9): 859–877.
- [60] Yacob, P., Aziz, N. S., Makmor, M. F. M. & Zin, A. W. M. 2013. The Policies and Green Practices of Malaysian SMEs. *Global Business and Economics Research Journal*. 2(2): 52–74.
- [61] Moser, C. A. 1967. *Survey Methods in Social Investigation*. London: Heinemann.
- [62] Hsu, C. C. & Sandford, B. A. 2007. The Delphi Technique: Making Sense of Consensus. *Practical Assessment, Research & Evaluation*. 12(10): 1–8.
- [63] Custer, R. L., Scarcella, J. A. & Stewart, B. R. 1999. The Modified Delphi Technique: A Rotational Modification. *Journal of Vocational and Technical Education*. 15(2): 1–10.
- [64] Witkin, B. R. 1984). *Assessing Needs in Educational and Social Programs*. San Francisco: Jossey-Bass Publishers.
- [65] Ludwig, B. 1997. Predicting the Future: Have You Considered Using the Delphi Methodology? *Journal of Extension*. 35(5): 1–4.