

SCOTTISH JOURNAL OF  
ARTS, SOCIAL SCIENCES  
AND  
SCIENTIFIC STUDIES

---

---

VOLUME 17, ISSUE II  
January, 2014

**Articles**

---

<b>Human Resource Management Practices for Employee Retention in Apparel Export Houses in Delhi NCR .....</b>	<b>3</b>
<i>Ms Suruchi Mittar</i> .....	3
<i>Sharmishtha Saini</i> .....	3
<i>Aditi Agarwal</i> .....	3
<b>Giving Students a voice - A Preliminary Study of the Validity of a Ultra Brief Outcome measure for Students: The Learning Rating Scale LRS .....</b>	<b>23</b>
<i>Poul Nissen</i> .....	23
<i>Sebastian Lemire</i> .....	23
<b>Impact of Internet Media Use to Facilitate Learning for Open Junior Secondary School Student .....</b>	<b>34</b>
<i>Nuridin Ibrahim</i> .....	34
<i>Zainudin Bin Hassan</i> .....	34
<b>Linear Measurement Models for Estimation of Corchorus Olitorius Leaf .....</b>	<b>47</b>
<i>Ajayi N. O</i> .....	47
<i>Abajingin D.D.</i> .....	47
<b>Entrepreneurial Strategic Alliances of Small and Medium Enterprises in Smallholders Agro Monoculture Logistic and Supply Chain.....</b>	<b>55</b>
<i>Mohd Amin Ahmad</i> .....	55

<b>Leveraging Environmental Sustainability in West Africa: From Crossroads to Concrete Plans.....</b>	<b>67</b>
<i>Peter Elias</i> .....	67
<i>Olatunji Babatola</i> .....	67
<b>Studying the Drying Parameters of Calcium Based Edible Soap from Sunflower Oil for Ruminants.....</b>	<b>81</b>
<i>Momoh O.R.</i> , .....	81
<i>Oyawoye, M.R.</i> .....	81
<i>Otaru S.M</i> .....	81
<i>Ajinomoh C.S.</i> .....	81
<i>Otuoze H.S.</i> .....	81
<b>The Conflicts of Academic Programme and Fund’s Influence on Athletes’ Performance in Nigeria University Games.....</b>	<b>95</b>
<i>Mayowa Adeyeye, (Ph.D)</i> .....	95
<i>Adeyemo Kehinde, (M.Sc)</i> .....	95
<b>The Ethics of Nobility as World Society in a Global Perspective.....</b>	<b>101</b>
<i>M. Hosnan</i> .....	101
<i>Ufi Saraswati</i> .....	101
<i>Kaharuddin</i> .....	101
<i>Zainuddin Bin Hassan</i> .....	101
<b>Meeting the Challenges of Numerical Representations in Science and Technology: A Case for the Review of Numeral Derivational Morphology of Nigerian Languages</b>	<b>112</b>
<i>Reuben O. Ikotun</i> .....	112

# Human Resource Management Practices for Employee Retention in Apparel Export Houses in Delhi NCR

---

**Ms Suruchi Mittar**

*Associate Professor*

*NIFT-NEW Delhi*

**Sharmishtha Saini**

*National Institute of fashion Technology*

*New Delhi*

*saini.sharmishtha@gmail.com*

**Aditi Agarwal**

*National Institute of fashion Technology*

*New Delhi*

*aditi\_ballet@yahoo.com*

## **Abstract**

**Background:** Profitability of any industry depends on money (Financial inputs), material (Raw material & other store spares inputs), machinery (Technology used and its level of upkeep), man (Employees - Human Resources), systems / procedures and market (Demand and price position).[1] Among all these factors, manpower assumes greater significance. Manpower is the life blood of any industry. Therefore, every effort should be taken on a priority basis to keep this factor for achieving the main objectives of the industry. The textile industry occupies a unique place in our country. It is the second largest employment generator after agriculture. The textile industry being labor-intensive, is a major contribution to the country's economy with its vast potential for creation of employment opportunities in the agricultural and industrial sectors. Business organizations are made up of people and function through people. Textile industries are no exception to this.(Kumar, MarimuthuSelva, Subbiah, A. and Krishnaveni, B.)[2]It is thus essential to apply human resource management in the export sector to retain employees.

**Objectives:** To find the relation between HR practices and employee retention in export houses in Delhi and NCR. The study is focused on middle-level management in export houses with turnover of more than 20 crore INR.

## **Need For Study:**

- Studies of HR practices and their relation with Employee Retention has been limited to retail and export industries.

- Inadequate emphasis given to HRM in apparel export industry.
- No previous studies focusing on middle level management.
- Previous research has been base on industries in the west-in United States of America, Europe and other developed countries.

**Methodology:**

- Factors affecting employee retention were identified by surveying literature.
- Development of questionnaires for Apparel Export Houses based on the above recognized factors.
- Collection of data from export houses based on the questionnaires.
- Comparison of data and analysis.

**Findings and results:** Appraisal, benefits and acknowledgement - 29.17%, Compensation - 11.80 % Training and development - 21.53% Esteem needs- 37.50%

**Conclusion:** The results of this study strongly support the research problem as there is significant relation of employee retention with human resource practices.

Hence, it can be said that the more HR practices are in place, the more the employees remain motivated to work effectively and efficiently, and have lesser intention to leave the organization

**Keywords:** Employee Retention, HRM Practices, Apparel Export Sector, Middle Level Management

## 1. Introduction

India's textiles and clothing industry is one of the mainstays of the national economy. It is also one of the largest contributing sectors of India's exports worldwide. The report of the Working Group constituted by the Planning Commission on boosting India's manufacturing exports during 12th Five Year Plan (2012-17), envisages India's exports of Textiles and Clothing at USD 64.41 billion by the end of March, 2017 (Government of India Ministry of Textiles (International Trade Section)).

The textiles industry accounts for 14% of industrial production, which is 4% of GDP; employs 45 million people and accounts for nearly 11% share of the country's total exports basket. During the year 2012-13(Apr-Jan), Readymade Garments account for almost 39% of the total textiles exports. Apparel and cotton textiles products together contribute nearly 72% of the total textiles exports (Government of India Ministry of Textiles (International Trade Section)).

The total textile exports during 2012-13 (Apr-Jan) (P) were valued at Rs 137619.44 crore as against Rs 129829.30 crore during the corresponding period of financial year 2011-12, registering an increase of 6.00 percent in rupee terms. In US dollar terms, the same was valued at US\$25263.74 million as against US\$27328.06 million during the corresponding period of previous financial year registering a decline of 7.55 percent in US\$ terms (Government of India Ministry of Textiles (International Trade Section)).

Year	Textiles			Clothing		
	World Export	India's Exports	India's %age share in world exports	World Export	India's Exports	India's %age share in world exports
2004	195.0	6.85	3.51	258	6.62	2.57

2005	203.0	7.85	3.90	276	8.29	3.00
2006	218.6	9.33	4.30	311.4	10.20	3.30
2007	241.3	9.81	4.06	347.06	9.93	2.86
2008	253.4	10.45	4.12	364.91	11.50	3.15
2009	211.1	9.12	4.32	315.62	11.45	3.62
2010	251.0	12.87	5.13	351	11	3.13
2011	293.5	15.01	5.13	412.45	14.36	3.48

Source: International Trade Statistics 2012, WTO Secretariat [3]

The latest available data released by WTO Secretariat, the values of top ten exporters of textiles & clothing in the world in calendar year 2012 are given below:-

(US\$ billion)

Textiles(2012)				Clothing (2012)			
Rank	Name of the Country	Value	%age of world share	Rank	Name of the Country	Value	%age of world share
1.	China	94	32.2	1.	China	154	37.3
2.	EU-27	77	26.1	2.	EU-27	116	28.2
3.	India	15	5.1	3.	Hong Kong, China	25	-
4.	United States	14	4.7	4.	Bangladesh	20	4.8
5.	RP Korea	12	4.2	5.	India	14	3.5
6.	Hong Kong, China	11	-	6.	Turkey	14	3.4
7.	Taipei, Chinese	11	3.8	7.	Viet Nam	13	3.2
8.	Turkey	11	3.7	8.	Indonesia	8	2.0
9.	Pakistan	9	3.1	9.	United States	5	1.3
10.	Japan	8	2.7	10.	Mexico	5	1.1
	World Total	268			World Total	372	

Source: International Trade Statistics 2012, WTO Secretariat [4]

### 1.1 Textiles Exports 2012-13

The targets for textiles exports for 2012-13 initially set at USD 38 billion have been revised upwards to USD 40.50 billion, following the Foreign Trade Policy Annual Supplement in June, 2012 (Government of India Ministry of Textiles (International Trade Section)).

#### Export Promotion Measures:

The Government has been continually supporting the textiles exports sector through various provisions of the Foreign Trade Policy and the other policy initiatives to enable the sector to increase market share in the global textiles markets. As per latest exports figures (Principal Commodities) released by the DGC&IS, textiles & clothing worth USD 26.82 billion was exported during 2010-11 and USD 33.31 billion during 2011-12. During April-Oct'12, exports of textiles & clothing were of the order of USD 16.86 billion as against USD 17.95 billion in April-Oct'11, recording a negative growth 6.04% (Government of India Ministry of Textiles (International Trade Section)).

The volatility in the EU market during the calendar year 2012 affected severely India's T&C exports to EU. The EU textiles market witnessed a negative growth of 13% during the calendar year 2012, resulting in a 2.3 billion shortfall of India's T&C exports to EU during the Calendar year 2012

over 2011. Though, it has been established that there is urgent need for a restructuring for domestic textile industry to address the slowdown that is being witnessed during the current financial year and last year (Government of India Ministry of Textiles (International Trade Section)).

India Export Statistics				
Commodity: Textile & Clothing				
Annual Series: 2007-2011, Year To Date: 12/2011 & 12/2012				
Millions United States Dollars				
Partner Country	Calendar Year			%Change
	2010	2011	2012	
World	27188	32642	32845	0.62
United States	4946	5779	5994	3.73
China	2325	2928	3907	33.47
United Arab Emirates	1798	2162	2172	0.46
United Kingdom	1667	2087	2080	-0.36
Germany	1528	1959	1567	-20.02
Bangladesh	1105	1101	1659	50.74
Italy	778	1030	774	-24.84
France	810	1017	823	-19.11
Spain	667	814	732	-10.01
Turkey	667	731	659	-9.89
Netherlands	523	728	626	-14
Belgium	474	615	477	-22.52
Brazil	497	557	544	-2.34
Saudi Arabia	473	540	547	1.33
Sri Lanka	397	502	483	-3.81
Egypt	338	492	493	0.21
Canada	347	431	402	-6.82
Japan	261	397	402	1.29
Denmark	281	381	308	-19.27
Pakistan	657	381	410	7.56

Source: Eurostat [5]

## 1.2 HRM Practices

Ass.Prof.Kiwook Kwon, Prof.JohngseokBae, Prof. John J. Lawler (2010) conducted a study that showed that a bundle of high commitment human resource practices was positively related to the affective organizational commitment of top performers more than that of lower performers. In a research study by Dorien T.A.M. et al. (2012) based on lifespan theories, it was expected and found that the association between development HR practices and well-being (i.e. job satisfaction, organizational commitment and organizational fairness) weakens, and that the associations between maintenance HR practices and well-being, and between development HR practices and employee performance, strengthen with age. In addition, a third bundle of 'job enrichment' HR practices emerged that elicited higher job performance among aging workers.

Elvira Nica et al. (2011) concluded that the organization must ensure a motivational environment for generating loyal employees. Results of the study conducted by B.R. Ananthan and L.N. Sudheendra Rao (2011) revealed that employees recognized total retention strategies, management/organizational strategies, reward and recognition strategies, employee benefit strategies, and employee ideas and suggestion strategies as most important.

Nighat G. Ansari (2011) investigated three dimensions of employees' perceptions, perceptions of fairness, perceptions of effectiveness, and perceptions of support (FES) of HRMPs of their organization and its relation with their Organizational Commitment (OC). McClean et al. (2011) examined the relationship between high-commitment HR practices and firm performance in

professional services firms through the mediator of employee effort. Their study's results show that high-commitment HR practices positively relate to firm performance through employee effort for two employee groups within professional services firms. Further, they found that the relationship between effort and performance is contingent on the value of the employee group to firm competitive advantage, suggesting that companies may only want to expend the effort and resources on building a high-commitment HR system for employee groups that are clearly tied to creating firm competitive advantage. Ceylan (2013) opened the black box of the relationship between HR management and firm performance by examining the causal relationships among a bundle of commitment-based HR practices (i.e. a commitment-based HR system), different types of innovation activities and firm innovation performance. Results show that a commitment-based HR system has a positive effect on process, organizational and marketing innovation activities. Furthermore, a commitment-based HR system mainly affects organizational innovation activities and shows that these innovation activities are the core drivers of process and marketing innovation activities, leading to higher rate of product innovation activities. Subsequently, product innovation activities enhance firm innovation performance, emphasizing their determinant role. Gahan et al. (2012) find a mixed result for the relationships between labor management practices and establishment productivity. While the introduction of a number of HR practices was also associated with significantly higher labor costs, the results indicate a more mixed result for the relationship between these practices and unit labor costs. A study conducted by Innocenti et al. (2012) addresses the issue by examining the role of behavioural integrity in the chain linking human resources (HR) practices to employee attitudes. The results of this study show that managers' perceived behavioral integrity plays two major roles: it promotes a positive relationship between intended and experienced HR practices, and boosts employees' affective commitment and job satisfaction both directly and indirectly. The analysis also reveals an intervening role for experienced HR practices, which mediate the joint impact of intended practices and behavioral integrity on the two employee outcomes.

Stumpf et al. (2010) explored the role of HR practices for individual and organizational success and perceived effectiveness of these HR practices influences employees' perceptions of career success and, to a lesser extent, organizationally rated performance and potential. It is further found that the differences in perceptions of HR practices among national, international, and global companies and among the industries of information technology (IT), manufacturing, and services. Based on soft HRM and self-determination theory, Marescaux et al. (2013) state that autonomy and relatedness satisfaction partially mediate the relationship between HR practices and HRM outcomes. Taking into account talents, interests and expectations within HR practices is associated with higher basic need satisfaction and subsequently HRM outcomes in addition to the presence of practices. Additionally, behavior of the supervisor when administering HR practices can be further explored as a catalyst of basic need satisfaction. Drawing on theories on lifespan development and self-regulation, Kooij et al. (2013) distinguished two bundles of HR practices: development HR practices that help individual workers reach higher levels of functioning (e.g. training), and maintenance HR practices that help individual workers maintain their current levels of functioning in the face of new challenges (e.g. performance appraisal) and found that the association between development HR practices and well-being (i.e. job satisfaction, organizational commitment and organizational fairness) weakens, and that the associations between maintenance HR practices and well-being, and between development HR practices and employee performance, strengthen with age. In addition, a third bundle of 'job enrichment' HR practices emerged that elicited higher job performance among aging workers. In a quantitative research conducted by Khatibi et al. (2012) on Iranian Hospitals it was found that of the main HRM practices (Compensation, Evaluation, and Promotion) compensation had the highest impact. Verma et al. (2012) explored the Relationship between HR Practices and Job Satisfaction and found that showed that in the IT industry, 82% of the HR practices are driven by three dimensions of job satisfaction, namely, information, variety, closure



and pay. A Study of Green HR Practices and Its Effective Implementation in an Organization conducted by Cherian et al (2012) identified how corporations today develop human resource policies for promoting environment management initiatives.

Javed et al. (2012) conducted a study to observe the relationship between three HR Practices i.e. (Training and Development, Rewards, Recognition) and the employee job satisfaction in the public sector organizations of a developing country, Pakistan and found that recognition and training and development are a key source of employee job satisfaction in Public sector organizations of Pakistan but rewards do not have any significant impact upon employee job satisfaction. Findings from a study conducted by Mohlala et al. (2012) on Employee retention within the Information Technology Division of a South African Bank indicate that employee turnover is the main contributor of skills shortages within the studied division. The lack of a retention strategy is making it difficult for leadership to identify crucial skills that must be retained. The article by Dewhurst et al. (2012) focuses on methods multinational companies can use to attract talent in emerging markets. It states increased competition for talent by local companies in emerging markets is making it more difficult to acquire and retain talent and talks about the need for more role models in global leadership roles to persuade highly talented local people to join and stay at their business and comments on the need for global businesses to enhance their brand as an employer.

The research findings of Sohail et al. (2011) in the textile industry prove significant relationship of career path with employee retention.

### **1.3 Employee Retention**

Frank et al. (2004) define retention as “the effort by an employer to keep desirable workers in order to meet business objectives” (Natalie et al., 2011). Retention is the ability to hold onto those employees you want to keep, for longer than your competitors (Johnson, 2000 cited in Madiha. et al., 2009 cited in Hira Fatima, 2011). The retention should be analyzed at more than just a single level the influence of employee retention can arise at multiple levels (Klein et al., 1994; Klein and Kozlowski, 2000; Raudenbush and Bryk, 2002; Yammarino and Dansereau, 2004 cited in Madiha. et al., 2009 cited in Hira Fatima, 2011). Retention is considered as multifaceted component of an organization’s human resource policies. It begins with the hiring of right people and persists with working agendas to keep them involved and devoted to the organization (Freyermuth, 2004 cited in Madiha et al., 2009 cited in Hira Fatima, 2011).

Kehinde et al. (2012) says that in order to achieve job satisfaction among organizations' employees investment in employees training and development and improving working conditions pay dividend in terms of securing employees' job satisfaction. The business environment is dynamic and there is need for organizations to adopt strategies to motivate and equip their staff, so as to ensure their loyalty and be source of complete advantage. Colleen Flaherty (2012) examines firms with tuition reimbursement programs versus firms without one to conclude how employers sponsored general training programs to increase employee retention. Prabhjot Kaur Mahal (2012) established that employees remain in the organization when they feel that they are being valued and their participation in decision making is recognized by the organization. Recognition from managers, team members, peers and customers enhances commitment. Hiroshi Yamamoto (2013) via his research study concludes that perceptions of rewards based on fair appraisal and job security have an effect on retention and moreover, overall perceptions of HRM increased retention. Dr. Nadeem Sohail et al. (2011) in their research study observed that the leading reasons for employees leaving any organization are culture, recognition, environment, policies of the organization and the relationship with company and co-workers. Career path is the most important factor that employees look for, to work in an organization.

Mariolina Longo and Matteo Mura (2011) identified two human resource management practices-communications and alignment-that positively influence intellectual capital and thus, contribute to the employees' job satisfaction and retention. John Sherman (2010) came up with three strategies to help a firm retain its top talent and keep employees happy during financial hardships-Cultivating a communication workplace, signaling through recruitment and promotions and promoting employee empowerment. A study conducted by Gayathri et al. (2012) say that employee retention is a process in which the employees are encouraged to remain with the organization for the maximum period of time or until the completion of the project. Retention is more important than hiring.

Mignonac et al (2013) explains how employees' perceptions of disinterested organisational decrease employee voluntary turnover through enhancing perceptions of organizational support and organizational commitment, and lessening turnover intention. Cianni et al. (2012) discuss a range of retention strategies, including bonuses, promotions, and personal communication from top managers for retaining key personnel during corporate mergers and acquisitions.

Holtbrügge et al. (2010) looks at the two major challenges in human resource management (HRM) in India: personnel recruitment and retention. Their findings suggest that a close relationship exists between using recruitment and retention practices shaped according to the RBV and these two efficiency criteria. The article by BECK et al. (2012) discusses the influence of selection ratio and employee retention on competitive advantage and concludes that investing in the satisfaction of workers is beneficial. Paill& Pascal (2012) conducted a study which shows that employees who have low levels of organizational citizenship behavior (OCB) have higher chances of leaving their employer.

A study conducted by Ya-Anan et al. (2011) examines the effect of leadership on the retention of employees in NGOs. Rehman&Safdar (2012) suggest the implementation of various HR policies to enhance the job performance resultantly improved job satisfaction and lower turnover.

Study by Miah et al. (2012) indicates a significant positive relationship between employee retention with performance appraisal process and recommends that Readymade Garments sector requires fair performance appraisal system to enhance employee's job satisfaction and organizational commitment. It commends that collaboration between employers and employees is essential to build an effective performance appraisal process. Patel et al. (2012) found that employee retention does not mediate the effects of HPWS on perceived labor productivity, but that mediation becomes significant and increases with greater levels of group culture. Fink & Sharon Birkman (2011) states that assessment testing bridges the gap between hiring needs and the job-seeker wants, that personality testing provides job candidates and employers with common language that will neutralize assumptions.

#### **1.4 Relationship between HRM and Employee Retention**

Kehinde et al. (2012) says that in order to achieve job satisfaction among organizations' employees investment in employees training and development and improving working conditions pay dividend in terms of securing employees' job satisfaction. The business environment is dynamic and there is need for organizations to adopt strategies to motivate and equip their staff, so as to ensure their loyalty and be source of complete advantage. Hiroshi Yamamoto (2013) via his research study concludes that perceptions of rewards based on fair appraisal and job security have an effect on retention and moreover, overall perceptions of HRM increased retention. Mariolina Longo and Matteo Mura (2011) identified two human resource management practices-communications and alignment-that positively influence intellectual capital and thus, contribute to the employees' job satisfaction and retention. John Sherman (2010) came up with three strategies to help a firm retain its

top talent and keep employees happy during financial hardships-Cultivating a communication workplace, signaling through recruitment and promotions and promoting employee empowerment.

An article by Daley & Jason (2013) looks at employee retention. How employee loyalty affects customer retention, how cutting costs can have a negative impact on employees and lead to higher turnover, and the value of offering flexible scheduling. Cianni et al. (2012) looks at strategies for retaining key personnel during corporate mergers and acquisitions. The authors discuss a range of retention strategies, including bonuses, promotions, and personal communication from top managers. They discuss whether retention bonuses should be tied to performance and offer suggestions for implementing performance-based rewards. Rehman&Safdar (2012), the recruitment, job satisfaction and job retention policies implied by the public sector of Pakistan are studied. By deep analysis of problems and challenges the study suggests the implementation of various HR policies to enhance the job performance resultantly improved job satisfaction and lower turnover. The paper proposes a conceptual framework linking various psychological factors and strategic HRM perspectives, examining how various strategies adopted by organizations help in recruiting and retaining talented employees.

Study by Miah et al. (2012) investigates the effects of employees' perception of performance appraisal process on organizational commitment, job satisfaction, and employee retention in readymade garments sectors. Results indicate a significant positive relationship between employee retention with performance appraisal process. Conversely, organizational commitment indicates a negative but not significant relationship with performance appraisal process. Study recommends that Readymade Garments sector requires fair performance appraisal system to enhance employee's job satisfaction and organizational commitment. It also asserts employers positive perception to employees regarding the performance appraisal implications. Finally, the study commends that collaboration between employers and employees is essential to build an effective performance appraisal process. Fink & Sharon Birkman (2011) discussed the systematic approach to human resource (HR) hiring and retention. It states that one of the benefits of assessment testing is it bridges the gap between hiring needs and the job-seeker wants. It mentions that personality testing provides job candidates and employers with common language that will neutralize assumptions. It says that employee testing provides a way for companies to find the right kind of employees to retain.

## **2. Factors Affecting Employee Retention**

- High Performance Work Systems
  - group of separate but interconnected human resource (HR) practices – e.g. selection, training, performance appraisal, and compensation
  - Employee attitudes : job satisfaction, organizational commitment, and empowerment.
- Employee loyalty
  - Make your employees marketable.
  - Employee training programs : professional education and occupational training opportunities for staff
  - Disinterested organisational support
  - Allow many paths to promotion.
- Job Satisfaction: Job satisfaction has to do with the way how people feel about their job and its various aspects (Spector, 1997). Positive and favourable attitudes towards the job indicate job satisfaction. Negative and unfavourable attitudes towards the job indicate job

dissatisfaction (Armstrong, 2006). Armstrong, M. (2006). A Handbook of Human Resource Management Practice, Tenth Edition, Kogan Page Publishing, London, p. 264).

Spector (1997) lists three important features of job satisfaction. Organization should treat workers fairly and with respect. The employees' level of job satisfaction will affect the organization's business.

- Organizational Commitment is affected by the following:
  - Personal - Gender, Education, Marital Status, Family responsibilities;
  - Job related - Supervisory Support, co-worker support, access to resources, role clarity; Involvement in Job - Tenure, Status
- Commitment model:
  - Affective Commitment : strongly identifies with the goals of the organization and desires to remain a part of the organization
  - Continuance Commitment : economic costs (such as pension accruals) and social costs (friendship ties with co-workers)
  - Normative Commitment : (obligation)
- Flexible scheduling
  - “A one-size-fits-all approach no longer works and employers are in a position where they must either accommodate the needs of people, or be faced with constant turnover and unhappy employees. Flexible work schedules may do the trick.”  
*Rauenhorst Recruiting Company (2011)*
  - “Good people leave good jobs to take other positions that are more family friendly”  
*John Shaw, Director of Operations and Account Manager, Rauenhorst Recruiting (2011)*
  - Sabbaticals
- Create flexible telecommuting opportunities: Working from home
- Self-monitoring : High self-monitoring reduces effects of surface acting variability on job satisfaction and work withdrawal
- Workplace Culture: Adherence to rules and regulations of the organization, cordial behaviour among colleagues, discussions at workplace
- Reward System : 
  - fair appraisal: Employee's perceived fairness on the basis of his comparison of his own performance with others'
  - Job security
  - Pay for performance
  - Promotions and incentives: Selection is based on contests or tournaments run by the organization or according to the organization's absolute performance standard.
  - Bonuses during an economic crisis
  - Provide cash bonuses for retaining key employees
  - Provide key employees with stock options/equity awards
- Perception of Human Resource Management
  - Gap between actual HR practices and perceived practices has to be covered if the perception is negative.
  - Positive gap to be created to boost HRM image.

- Firm's complementary assets : asset sharing
- Promotion and advancement opportunities : Let key employees know they're essential to the business. Discuss with key employees their future opportunities within the organization
- During mergers : bonuses, promotions, and personal communication from top managers
- Equity compensation : qualified, or incentive, stock options, nonqualified stock options, and restricted stock; compensation that maximizes an employee's after-tax wealth.
- Create an extensive benefit package: Basic remuneration and performance related pay, flexible benefits allowance, voluntary benefits that the employees can get for discounted rates, tax effective benefit packages
- Family-friendly policies: Flex Time, Job sharing(employees sharing a single position, each working a fraction of the time), employee and family health benefits(health and dental insurance),
- Supervisory communications
- Providing tuition reimbursement and other educational opportunities
- Self-monitoring : High self-monitoring reduces effects of surface acting variability on job satisfaction and work withdrawal
- Employee benefit management
- Employer-employee trust
- Managing perceptions of fair treatment : Male vs. Female
- Group culture
- Employee testing
  - Personality testing provide job candidates and employers with common language that will neutralize assumptions.
  - Bridge the gap between hiring needs and the job-seeker wants.
  - Find the right kind of employees to retain .

**We have focussed on factors falling under:-**

- Appraisal, benefits and acknowledgement
- Compensation
- Training and development
- Esteem needs of employees

### **3. Research Framework**

#### **3.1 Appraisal, Benefits & Acknowledgement**

Hiroshi Yamamoto (2013) via his research study concludes that perceptions of rewards based on fair appraisal and job security have an effect on retention. Study by Miah et al. (2012) investigates the effects of employees' perception of performance appraisal process on organizational commitment, job satisfaction, and employee retention in readymade garments sectors. Results indicate a significant positive relationship between employee retention with performance appraisal process. Conversely, organizational commitment indicates a negative but not significant relationship with performance appraisal process. Study recommends that Readymade Garments sector requires fair performance appraisal system to enhance employee's job satisfaction and organizational commitment. It also asserts employers positive perception to employees regarding the performance appraisal implications.

**H1:** Positive employees' perception of the performance appraisal process has a positive relationship with employee retention.

### **3.2 Compensation**

Khatibi et al. (2012) in a quantitative research on Iranian Hospitals found that of the main HRM practices (Compensation, Evaluation, and Promotion) compensation had the highest impact. Results of a study conducted by Verma et al (2012) show that 82% of the HR practices are driven by three dimensions of job satisfaction, namely, information, variety, closure and pay.

**H2:** Effective compensation system has a positive effect on employee retention.

### **3.3 Training and Development**

Javed et al. (2012) in a study conducted to observe the relationship between HR Practices and the employee job satisfaction in the public sector organizations of a developing country, Pakistan, concluded that training and development are a key source of employee job satisfaction in Public sector organizations of Pakistan. In yet another study conducted by Kehinde et al. (2012) the result indicates that in order to achieve job satisfaction among organizations' employees investment in employees training and development and improving working conditions pay dividend in terms of securing employees' job satisfaction. Colleen Flaherty (2012) used administrative data from a large establishment that implemented a tuition reimbursement program by which these employers sponsored general training programs to increase employee retention.

**H3:** Training and Development have a positive effect on Employee Retention.

### **3.4 Esteem Needs**

According to Spector(1997) organization should treat workers fairly and with respect. Prabhjot Kaur Mahal (2012) established that employees remain in the organization when they feel that they are being valued and their participation in decision making is recognized by the organization. Dr. Nadeem Sohail et al. (2011) in their research study observed that the leading reasons for employees leaving any organization are culture, recognition, environment, policies of the organization and the relationship with company and co-workers. John Sherman (2010) stated that for a firm to retain its top talent and keep employees happy during financial hardships Cultivating a communication workplace and promotions and promoting employee empowerment must be heeded.

**H4:** Fulfilment of Esteem need has a positive effect on Employee Retention.

## **4. Methodology:**

The most common method of generating primary data is through survey (Zikmund 1999). According to Zikmund, a survey is a research technique in which information is gathered from a sample of people through a questionnaire.

The questionnaire was developed for the purpose of isolating factors affecting employee retention.

### **4.1 Population and Sample**

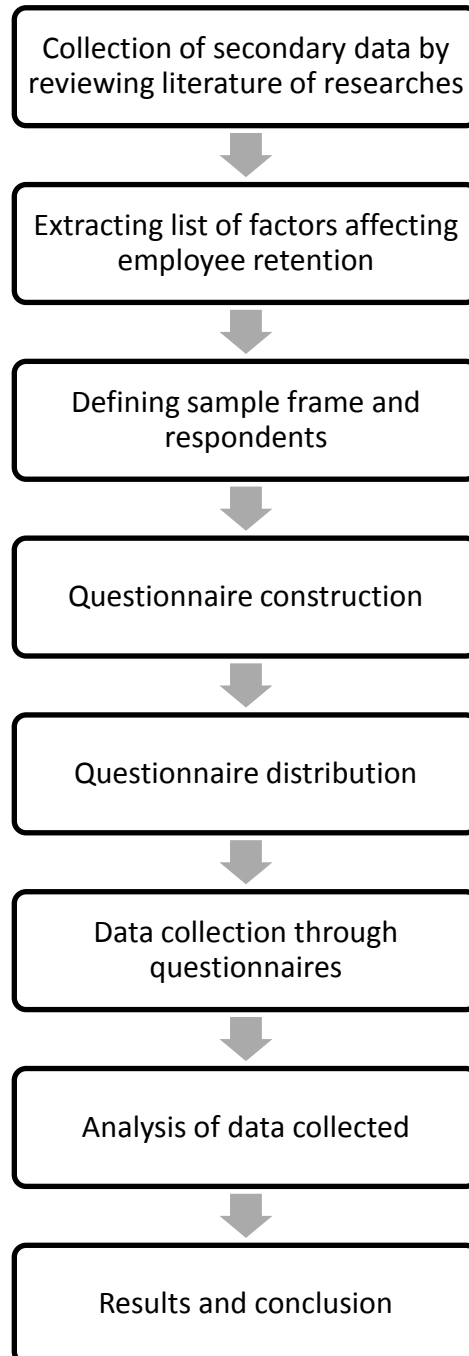
The target population was middle-level managers in ten export houses of turnover of more than 20 crore INR in Delhi and NCR. The questionnaire was administered to employees at random according to their availability in consideration of time constraints and willingness for filling it.

### **4.2 Data Collection**

Self-administered questionnaires were used to obtain information from the employees. The self-administered questionnaires gave the respondents the freedom to fill the questionnaire at leisure. The respondents were asked to indicate their responses on the five point Likert scale, ranging from

1(Strongly Disagree) to 5(Strongly Agree). The respondents were required to choose one option amongst the following- Strongly disagree, disagree, neutral, agree and strongly agree. The questionnaire had a total of 20 questions divided into four segments. Segment A had questions related to 'Appraisal, benefits and acknowledgement'. Segment B gathered information on 'Compensation' while Segment C was on 'Training and Development' and Segment D on 'Esteem Needs'.

#### 4.3 Research Methodology Mapping:



**5. Results and Discussions:**

The study used to percentages to generate a result on the human resource management practices affecting employee retention in export houses and the percentage of their influence.

**5.1 Data Tabulation:**

**Responses to the questionnaire according to the factors:**

**5.1.1. Appraisal, Benefits & Acknowledgement**

	Questions	Strongly Agree	Agree	Neutral/No Opinion	Disagree	Strongly Agree
1	The rewards I receive from my organization are well-deserved according to my performance.	3	3	3	0	1
2	The timing of the rewards is tied to my effective performance.	0	5	4	1	0
3	The organization promotes employees' regularly on the basis of their performance.	3	3	2	0	2
4	My appraisal done by the supervisor is fair(perceived fairness, employee's output compared to others')	3	5	1	0	1
5	The organization has flexible scheduling so my work hours can be adjusted according to my needs	2	1	2	2	3
6	The organization provides health benefits like health insurance/dental insurance.	1	7	0	2	0
7	I will continue working in this organization because of the benefits given by the organization such as health insurance, pension accruals and my friendship ties with my co-workers	1	5	2	1	1

**5.1.2. Compensation**

	Questionss	Strongly Agree	Agree	Neutral/No Opinion	Disagree	Strongly Disagree
8	The organization has a transparent pay system.	3	1	3	2	1
9	The organization provides bonuses during any economic crisis.	2	1	4	2	0
10	The organization shares its complementary assets with the employees.	1	2	2	2	1
11	The organization provides either of these benefits- a) Voluntary benefits that the employee can get for discounted rates.	0	0	10	0	0
12	b) Tax effective benefit packages.	0	7	3	0	0



### 5.1.3. Training and Development

	Questions	Strongly Agree	Agree	Neutral/No Opinion	Disagree	Strongly Disagree
13	With my qualifications, I'm well-equipped to do my job.	6	4	0	0	0
14	The training given to me by the organization has helped me improve the quality of my work.	0	9	1	0	0
15	I will continue working in this organization because it provides me ample opportunities for growth in my career.	1	6	2	0	0
16	I will continue working in the organization- Because of the resources the company has invested in me, I feel obliged to stay.	1	4	2	1	1

### 5.1.4. Esteem Needs

	Questions	Strongly Agree	Agree	Neutral/No Opinion	Disagree	Strongly Disagree
17	My colleagues and seniors treat me with respect.	4	4	2	0	0
18	I'm satisfied with my role in the organization.	4	4	2	0	0
19	There is clear-communication from supervisors about the role I'm expected to play.	2	6	1	1	0
20	I have cordial relations with my colleagues.	6	3	1	0	0
21	My colleagues and I adhere to the rules and regulations of the organization.	4	5	1	0	0
22	Women are treated equally and on par with men.	6	4	0	0	0
23	I won't get a job anywhere else.	0	0	0	1	9
24	I want to study further and my organization provides tuition reimbursement for that	0	2	5	1	2

## 5.2 Preliminary Analysis

**Analysis of the responses indicates the following:**

Factors	No. of Affirmative Responses	Total no. of Questions	% In Field	% of Total
Appraisal, Benefits & Acknowledgement	42	70	60	29.17
Compensation	17	50	34	11.80
Training and Development	31	40	77.5	21.53
Esteem Needs	54	80	67.5	37.50
Total	144	240		100

### 5.3 Hypothesis testing

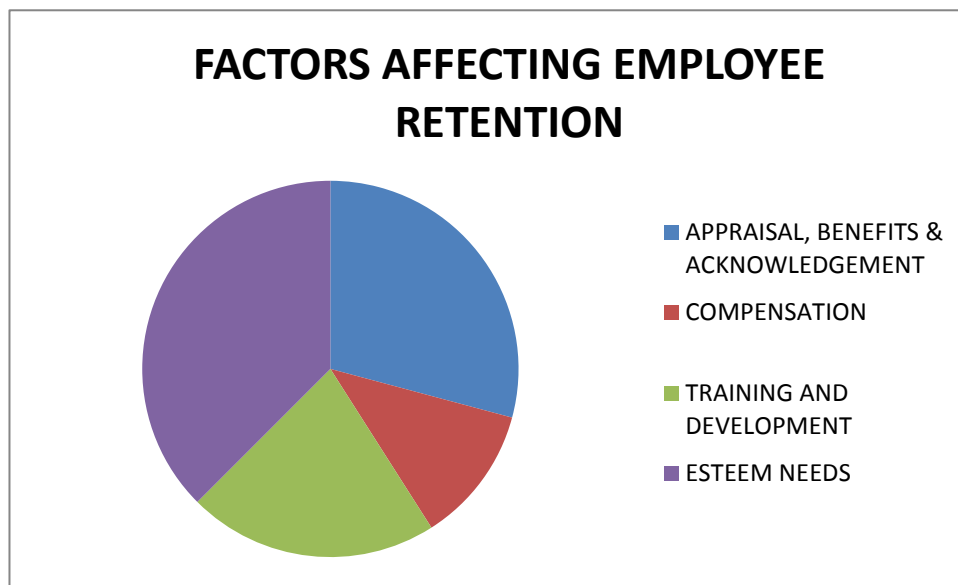
The Hypothesis can be verified by the analysis of the responses to the survey conducted.

The first Hypothesis was about how positive employees' perception of the performance appraisal process has a positive relationship with employee retention. The analysis indicates that 42 of 70 i.e., 60% of the responses were in the affirmative.

The second Hypothesis is about how effective compensation system has a positive effect on employee retention. The analysis indicates 17 of 50 i.e., 34% of the responses were in the affirmative. This indicates that the hypothesis does not hold relevance in the study of the given sample space.

The third Hypothesis states that Training and Development have a positive effect on Employee Retention. As per the analysis 31 of 40 i.e., 77.5% of the responses were in the affirmative. This indicates that this hypothesis strongly holds true.

As per the fourth hypothesis fulfilment of Esteem need has a positive effect on Employee Retention. The analysis states that 54 out of 80 i.e., 67.5% of the responses were in the affirmative. This indicates that the hypothesis has substantial backing and is significantly true.



### 6. Conclusion:

The results of this study strongly support the research problem as there is significant relation of employee retention with human resource practices. The study also proves that the HRM performance link that has been demonstrated in the Western hemisphere also exists in the Indian context. Hence, it can be said that the more HR practices are in place, the more the employees remain motivated to work effectively and efficiently, and have lesser intention to leave the organization. We can also conclude that middle level management in apparel export houses regards training and development as the most important factor that can tie them to an organization. Esteem needs and appraisal follows as secondary contributors while compensation doesn't do much to motivate employees to stay.

### 7. Limitations and Direction for Future Research

This research is subject to usual limitations of survey research. First, the sample size only included ten export houses and more export houses need to be surveyed to gather more reliable data. Secondly the chosen export houses have a turnover of 200 crore INR or more. Further research could be done on export houses of a more inclusive range of turnover to study how human resource

management practices influence employee retention in organizations of less turnover. In addition, the research framework and hypothesis developed for this study could be expanded to include the influence of other HR practices and environmental factors on employee retention.

## References

- Fibre2fashion(Www)<http://www.fibre2fashion.com/industry-article/26/2598/human-resource-management-in-textile-industry-its-impact-on-profitability1.asp> Accessed on: 10 May, 2013
- [http://texmin.nic.in/sector/note\\_on\\_indian\\_textile\\_and\\_clothing\\_exports\\_intl\\_trade\\_section.pdf](http://texmin.nic.in/sector/note_on_indian_textile_and_clothing_exports_intl_trade_section.pdf)(Government of India Ministry of Textiles (International Trade Section))
- American Agent & Broker, 2013EXTREME Makeover. (cover story)
- Ananthan, B.R. and Rao, L. N. S. 2011, 'Dynamics of Retention: Practices and Strategies'.
- Ansari, N. G. 2011, 'Employee Perception of HRM Practices: Impact on Commitment to the Organization Cianni, Gundy, M. and Peter 2012, Putting Performance Back Into Retention'.
- Beck, J., Walmsley, W. and Philip, T. 2012, 'Selection Ratio and Employee Retention as Antecedents of Competitive Advantage'.
- Barberán, M., Beyersdorfer, D., Dessain, V., Ton, Z., Hollanders, N. and 2012, 'Bonuses in bad times'.
- Campbell, B., Granco, M., Franco, A. and Agrawal, R. 2012, 'Who leaves, where to, and why worry? Employee Mobility, entrepreneurship and effects on source firm performance'.
- Ceylan 2013, 'Commitment-based HR practices, different types of innovation activities and firm innovation performance.Flaherty, C. 2012, General Human Capital And Employee Mobility: How Tuition Reimbursement Increases Retention Through Sorting And Participation'.
- Cianni, M and Gundy. P 2012 'Putting performance back into retention'.
- Cherian Jacob and Jolly 2012, 'A Study of Green HR Practices and Its Effective Implementation in the Organization: A Review'.
- Daley, Jason 2013, 'In It For The Long Haul'.
- Dewhurst,M. 2012, 'How multinationals can attract the talent they need'.
- Edwards, M. and Edwards, T. 2013, 'Employees responses to changing aspects of the brand following a multinational acquisition: A longitudinal study'.
- Evans, J., Nagarjan, N. and Schloetzer, J. 2010, 'CEO turnover and Retention LIght: Retaining former CEO on the Board'.
- Fatima, H. 2011 'Does Employee retention affect OrganizationalCompetence?'
- Fink, Sharon, B. 2011, 'From guess to process: A systematic approach to hiring and retention'.
- Gahan, Michelotti, P. and Standing, M. 2012, 'The Diffusion Of HR Practices In Chinese Workplaces And Organizational Outcomes'.
- Gayathri, R., Sivaraman, G. and Kamalambal, R. 2012, 'Employee retention strategies in BPO's-An empirical investigation'.
- Haar, Jarrod M.White, Brook J.2013, 'Corporate entrepreneurship and information technology towards employee retention: a study of New Zealand firms'.
- Holland, P., Pyman, A., Cooper, B. and Teicher, J. 2011, Employee voice and job satisfaction in Australia: The centrality of direct voice.
- Holtbrugge, D., Friedman, C and Puck., J. 2010, 'Recruitment and retention in foreign firms in India: A resource based view'.

- Innocenti, Peluso, L., Pilati, A. and Massimo 2012, 'The Interplay Between HR Practices and Perceived Behavioural Integrity in Determining Positive Employee Outcomes'.
- James, L. and Mathew, L. 2012, 'Employee Retention Strategies: IT Industry '.
- Javed, Rafiq, M., Ahmed, M., Khan, M. and Mustajab 2012, 'Impact of HR Practices on Employee Job Satisfaction in Public Sector Organizations of Pakistan'.
- Jayaraman 2012, 'Succeeding through People - an Overview of How Business Excellence Practices have changed the HR Landscape'
- Kehinde, Oladele, J., Abiodun, Abolaji, J., Osibanjo and Adewale, O. 2012, 'Human Resource Management and Employee Job Satisfaction: Evidence from Nigerian Banking Industry'.
- Khatibi, Asgharian, P., Saleki, R., Seyed, Z., Manafi and Mahmoud 2012, 'The effect of HR practices on Perceived Employee Performance: A study of Iranian hospitals'.
- Kim, S. 2012, 'A Study of Public Sector Organizations with Respect to Recruitment, Job Satisfaction and Retention'.
- Kooij, D., Guest, D. E., Clinton, M., Knight, T., Jansen, P. G. W. and Dikkers, J. S. E. 2012, 'How the impact of HR practices on employee well-being and performance changes with age'.
- Kumar, MarimuthuSelva, Subbiah, A. and Krishnaveni, B., 'A Study of Human Resource Management in Textile Industry' (September 13, 2012). The IUP Journal of Management Research, Vol. XI, No. 1, pp. 48-70, January 2012. Available at SSRN: <http://ssrn.com/abstract=2145811>
- Kwon, K., Bae, J. and Lawler J. J. 2010, 'High Commitment HR Practices and Top Performers'.
- LaVarHarline, N. 2013 'Maximizing employee after Tax wealth for stock options and restricted stock'.
- Longo, M. and Mura, M. 2011, 'The Effect of Intellectual Capital on Employees' Satisfaction and Retention'.
- Mahal, P. K. 2012, 'HR Practices as Determinants of Organizational Commitment and Employee Retention'.
- Marescaux, Winne, E. D., Sels, S. and Luc 2013, 'HR practices and HRM outcomes: the role of basic need satisfaction'.
- McClean, Collins, E. and Christopher J. 2011, 'High-commitment HR practices, employee effort, and firm performance: Investigating the effects of HR practices across employee groups within professional services firms'.
- Miah, D., Haque, M., A. K. M. 2012 'The Effects of Employees' Perceptions of Performance Appraisal Process of Readymade Garments Industries in Bangladesh : An Empirical Study'.
- Mignonac, K. and Richebe, N., 2013 'No strings attached?: How attribution of disinterested support affects employee retention'.
- Mohlala, Goldman, J., Goosen, G. A. and Xenia 2012, 'Employee retention within the Information Technology Division of a South African Bank'.
- Morgan, B., King, W. and B, E. 2012, 'Mothers' psychological contracts: Does supervisor breach explain intention to leave the organization?'

- Nica, E., Lefter, V. and Popescu, G. H. 2011, 'Instilling Confidence in Employees in order to Increase Loyalty and Employee Retention'.
- Pascal, P. 2012, 'Employee retention: exploring the relationship between employee commitment, organisational citizenship behaviour and the decision to leave the organisation'.
- Patel, Pankaj C. and Conklin, B. 2012, 'Perceived Labor Productivity in Small Firms-The Effects of High-Performance Work Systems and Group Culture Through Employee Retention'.
- Ryan, K. 2012, 'Gilt Groupe's CEO on Building a Team of A Players'.
- Schramm, Jennifer 2012, 'Effective HR Practices Drive Profit'.
- Scott, B., Christopher, M. and David, T. 2012, 'Chameleonic or consistent? Multilevel investigation of emotional labor and variability and self-monitoring'.
- Sohail, N., Muneer, A., Tanveer, Y., Tariq, H. 2012, 'Losing Your Best Talent: Employee Retention The Dilemma of Textile Industry a case of Textile Sector'.
- Sherman, J. 2010, 'Three Strategies for Managing through Economic Change'.
- Sohail, N., Muneer, A., Tanveer, Y. and Tariq, H. 2011, 'Losing Your Best Talent: Employee Retention The Dilemma of textile Industry. A Case of Textile Sector'.
- Stumpf, Doh, S. A., Tymon, J. P. and Walter G. 2010, 'The strength of HR practices in India and their effects on employee career success, performance, and potential'.
- Verma, Malhotra, A., Bedi, M. and Monica 2012, 'Exploring the Relationship Between HR Practices and Job Satisfaction Across Selected IT Companies'.
- Vokić and Pološki, N. 2012, 'Controlling Of Human Resource Management Practices In Croatian Firms'.
- Whitcomb, J. 2012, 'Employee Retention'.
- Ya-Anan, M. and Bunchapattanasukda, Chanchai 2011, 'Leadership Effect on the retention of Non-governmental Organizations Employees in Thailand'.
- Yamamoto, H. 2011, 'The relationship between employee benefit management and employee retention'.
- Yamamoto, H. 2013, 'The relationship between employees' perceptions of human resource management and their retention: from the viewpoint of attitudes toward job-specialties'.
- Zachariah, Roopa, M. and T. N. 2012, 'A Study On Employee Retention Factors Influencing It Professionals Of Indian IT Companies And Multinational Companies In India'.
- Zikmund, W. G. (1999). 'Essentials of marketing research'. Orlando: The Dryden Press.

# Giving Students a voice - A Preliminary Study of the Validity of a Ultra Brief Outcome measure for Students: The Learning Rating Scale LRS

---

**Poul Nissen**

*Aarhus University*

**Sebastian Lemire**

*Rambøll Management Consulting*

*Frans Ørsted Andersen, Aarhus University*

*The authors would like to acknowledge professors Mihaly Csikszentmihalyi and Jeanne Nakamura from Claremont Graduate University for their generous support and advice.*

## **Abstract**

Concurrently with increased globalization policy makers and politicians put pressure on schools to improve the quality of education - "to deliver the goods" - in order to ensure better education for more students. In spite of several research findings, which demonstrate a robust connection between (1) a positive alliance between teacher and students, and (2) whether the teachers' way of teaching (3) facilitate the learning processes of the students, and (4) high expectation of the students, are of crucial importance for the learning process, paradoxically no outcome-measures have been developed as a specific tool for the teacher to use on a day-to-day basis. Feedback from the students to the teacher is according to several studies the single most important factor for whether learning takes place or not. This article describes the development and validation of an ultra brief, easy-to-use measurement instrument, the Learning Rating Scale (LRS), which measures the degree to which learning processes are facilitated in the classroom. The instrument's psychometric properties are examined and reported. Informed by practical experience with the LRS, its feasibility in class room settings is also considered and implications for further use of the instrument are presented.

**Keywords:** Learning, teacher-student alliance, analog rating scale, measurement instrument, validation.

## Introduction

The role and importance of teaching method in promoting learning has for many years dominated discourse on student learning. Likewise research focus has primarily been placed on teaching methods with the aim of identifying the best possible method of promoting learning. Recent research, however, demonstrates that a positive alliance between teacher and student correlates with academic achievement (Crosnoe, Johnson, & Elder, 2004) as well as social behavior at school (Hamre & Pianta, 2005). As such, students who experience a positive teacher-student relationship, as compared to those who do not, achieve better grades, show higher levels of classroom motivation and participation, and display higher levels of comfort, enjoyment, and acceptance by their peers (Crosnoe, et al., 2004; Hamre & Pianta, 2005, Hughes & Kwok, 2006). Moreover, the documented impact of positive student-teacher alliances persists across different cultures and gender (Hughes & Kwok, 2006).

Research studies also document that positive expectations towards the students have a marked impact on intellectual performance among students (Rosenthal & Jacobson, 1977; Rosenthal, 2003; McKinsey & Company, 2007).

Finally, the teachers' approach to teaching, the teacher's expectations to the students, as well as the social context are of crucial importance of whether the learning process of the students is "triggered" or not and where the main outcome arrives from (Bandura, 1997; Deci & Ryan, 2000; Deci, Ryan, & Koestner, 1999).

Hence other factors than "merely" the way of instruction or method of teaching appear to be of crucial importance for facilitating the learning process. By analyzing several studies Hattie (2007) has found that the most powerful influences on learning and achievement is feedback, in the sense that the teacher receives feedback from the perspective of the students, and the student from the teacher. In accordance to Hattie the most powerful feature was the creation of situations in the classroom for the teachers to receive feedback about their teaching and the ripple effect back to the students (2009).

However there is to our knowledge no specific tool for teachers to use on a day to day basis emphasizing immediate feedback and feasibility in the class room. Such an instrument would be relevant for researchers, school leaders and teachers – to be used easily and efficiently on a day-to-day basis. The Learning Rating Scale (LRS) aims to address this gap by providing an easy to use and quick in-the-class room way of measuring extent to which student learning takes place in the class room.

The Learning Rating Scale (LRS) has been developed in order to measure the connections between the psychological factors that promote learning. The development of the LRS – in format inspired by the work of Duncan and Miller (2003) - is based on research findings showing that a positive learning alliance between teacher and students is strongly influenced by (1) the personal well being of the student in the class room (Crosnoe, et al., 2004; Hamre & Pianta, 2001; Hughes & Kwok, 2006; Rathunde, 2003; Rathunde & Csikszentmihalyi, 2005), (2) the teaching style, especially (3) whether the student can use the way the teacher teaches in her or his personal learning development (Bandura, 1997; Deci & Ryan, 2000; Deci, et al., 1999; Stern, 1985), and (4) positive expectations towards the student, have powerful influence on the learning process (Rosenthal, 2003).



## LRS Learning Rating Scale

Name \_\_\_\_\_ Age \_\_\_\_\_ Date \_\_\_\_\_ No. \_\_\_\_\_

Class \_\_\_\_\_ School \_\_\_\_\_

How do you think you are doing in school at the moment? Please put a mark on the lines to let us know.

**In class**

I don't learn much in school ☹️ |-----| 😊 I learn a lot in school

**Socially**

I don't get along well in school ☹️ |-----| 😊 I get along well in school

**Method**

I don't like the way teacher teaches ☹️ |-----| 😊 I like the way teacher teaches

**Expectation**

Not much is expected of me in school ☹️ |-----| 😊 Much is expected of me in school

Copyright © 2012 Dr. Poul Nissen

Figure 1. LRS – The Learning Rating Scale.

These theoretical ideas are in the LRS transformed into a four-item visual analogue instrument, consisting of four 10-cm visual analog rating scales with instructions to place a hash mark on a line with negative responses depicted on the left and positive responses indicated on the right (see figure 1). First a *learning gain scale* gauges the experienced learning gain in the lesson on a continuum from “I don’t learn a lot in school” to “I learn a lot in school”. Second is a *social scale*, that rates the lesson on a continuum from “I don’t get along well in school” to “I get along well in school”. Third is a *method match scale* requiring the student to rate the lesson on a continuum from “I don’t like the way teacher teaches” to “I like the way teacher teaches”. Finally a fourth *expectation scale* gauges the student experience of expectations on a continuum from “Not much is expected of me in school” to “Much is expected of me in school”.

The objectives behind the rating scale are to enable the teacher to measure whether the intrinsic learning process is taking place in the class room and in effect to support evidence-informed teaching. The intension is not to use the LRS in connection with every lesson but to use the LRS when the teacher wants to know, whether the instruction works or not.

## Method

### Research design

The LRS was used among other research instruments in a nation-wide evaluation of experiments with teacher assistants in Danish public schools (Rambøll, 2011). The evaluation, commissioned by the Agency for Quality Assurance and Evaluation under the Danish Ministry of

Education, was carried out in the school year 2010-11. The evaluation involved an interrupted time series design where the LRS was administered before, during and towards the end of the teacher assistant experiment.

The LRS was administered at 24 randomly selected schools. First, an information package containing an introduction to the LRS, a guide to the administration of the instrument and 60 pre-printed copies of the LRS was sent to the schools. Second, a series of follow-up phone calls were made with school administrators at all of the participating schools to accommodate questions relating to the subsequent administration of the LRS. Third, the LRS forms were administered by the teachers in their respective classrooms. The teachers administered the LRS at the end of the class. Teachers were asked to read a brief introductory text about the LRS and how to fill out the four items on the LRS. Fourth and final, the completed LRS forms were returned to Rambøll Management Consulting by the school administrator.

The LRS was subsequently scored by simply summing the marks made by the student measured by one decimal place on each of the four lines. Each of the four lines was scored from 0-10 points, awarding one point per centimeter. As a result, the overall *learning alliance score* ranges from 0-40 points.

### Sampling Procedures

A random sample of 24 public schools carrying out experiments with teaching assistants took part in the time series study evaluation. Neither schools nor participants were compensated for their participation. The LRS was administered at all of these schools in classes where the teaching assistants had been consistently present throughout the school year. As such, the class rooms and in effect the pupils were not randomly selected for participation. The results of the validation study only pertain to pupils with the specified participant characteristics presented in the following section.

### Participant characteristics

The population in the validation study consists of 901 pupils from 24 public schools in Denmark. Participants were unevenly dispersed across class levels with the majority of pupils in 2<sup>nd</sup>-5<sup>th</sup> grade, as shown in Table 1. The participants ranged in age ( $M = 9.3$  years, age-range 5-16 years) and males constituted a majority of the population (47 % female, 53 % male).

**Table 1. Class level**

Class level	Frequency	Percent
0	43	4.8
1	63	7.0
2	158	17.5
3	274	30.4
4	122	13.5
5	121	13.4
6	61	6.8
7	41	4.6
8	15	1.7
9	3	.3
Total	901	100.0

### Validation strategy

A measurement tool is considered to be valid if it measures what it purports to measure (Allen and Yen, 1979). Validity can be assessed in several ways, depending on the measurement tool and its intended use. In our effort to validate the LRS, we awarded particular attention to both content and construct validity. Let's consider these in turn.

*Content validity* (also known as logical validity) is an advanced form of the oft-cited face validity and constitutes an important and very often useful first step in developing new and valid measurement tools. Content validity involves the "careful definition of the domain of behaviors to be measured by a test and the logical design of items to cover all the important areas of this domain" (Allen and Yen, 1979). In our effort to develop a valid measure of student learning, content validity was enhanced by informing the structure and content of the LRS by existing evidence on factors promoting student learning.

First, the development of our measurement was informed by existing knowledge, theories and studies on student learning. The first item *learning* measures to which degree the intrinsic learning process is facilitated and is based on a vast body of literature from former theorists like Dewey, Piaget, Rogers, and Vygotsky, whose collective work emphasized that students actively construct their own learning. These early ideas are further elaborated by modern theories like Deci's self-determination theory (Deci, 1976, 1980; Deci & Ryan, 2000; Deci, et al., 1999) that emphasizes the importance of self-motivation or intrinsic motivation in opposition to extrinsic motivation so the learning process can be seen as a form of personal growth.

The second item *Social* relates to the importance that social climate has on student learning. Social climate involves the teacher-student relationship, the student-student relationship and as a whole the total social setting of the school. If the students experience social difficulties, their energy is taken away from the learning process (Crosnoe, et al., 2004; Hamre & Pianta, 2001, 2005; Hughes & Kwok, 2006; Rathunde, 2003; Rathunde & Csikszentmihalyi, 2005).

Item three, *Method*, focuses on the kind of instruction the students are "exposed" to in the classroom (Joyce, 2009), while the fourth item *expectation* reflects the importance of positive expectations towards the students in relation to intellectual performance (Rosenthal & Jacobson, 1977; Rosenthal, 2003). See fig. 2.

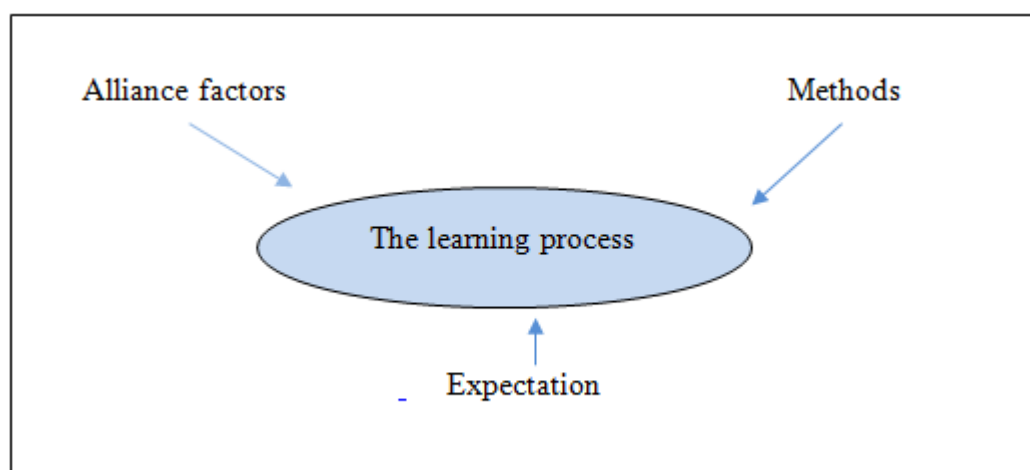


Fig. 2. The learning process is influenced by alliance factors, teaching methods, and expectation to the student

By developing our model informed by existing literature on student learning and systematically translating our model into a corresponding set of items, the content validity of the LRS was enhanced. In the end, however, we are well aware that content validity, being based on a set of systematic, yet subjective judgments, is more vulnerable to error than other types of validity. Hence the content validity of our measurement tool did not – in and of itself – constitute a sufficient justification for its use. With this in mind we also examined the construct validity of our model.

*Construct validity* expresses the degree to which a measurement tool measures the theoretical construct that it was designed to measure. Establishing construct validity involves three successive steps:

- Based on current theory regarding the trait being measured, the developer makes predictions about how the scores should behave in various situations.
- These predictions are then tested.
- If the predictions are supported by the data, construct validity is enhanced.

In our validation of the LRS, we made two central predictions about how the scores would behave:

First, we expected that the learning, social, method and expectation dimensions of the LRS individually constitute relevant factors for the learning alliance between a teacher and a pupil. As such, we examined the following:

- A. If the four dimensions measure the same underlying dimension then we would expect them to hold a moderate to strong positive correlation with each other. In contrast, if there are any variables that fail to correlate with any other variables, they should be excluded from the model. We examined this prediction by looking at the inter-correlation between the four variables.
- B. If each of the four dimensions is independently relevant then the dimensions will not correlate too highly, as it becomes impossible to determine the unique contribution of the individual dimensions to the overall learning alliance score. The too high or perfect correlation would be indicated by multicollinearity between the dimensions. We examined this prediction by looking at the determinant of the correlation-matrix.

Second, we predicted that the *learning* and *social* dimensions of the LRS would present the strongest relationship with the overall learning alliance score. We tested this prediction by carrying out a multiple regression analysis with the four dimensions as explanatory variables (i.e. independent variables) of the overall learning alliance score (dependent variable).

The results of the construct validity tests are presented in what follows.

## Results

### Statistics and data analysis<sup>1</sup>

The first step in our validation analyses was to examine the correlation between the four dimensions of the LRS. Table 2 presents a correlation matrix. The purpose of the correlation matrix is to display the strength and direction of the relations between the four dimensions in the LRS. As the table indicates, there are moderate positive relations between the learning, social and method dimensions of the LRS (correlation coefficients ranging from  $r = .428$  to  $r = .504$ ,  $p < .001$ ). In comparison, the expectation dimension has slightly weaker positive relations with all the other

---

<sup>1</sup> All the statistical analyses were carried out in SPSS 17.

dimensions (correlation coefficients ranging from  $r = .330$  to  $r = .377$ ,  $p < .001$ ). Moreover, there appears to be no multicollinearity between the dimensions, indicating that each of the dimensions contribute individually (determinant of 0.449 is greater than the necessary value of 0.00001).

**Table 2. Correlation matrix**

Dimension	Learning	Social	Method	Expectation
Learning		.445	.504	.377
Social			.428	.330
Method				.345
Expectation				

All correlations are significant at  $p < 0.001$ , Determinant = .449.

The second step in our validation analysis involved carrying out a multiple regression analysis to determine the relative contribution to the overall learning alliance score by each of the four dimensions. The purpose of multiple regression analysis is to examine how the value of the dependent variable (e.g. the overall learning alliance score) changes when any one of the independent variables (e.g. social) is varied, while the other independent variables are held fixed (e.g. learning, method, and expectation). We carried out a hierarchical multiple regression analysis by stepwise entering each of the dimensions in the following order: learning, social, method and experience. Table 3 presents the model summary for each of the four steps in our analysis. The value of R Square indicates how much variability in the overall learning alliance score is accounted for by the dimensions. As the table indicates the *learning* dimension accounts for 58.1 % of the variation in the overall learning alliance score when holding the other dimensions constant. Moreover, the *learning* and *social* dimension of our model collectively accounts for 77.7 % of the variation of the overall learning alliance score, which means that the addition of the social dimension accounts for an additional 19.7 %. Finally, if we add either the *method* or the *expectation* dimension to our model the model accounts for an additional 11% of the variation.

**Table 3. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1. Learning	.762	<b>.581</b>	.580	4.3569	<b>.581</b>	1244.970	1	899	.000
2. Learning/social	.882	<b>.777</b>	.777	3.1773	<b>.197</b>	792.511	1	898	.000
3. Learning/social/Method	.943	<b>.890</b>	.890	2.2334	<b>.113</b>	920.464	1	897	.000
4. All dimensions	1.000	<b>1.000</b>	1.000	.0000	<b>.110</b>	8.872E16	1	896	.000

Dependent variable is overall learning alliance score

In summary, the results of our analyses appear to provide positive support for our model while at the same time suggesting further revisions and research needs. Three of the four dimensions, *learning*, *social* and *method*, display positive and moderately strong relations, indicating that they are measuring the same underlying construct. The *expectation* dimension, though, indicates generally low correlation with the other dimensions, suggesting that it might be excluded from the model. The

two dimensions *learning* and *social* present the strongest relationship and serve as the best predictors of the overall learning score.

### **Discussion**

In this article we have presented the results of an initial validation study of the LRS, a newly developed measurement instrument that measures psychological factors promoting student learning. Overall the LRS performs well; though, our findings also suggest further refinement and practical experience is called for. Three of the four dimensions, *learning*, *social* and *method*, display positive and moderately strong relations, indicating that they are measuring the same underlying construct. The *expectation* dimension, though, indicates generally low correlation with the other dimensions, suggesting that it might be excluded from the model. The two dimensions *learning* and *social relation* present the strongest relationship and serve as the best predictors of the overall learning score.

The current effort is a first step in the development and validation of the LRS. As such, we feel that several new researches needs arise from our efforts. These relate to both the further validation of the instrument as well as the practical use of the instrument.

### **Further validation needs**

In enhancing the validity of the LRS further work on the criterion-related validity of the instrument would be in place. This could involve the parallel administration of the LRS and validated instruments measuring student learning. Alternatively, the LRS could be administered in combination with systematic teacher appraisals of students' ability levels. The validation effort would moreover serve to establish cut-off scores or intervals for determining students with high and low learning gain. This would also further the practical use of the instrument among teachers.

Another area in need of further validation study is the expectation dimension of the LRS. The low correlations between this dimension and the other dimensions in the model could be the product of a theory error (the dimension is not relevant and hence should be included in the LRS) or an implementation error (the phrasing of the item is incorrect and hence should be revised). In clarifying the type of error in the expectation dimension, the LRS scores on the expectation dimension could cross validated with other validated measurement instrument of teacher-student expectation (for example the motivational questionnaire by Ryan and Deci, 2000). The aim of this effort would be to determine the type of error underlying the low performance of the dimension and in effect whether the dimension should be revised or eliminated from the LRS.

Finally, we find it important to examine the consequential validity of the LRS. Consequential validity has to do with the extent to which any negative consequences or implications arise from the practical application of the instrument and the degree to which these negative outcomes stem from flaws in the measurement instrument. The focus on utilization of the LRS in class room settings makes the examination of consequential validity particularly compelling. The practical approach to explore this type of validity would involve a more qualitative yet systematic analysis of the use and consequences of the LRS in various school settings.

### **Practical significance of findings**

One strand worth pursuing in the practical development of the LRS would be the further use and practical implementation of the instrument in varied school settings. The instrument is not developed on the basis of specific teaching methods or approaches and the LRS is in its practical application method-neutral. As such, it can be applied in combination with a broad range of teaching methods and approaches. Likewise it would be interesting to pursue practical experiences with the LRS in both traditional settings with "one teacher, one subject, one room and one class" and more experimental settings with project-oriented learning environments. The systematic application of the

LRS in different settings could also involve the use of LRS in combination with various instructional strategies or methods, subjects and curriculums or even the administration of the LRS by different types of staff (e.g. the use of teaching assistants or teaching aids), with different types of students (e.g. socio-economic background, grade levels, learning styles etc.), or in relation to different ways of organizing the class room.

Another area of interest could be the use of the LRS in working with individual or groups of students on academic progression and performance. How do teachers use the LRS scores in dialogues with students and/or parents? How do teachers use the LRS in dialogues about student progress with other teachers? How if at all can the LRS be used in developing individual student plans for academic improvement? These are some of the questions that could be interesting to pursue in further research efforts.

Finally, we find it worthwhile to examine the potential application and use of the LRS in furthering teacher reflections on various teaching methods. How if at all can the use of the LRS promote more small scale, yet systematic, development and testing of various instructional strategies and methods? How can the LRS play a beneficial role in teachers developing their practice? This potential role of the LRS is particularly compelling in the context of promoting more small scale evidence-informed practices in the class room.

It is our hope that our discussion of the initial results and potential roles of the LRS will promote further interest and systematic application of the LRS among teachers and researchers.

## References

- Allen, M. J., & Yen, W. M. (1979). *Introduction to Measurement Theory*. Long Grove: Waveland Press inc.
- Bandura, A. (1997). *Self-efficacy - The Exercise of Control*. New York: W. H. Freeman and Company.
- Crosnoe, R., Johnson, M. K., & Elder, G. (2004). Intergenerational Bonding in School: The Behavioral and Contextual Correlates of Student-Teacher Relationships. *Sociology of Education*, 77(1), 22.
- Deci, E. L. (1976). *Intrinsic Motivation*. New York: Plenum Press.
- Deci, E. L. (1980). *The psychology of Self-Determination*. Lexington, Massachusetts: Lexington Books.
- Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, 11(4), 227-268.
- Deci, E. L., Ryan, R. M., & Koestner, R. (1999). A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation. *Psychological Bulletin*, 125(6), 627-668.
- Duncan, B. L., Miller, S. D., Sparks, J. A., Claud, D. A., Reynolds, L. R., Brown, J., et al. (2003). The Session Rating Scale: Preliminary Psychometric Properties of a "Working" Alliance measure. *Journal of Brief Therapy*, 3(1), 3-21.
- Hamre, B. K., & Pianta, R. C. (2001). Early teacher-Child Relationships and the Trajectory of Children's School Outcomes through Eighth Grade. *Child Development*, 72(2), 625-638.
- Hamre, B. K., & Pianta, R. C. (2005). Can Instructional and Emotional Support in the First-Grade Classroom Make a Difference for Children at Risk of School failure? *Child Development*, 76(5), 949-967.
- Hattie, J. (2009). *Visible Learning - A synthesis of over 800 meta-analyses relating to achievement*. London & New York: Routledge.
- Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, 77(1), 81-112.
- Hughes, J. N., & Kwok, O. (2006). Classroom engagement mediates the effect of teacher-student support on elementary students' peer acceptance: A prospective analysis. *Journal of School Psychology*, 43(6), 465-480.
- Joyce, B. (2009). *Models of teaching*. US: Pearson Education.
- MaKinsey & Company (2007). *How the world's best-performing school systems come out on top*.
- Murphy, J. J., & Duncan, B. L. (2007). *Brief Intervention for School Problems - Outcome-Informed Strategies*. New York: The Guilford Press.
- Rambøll (2011). *Evaluering af undervisningsassistenter*. [Evaluation of teacher's aids]. Copenhagen: Rambøll.
- Rathunde, K. (2003). A Comparison of Montessori and Traditional Middle Schools: Motivation, Quality of Experience, and Social Context. *The NAMTA Journal*, 28(3), 12-53.



- Rathunde, K., & Csikszentmihalyi, M. (2005). Middle School Students' motivation and Quality of Experience: A Comparison of Montessori and Traditional School Environments. *American Journal of Education*, 111(3), 341-371.
- Ryan, R. & Deci, E. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*. Volume 55, Number 1, 68-78.
- Rosenthal, R. (2003). Covert Communication in Laboratories, Classrooms, and the Truly Real World. *Psychological Science*, 12(5), 151-155.
- Rosenthal, R., & Jacobson, L. (1977). *Pygmalion in the classroom: Teacher expectation and pupils' intellectual development*. New York: Holt, Rinehart & Winston.
- Stern, D. N. (1985). *The Interpersonal world of the infant*. New York: Basic Books.

# Impact of Internet Media Use to Facilitate Learning for Open Junior Secondary School Student

---

**Nurdin Ibrahim**

Email: [nurdin1349@yahoo.com](mailto:nurdin1349@yahoo.com)

*Educational Technology Devition, Jakarta State University-Indonesia*

**Zainudin Bin Hassan**

Email: [p-zainudin@utm.my](mailto:p-zainudin@utm.my)

*Faculty of Education, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia*

## Abstract

The objectives of this research is to determine the impact of internet media use in facilitating learning for open junior secondary school student. This research is a quantitative descriptive research using a survey method. The primary data was obtained through questionnaire and forum group discation. The research sample consists of 157 students which is taken from class IX at Nort Jakarta and Kandang Haur West Java Open Junior Secondary School (OJSS). This research was conducted during September to October 2012. The results show that: 1. Almost all of the respondents, thus about 81.90% agree, 12.53% no comment and 7.58% not agree on the assertion that internet media is a technology. 2. More than a half of the respondents mounting to about 72.83% agreed that internet media is a tutor or a teacher even though 22.72% have no comment and 4.45% did not agree. 3. However, on the issue that said internet media is a socializing agent, the result shows that 47.88% agree, 35.67% no comment and 16.45% not agree. 4. The assertion that said internet media is a motivator for learning, had the responses of the students in this manner; 48.39% agree, 33.01% no comment and 18.68% not agree. 5. More than a half of the respondents thus, 67.31% agree that internet media is a tool for problem solving while 26.43% have no comment and 6.26% not agreed. Finally, the research concluded that internet media can be able to: 1. Assist students in understanding the material for learning easily and conclusively. 2. Enrich, clarify and simplify learning. 3. Increase interest and diligently find information related to learning. 4. Encourage motivation spirit and add initiatives in learning and 5. Help to solve learning problems, reduce the difficulty and assist to complete tasks in the study.

**Key word:** Internet, media, educational technology, media function

## Introduction

In the current era of globalization, there had been a rapid development of information technology especially the internet in various countries such as Indonesia. Presently, Internet is a medium that integrates all existing conventional media, and also serves the global world means to obtain any required information including the exchange of data and information. Application and development of the internet in the world has entered pervasive education and learning, as well as in Indonesia. Internet in education is often used as a medium of teaching and learning. Internet can facilitate and enhance student learning. On that basis since 2008/2009, Ministry of National Education in Indonesia has pioneered the use of the Internet to facilitate student learning Open Junior Secondary School (OJSS). OJSS is one model of education system practically implement theoretical and concepts Educational Technology. Definition of educational technology set by the Association for Education Communications and Technology (AECT), namely "education technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing processes and resource appropriate technology" (Januszewski and Molende 2008, p.1). Through the use and management of appropriate technology such as the internet media which allows every student be able to improve the self-learning process (individual learning) or face to face at OJSS. Utilizing the internet media will facilitate students in accessing a variety of information science, school assignments sent by email, and so on. In addition to students, teachers also can facilitate in implementing the learning process. Use of Internet media is essential for the attainment of learning on OJSS, considering this system prioritizes students to learn individually in four (4) days and learn face-to-face for two (2) days a week.

Internet is a very large computer network that consists of small networks which are interconnected and reach out to the whole world or an internet is often called the Interconnected Network (Deanie F., Charles H, Johnson, C. and Gerald F, 1999; Oetomo, 2002; & Rakhmawati, 2009). In internet connections, the computers stand-alone or independently but are connected to each other.

Furthermore, Gagne, (1970) stated that, "The media are various components in learners' environment which support the learners learning". Media has many definitions ranging from a special form of communication such as printing and nonprinting form, either by design or by utilitatio. Media is part of the learning resources that exist outside of the students and be considered to influence the learning process (Percival and Ellington, 1998; Edgar Dale, 1969).

Basically, there are three forms of learning systems through the Internet that can be considered as a basis for the development of a learning system by utilizing Internet, namely: (1) Web Course, (2) Web Centric Course, and (3) Web Enhanced Course (Haughey, 1998, h.72).

According to RE Clark, there are five function utilization of media (Internet) learning. Clark argued that "the condition under media can be made to influence learning are being optimally Explored from at least five perspective : (a) media as technology, (b) media as a tutor or teacher, (c) media as Socializing agents, (d) media as motivators for learning, and (e) media as problem solving" (Plomp and Ely, 1996:69 ).

First, in media as technology, the utilization or resource is done in order to make the learning resources can be used as a source to obtain information in general is done. The use of the Internet for learning purposes, in which all learning materials, discussion, consultation, assignments, exercises and exams delivered entirely over the Internet. Students are entirely separate, but relations or communications between learners can be done with the teacher at any time. Communication is mostly done on an on-going basis. This course web form does not require any face-to-face activities, either for learning or evaluation and examination, because all the learning process is done entirely through the use of internet facilities like e-mail, chat rooms, bulletin boards and online conferencing.

Furthermore Spector (2012:5) defines technology is the application of knowledge for a practical purpose.

Secondly, media as tutor or teacher means the use of learning resources such as the Internet which is based on the premise that learning resources be used to provide additional resources, information and enrich the learning materials in accordance with all the science disciplines studied in schools. Students can learn independently achieve material resources in order to enrich the learning process. Also the foundation for the use of media (internet) as a communication tutor education, namely, the deliberate and intentional act of communicating content to students with the assumption that they will learn something "from" these communications. For example, the animation is a form of media that can be delivered to students through a variety of technologies such as the World Wide Web. In web-based science, such as the movement of moon around the earth animation may be shown to the students through visualization and animation are supported with audio and text.

Thirdly, is the internet media socializing agent. With the utilization of instructional media is expected to influence the attitudes or behaviour. Media can be used to change the behaviour of the users. With the web students more interested to want to learn, be happy to learn and have a desire to learn.

Fourth is the media as a motivator for learning. In this case the learning resources that can be utilized should be a motivator in self-learners to learn more and develop a sense of want to explore what is learned.

The fifth is media as problem solving: In this case the use of media such as the internet as a learning resource can enhance or serve as a thinking tool for problem solving among students. Internet usage is expected to affect the creativity of students who appear to facilitate the understanding especially subjects being studied. When we refer to the Clark opinion, the use of the internet can be a path associated with the learning process and its learning objectives to be achieved.

### **Research Questions**

Based on the theories or concepts discussed above, the researchers want to conduct research under the title "Impact of Internet Media Use to Facilitate Learning for Open Junior Secondary School Students". On this regard therefore, the major question in this study is; whether the use of Internet as a medium has a positive impact for middle school students to facilitate learning? And the specific research questions are whether the students believed that Internet media can be able to function as:

- a. Technology media (media as technology) ?
- b. tutor or teacher (media as tutor or teacher) ?
- c. socialization agents (media as socializing agent) ?
- d. learning motivator (media as a motivator for learning) ?
- e. learning problem solver (media as problem solving) ?

### **Research Methods**

Based on the research objectives, namely to get an idea of how to use the Internet as a medium or a source of learning, this research enter into descriptive survey research is explorative. With the survey method and a descriptive report, the data obtained from respondents collected, compiled and then analysed. According to Gall and Borg (2007:300-301), descriptive research is research that is more focused on what the question is. Such as how many teachers or students who argue or take a stand on the phenomenon exists. In other words intended to collect information on the status of symptoms at the time the study was conducted, describe what it is about a symptom or condition. Previously, descriptive researchers have developed the concept and gather facts, but did not test the hypothesis.

The population is all of the Open Junior High School Student at 3 locations, namely : OJSS 2 North Jakarta, OJSS Kandang Haur - West Java, and OJSS Malang, East Java; while all reasonable population of Grade IX student, from OJSS Kandang Haur – West Java and North Jakarta. Affordable sample at 157 class IX from OJSS the two locations. This study was conducted in September-October 2012.

The method used was a survey method, a tool is selected as the data collection was questionnaire which have the form liker’s scale with options 1-3, which means to agree, ordinary, and did not agree. If the respondent chose number 1 is defined argued agree, 2 is plain no comment and 3 is disagree (not agree). Questionnaire before used to collect the data, first tested the validity and reliability. Validity test was calculated with Product Moment formula and reliability test was calculated with Cronbach Alpha formula. Level of reliability of the instrument is 0.767 and can be categorized as good. Data were analysed by using frequency the number of voters in each category and the percentage calculated and then calculated the Standard Deviation (SD) and the mean of each group of data by each sub-variable in this study. The data was then analysed by comparing the mean using the t test.

## Results

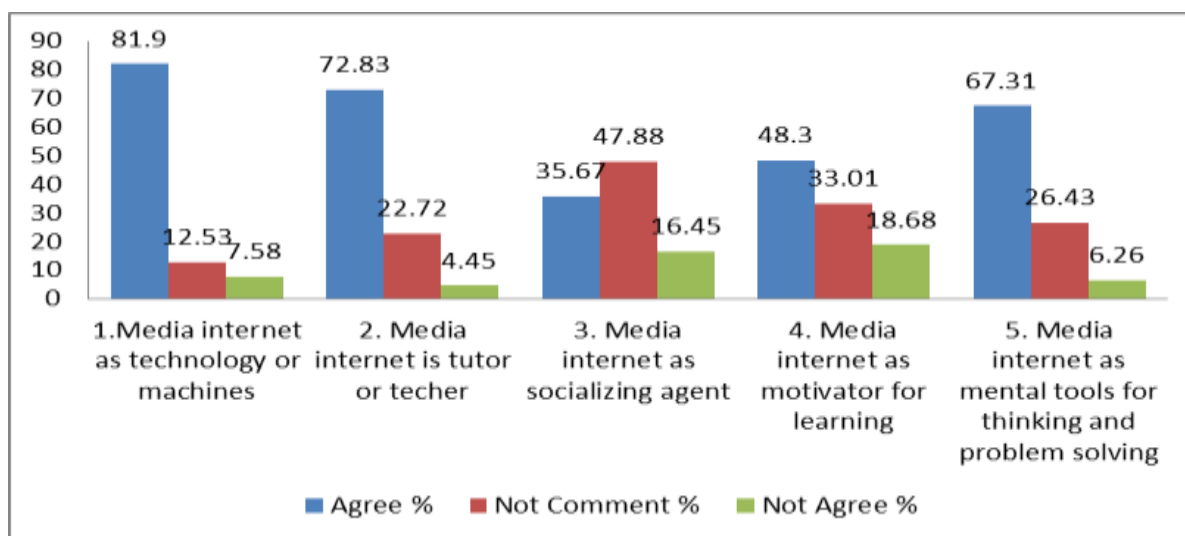
### Utilization of InternetMedia in Learning

Table I below indicates the result of the respondents on the impact of the use of internet media in learning.

**Table I: Utilization of Internet Media in Learning**

S/N	The Use of Internet	Agree (%)	No Comment (%)	Not Agree (%)	Mean	Standard Deviation
1	Media internet as technology	80.4	12.4	7.2	2.72	0.58
2	Media internet is tutor or techer	72.83	22.72	4.45	2.68	0.65
3	Media internet as socializing agent	35.67	47.88	16.45	2.19	0.8
4	Media internet as motivator for learning	48.3	33.02	18.68	2.30	1.04
5	Media internet as problem solving	67.31	26.43	6.26	2.61	0.75

Based on the table above, the responses on technology media or media as technology reveal that 80.40% agree, and 12.40% no comment and 7.20% did not agree. For internet media as tutor or teacher, the responses indicate 72.83% agree, 22.27% no comment and 4.45% did not agree. For internet media as socializing agent, 35.67% agreed, 47.88% no comment and 16.45% did not agree respectively. Furthermore, for the internet media as a motivator for learning respondents that agreed were 48.30%, 33.02% no comment and 18.68% disagreed and lastly, for internet media as mental tools for thinking and problem solving the study reveals those who had agreed as 67.31%, no comment 26.43%, and 6.26% did not agree. From the processed data above therefore, one can be able to conclude that the five internet media utilization was instrumental in facilitating teaching and learning and in order to clarify the data above, detail result is presented in graph 1 below.



Graph1: Utilization of Internet Media by Students

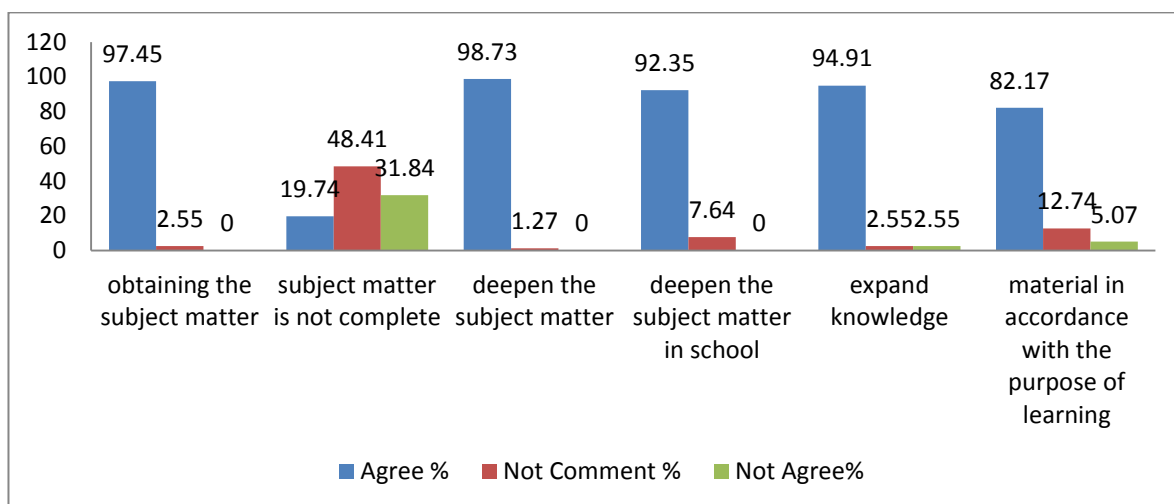
### Internet media as technology

On the use of internet as a technology, the study reveals that students use it as a tool and it affects the quality of student learning. These include activities such as downloading of course materials and collecting data. Detail on the result of this item is presented in the table 2 below:

**Table 2: Internet as Technology**

Item	Agree (%)	No Comment (%)	Not Agree (%)	Mean	Standard Deviation
1	97.45	2.55	0	2.87	0.632
2	19.74	48.41	31.84	1.87	0.757
3	98.73	1.27	0	2.96	0.861
4	92.35	7.64	0	2.58	0.757
5	94.91	2.55	2.55	2.93	0.77
6	82.17	12.74	5.07	2.73	0.699

Based on the result in table 2 above it can be said that most of the respondents agreed that internet is a technology and can be used in obtaining course materials. The responses indicated 97.45% agree, against the 2.55% agreed and 0% no comment respectively. With regards to the question item that addressed the issue of whether internet is not complete, 19.74% did not agree, 48.41% no comment and 31.84% said not agree. With regards to the question, the internet can help deepen the subject matter, 98.73% of students stated agree, 1.17% no comment and 0% not agree. For question on whether internet can help deepen the learning materials in schools, 92.35% stated agree against 7.64% no comment and the 0% not agree. Internet can help expand knowledge in accordance with the lessons in the school, 94.91% of respondents agree, 2.55% no comment and 2.55% not agree. The item that requested the opinion of the respondents on whether the material obtained is in accordance with the purpose of learning, 82.17% respondent agreed, 12.74% no comment and 5.07% not agree. From this data it can be concluded that the Internet as a technology can help the process of understanding the learning materials by students in learning. Detail finding is presented in a graph form in the graph 2 below:



Graph 2: Internet as Technology and Engineering

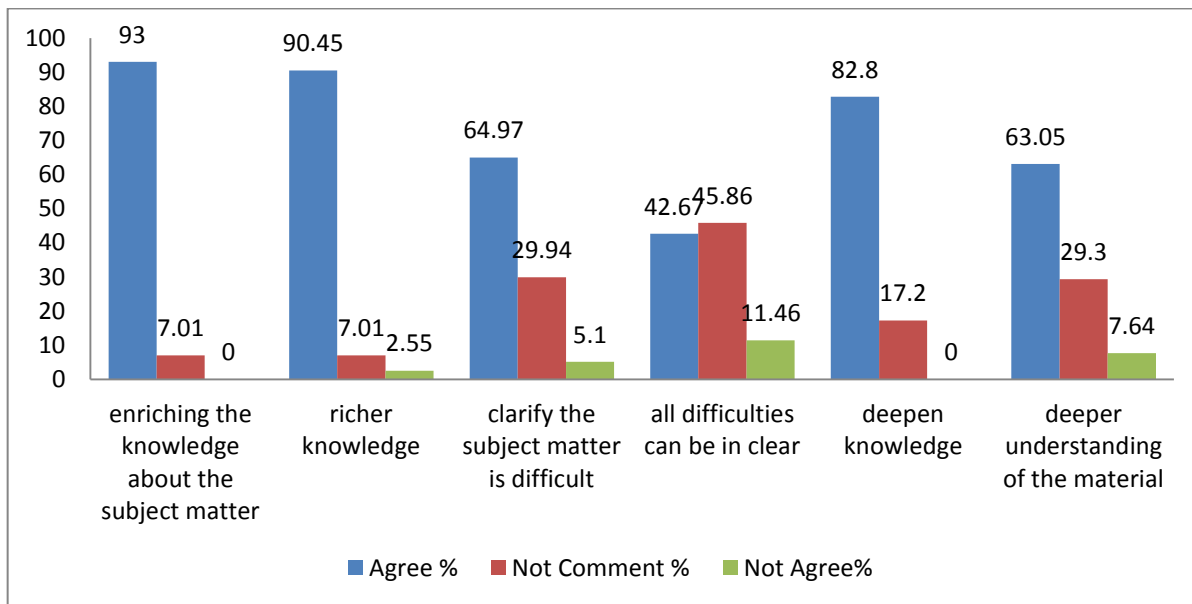
### Internet media is tutor or teacher

The result of this item is clearly presented in table 3 below:

Table 3: Internet as a Totur

Item	Agree (%)	No Comment (%)	Not Agree (%)	Mean	Standard Deviation
1	93	7.0	0	2,86	0,503
2	90.45	7.01	2.55	2,93	0,618
3	64.97	29.94	5.1	2,58	0,774
4	42.67	45.86	11.46	2,33	0,762
5	82.8	17.2	0	2,81	0,534
6	63.05	29.3	7.64	2,49	0,680

Based on the table above, it can be explained that the internet media is tutor or a teacher. This is justified by the responses of 157 respondents thus 93% who agreed that it can enrich the knowledge related to the learning material against the remaining 7.0% no comment and the 0% not agree. Respondent also stated that internet can clarify the subject matter by indicating that it is difficult when studying alone. It is by 90.45% respondents who agreed against 7.01% not comment and 2.55% not agree. Similarly, on the item that requested opinions on whether Internet can expand the knowledge, 64.97% respondents agreed, 29.94% no comment and 5.1% not agree. Furthermore, on the issue of whether internet media can as well able to help students learn to solve difficulties, 42.67% agree, 45.86% not comment, and 11.46% not agree. On the item of internet media can also be able to deepen knowledge or learning materials, 82.8% agree, 17.2% no comment and 0 % not agree. But the issue of whether internet can be able to deepen the understanding on the media of all learning materials available in curriculum, 63.05% respondents agree, 29.3% no comment, and 7.64% not agree. From this data it can be said that the Internet can enrich, clarify, simplify, deepen, and expand the learning materials. To clarify the above data is presented in graphical form below.



Graph 3. Internet Media as a tutor/teacher

### Internet media as Socializing agent

Detail result of this subject matter is presented in the table 4 below:

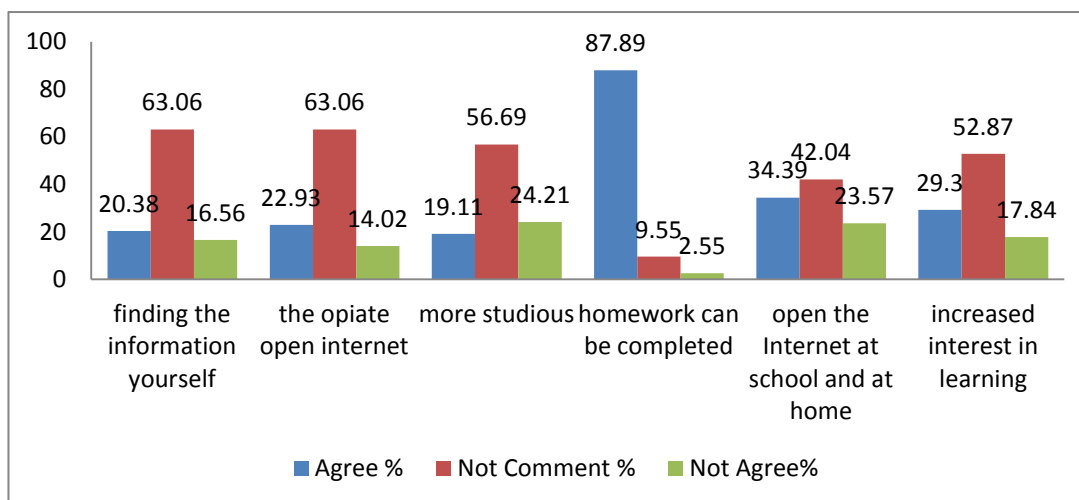
**Table 4: Internet is a socializing agent**

Item	Agree (%)	No Comment (%)	Not Agree (%)	Mean	Standard Deviation
1	20.38	63.06	16.56	2,03	0,737
2	22.93	63.06	14.02	2,09	0,724
3	19.11	56.69	24.21	2,10	0,897
4	87.89	9.55	2.55	2,83	0,703
5	34.39	42.04	23.57	2,49	0,918
6	29.3	52.87	17.84	2,62	0,824

Based on the table above, it can be explain that the internet media is a socializing agent. Based on respondents through questionnaires presented on the matter, 20.38% agree to open the internet to seek information from the friend, though 63.06% were of the no comment category and 16.56% not agreed. Also only 22.93% of the respondents agree that they are more often open internet for learning, the rest of the respondents were of the groups of no comment at 63.06% and not agree at 14.02% respectively. Somewhat not different with their opinion on the statement above was the total of 19.11% who agree that they are more diligent after accustomed to using the internet, while 56.69% were of no comment and 24.21% were of not agree group. In contrast to this opinion is the 87.89% respondents who agree that when they have home work, they will search the internet and where only 9.55% of those who claimed not comment and 2.55% not agree. The respondents were also encouraged to always learn through the internet at school, at home, and a cafe. This statement was delivered by the 34.39% who agree, though 42.04% were of no comment and 23.57% had not agreed. Respondents also argue that the internet media can change the habits of students to learn. A total of 29.3% of respondents agree, 52.8% not comment and 17.84% not agree. From this data it can be said that internet can change students' study habits, making diligent study and search for



information related to learning. For detail comprehension the data was presented in graphical form in graph 4 below.



Graph 4: Internet Media as socializing agent

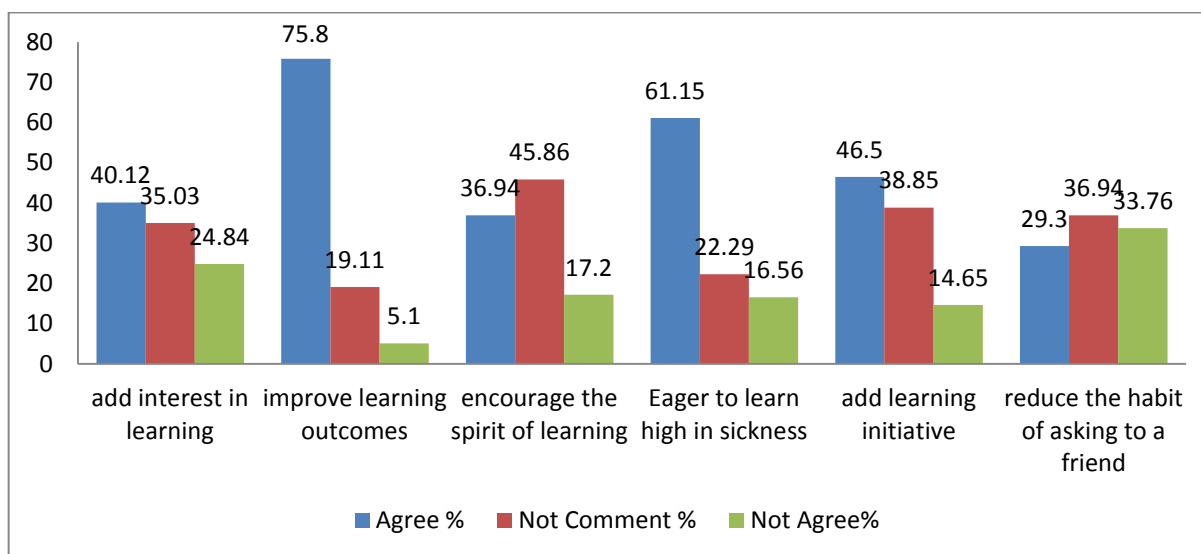
### Internet Media as a Motivator for Learning.

The result on this question item is placed in the table 5 below:

**Table 5: Internet media as a motivator for learning**

Item	Agree (%)	No Comment (%)	Not Agree (%)	Mean	Standard Deviation
1	40.12	35.03	24.84	2.15	0.632
2	75.8	19.11	5.1	2.70	0.757
3	36.94	45.86	17.2	2.18	0.861
4	61.15	22.29	16.56	2.44	0.757
5	46.5	38.85	14.65	2.33	0.77
6	29.3	36.94	33.76	1.95	0.699

Based on the table above, it can be explained that the internet media can be said to be a motivator for learning in as much as 40.12% of respondents agree on the idea that internet can add interest to learning even though about 35.03% were of the opinion of no comment and 24.84% had not agree. Again, 75.8 % agree that internet can improve efforts to achieve maximum learning results, 19.11% belong to no comment category and 5.1% not agree. On the other hand, there is a 36.94% respondents who agree that internet media can encourage the spirit of learning, but almost half thus 45.86% were of no comment and 17.2% not agree on this assumption. Nevertheless, more than half the students, thus 61.15% agree that the spirit of learning remain high despite their physical condition of illness and only 22.29% were of no comment and 16.56% said not agree. On the same vain, almost half of the respondents thus, 46.5% agree that the internet adds to their learning initiatives even though about 38.85% were of no comment and 14.65% not agree. Also as indicated in the table above 29.3% of respondents agree that internet helps students in completing assignments from school, but 36.94% no comment while 33.76% not agree. From this data it can be deduced that internet can encourage the learning spirit by adding initiative in learning. For further details data is presented in graph 5 below:



Graph 5: Internet Media as motivator for learning

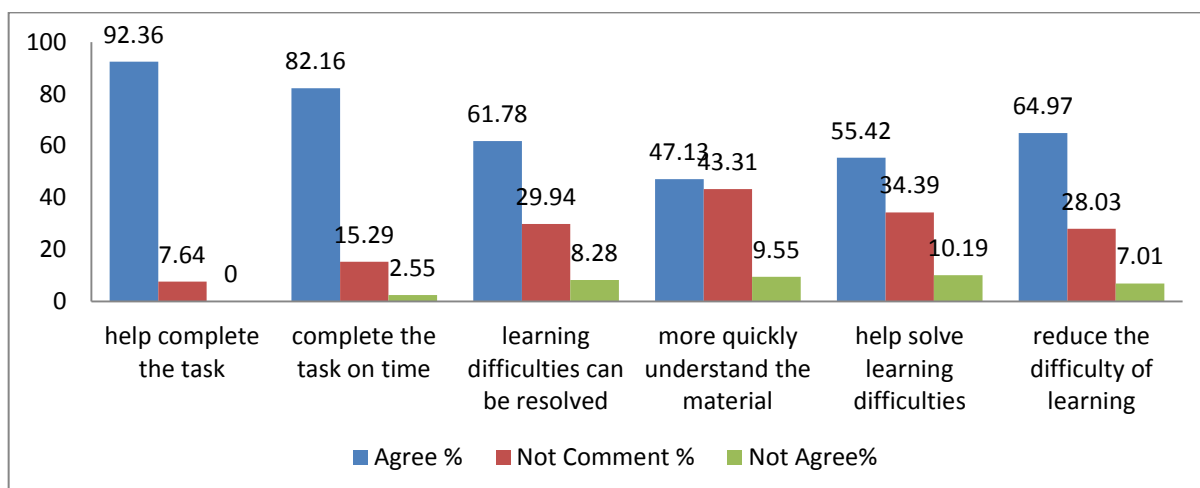
### Internet media as problem solving

The result of the data collected for this question item is described in the table below:

**Table 6: Internet media as mental tools for thinking and problem solving**

Item	Agree (%)	No Comment (%)	Not Agree (%)	Mean	Standard Deviation
1	92.36	7.64	0	2.92	0.632
2	82.16	15.29	2.55	2.79	0.757
3	61.78	29.94	8.28	2.53	0.861
4	47.13	43.31	9.55	2.37	0.757
5	55.42	34.39	10.19	2.45	0.77
6	64.97	28.03	7.01	2.57	0.699

Based on the result in the table above one can describe the internet media as mental tools for thinking and problem solving. This is in accordance with the results obtained where 92.36% agree that internet helps in completing the task of the school, though very few respondents of about 7.64% have not commented and 0% did not agree. Similarly, the majority of students 82.16% agree that the Internet can help to accomplish tasks on time and get used to using it. The rest 15.29% no comment and 2.55% not agree. In addition, more than half of the respondents thus, 61.78% agree stating that internet can help solve students' learning difficulties through browsing. However, nearly one-third of respondents 29.94% no comment and 8.28% did not agree. Furthermore, regarding the impact of the internet on the understanding of the speed of learning materials, almost half thus, 47.13% agree and 43.31% no comment and 9.55% declared not agree. According to respondents, internet can help solve their learning difficulties. It is more than most respondents thus about 55.42% agree while the rest 34.39% no comment and 10.19% not agree. On the issue of using the internet media, 64.97% of respondents agree that internet can reduce learning difficulties, 28.03% not commented, and 7.01% not agree. From this data therefore, it can be concluded that in general, internet media can help solve, reduce the difficulty and completing tasks for students learning procedure. For detail understanding on the finding data is further presented in graph 6 below:



Graph 6: Internet media as mental tools for thinking and problem solving

### Comparison of Utilization Impact of Internet Media in Learning

Detail of a comparison of the impact of internet use on any sub-variable done via t-test from the results of the t-test is presented in the table below.

Table 7: Comparative Impact of Media Use of Internet in Learning

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Internet is Teknologi	183.598	156	.000	23.548	23.29	23.80
Internet tutor	99.354	156	.000	22.777	22.32	23.23
Internet pengubah prilaku	74.918	156	.000	19.255	18.75	19.76
Internet Motivator	65.192	156	.000	19.860	19.26	20.46
Internet pemecah_maslah	99.131	156	.000	22.726	22.27	23.18

From the table above, it can be concluded that there are differences in the average impact of the use of internet media in learning and teaching. Internet media as technology has t greater than others thus, 183.598, then the internet as the tutor or teacher has t-count 99.354, internet media as mental tools for thinking and problem solving has t-count 99.131, internet media as Socializing agents have t-count amounted to 74.918 and internet media as a motivator for learning has t-count 65.192. Of this data can be said that there are differences in the utilization of the Internet media as learning.

## Discussion

### Internet Media as Technology

Based on the research conducted, the researchers have come to a conclusion that internet can be a technology and machines this is because internet may obtain the subject matter and thereby help to deepen the subject matter. It is a means by which all the respondents overwhelmingly accepted that can be used in to expanding the knowledge through its possibility in accesses of various learning materials in accordance with subject matter. The students accepted to have used the internet through the variety of its facilities such as the e-mail, chatting and browsing accessibility in their learning process. The point here is that internet browsing facilities that are often used by students in the

learning process do help them to supplement and enrich the learning materials at hand such as the printed materials like text books. Through internet facilities these students may easily find a variety of theories and useful images in the internet published articles, paper reports, power-point presentations and much other useful information that is available online. As such this establishes the fact that students who use some of these facilities were able to get support materials that could help them to enhance their study completion in good time.

### **Internet Media as Tutor or Teacher**

This study also investigated whether internet media can serve as a tutor or a teacher. It was established that yes the internet can enrich knowledge about any subject matter, the internet can clarify the subject matter which felt difficult when students are learning on their own, learning difficulties at school can be clarified through the internet, the internet can deepen knowledge of the subject matter and it can also enhance the understanding on subject matter. Furthermore, this research was able to understand that internet have characteristics that include first, the ability to utilize electronic technology services; this include both the teachers and students, also students and fellow students or teachers and fellow teachers can communicate with relative ease without being limited. Second, it has the ability to use instructional materials independently (self-learning materials); these materials are stored in the computer so that it can be accessed by the teachers and students anytime and anywhere at the time of their needs. Thirdly, it can utilize learning schedule; thus, issues such as curriculum and other learning outcomes and progress matters relating to the administration of education can be viewed at any time on the computer. This is consistent with what is conveyed by Miarso, (2004). Fourthly, activities such as the e-learning cannot be separated from internet services. Utilization of the Internet have come along with various learning techniques and are always available on the internet. There is no doubt in what so ever that internet has affected the task of classroom teacher in the learning process. Previously, the teaching-learning process is dominated by the role of the teacher, this period was called the era of teacher, but now the teaching-learning process are dominated by the role of teachers and books (the era of teacher and book) and on the future of teaching and learning process will be dominated by teachers, books, and technology (the era of teacher, books, and technology). Another theory says that the use of internet as a learning resource belongs to the individual learning system ways that are considered easy and affordable by learners. Delivery of teaching materials can also be accompanied by a tutorial program, which was organized by a particular location or schedule and in accordance with the collective agreement.

### **Internet Media as Socializing Agents**

In another dimension, this research seeks to understand internet media as socializing agents. Through the responses available it was established that students seek information from their friends, they tend to be more often on the line to open the internet for learning which also justifies the assertion that, the students are accustomed to using the internet, also because every homework can be found on the internet, the use of the internet at school and at home had increase interest in learning, also due to the use of internet learning by utilizing website as a learning resource, students do not focus on the teacher as a tutor or a teacher because the students prefer to focus on learning independently. This can also be related to the a theory proposed by Wedermeyer (1973) as cited by Keegan (1996) which see self-learning as an independent learning, and is a kind of learning that changed the behaviour, that results from activities carried on by the learner in space and time, learners whose environment is different from that of the school, learners who may be guided by teachers, but who are not dependent upon them, learners who accept degrees of freedom and responsibility in initialing and carrying out the activities that lead to learning. In independent study, students have the freedom to learn without having to attend lessons of the teacher. Students can learn

the subject or topic of a particular subject by reading the print module, see and listen to books or instructional media program without assistance or with limited assistance from others.

### **Internet Media as a Motivator for Learning**

The study furthermore investigated where internet media serves as a motivator for learning. It was established that internet can add attractiveness to learning, it can also improve the efforts of students to learn new task. And most importantly, it is believed that the change of behaviour can be the end result of learning process which can be achieved from a deliberate interaction between students and their learning environments. To this also there are three factors that may likely encourage the students and teachers teaching and learning process. The first factor is the physical and mental readiness of the student to do something, secondly, is the issue of self-motivation which is also described as the urge to do something and thirdly is the ability to achieve the desired objective.

### **Internet Media as Problem Solving**

Finally, this research exposes the fact that internet media can be a mental tool for thinking and problem solving among the student. It can help them to complete learning task at school, also in a timely manner. As a tool for problem solving, the internet can help students to resolve all their learning difficulties and it will also help the students to understand the subject matter as well. This is also in consistent with the theory of Bates (1995) and Wulf, (1996) respectively which if summarised can be viewed as capable of:

- a. Increasing the level of learning interaction between learners and teachers or instructors (enhance interactivity)
- b. Bringing a room for interaction anywhere and at any time (Time and Space flexibility)
- c. Reaching and encouraging the learner. (Potential to reach global audience)
- d. Facilitating the completion and storage of learning materials. (Easy to update the content as well as capable to achieve)

### **Conclusion**

On this note therefore, the researcher have concluded that the impact of the use of internet media in learning are:

1. Internet as a media technology can assist students in understanding the material in the students' learning.
2. Internet media as a tutor or teacher that can enrich, clarify, simplify learning.
3. Internet media as socializing agent that can increase interest, making diligent in finding information related to learning.
4. Internet media as motivator that can encourage motivation spirit, add the initiatives in learning.
5. Internet media as learning problem solving that can help students to solve problem, reduce the difficulty and can complete tasks in the study as well.
6. Internet media as a technology and machinery that has a very important role because it has a different average higher when compared with the use of the internet to the other four.

## Bibliography

- Budi Sutedjo Dharma Oetomo, (2002). e-Education ; The concept of Internet Technology and Applications Education. Yogyakarta :Penerbit Andi
- Dale, Edgar. (1969). Audio Visual Methods in Teaching. New York: Holt, Rinehart, and Winston, Inc.
- Desmond, K.(1996). The Foundation of Distance Education.Dover Biddles Ltd Buildford and King's Lyon,
- French, D., H. Charles, C Jhonson and Gerald (1999). Farr. Internet Based Learning an introduction and framework for higher education and business. London: Kogan Page Limited
- Gagne, R. M. (1970). The learning of concepts IN Clarizio, H. F., Craig, R. C. & Mehrens W. A. (Eds.) Contemporary Issues in Educational Psychology 230-237 Boston: Allyn & Bacon
- Hadi. M. Y., (2004). Sowing Seeds Technology Education. Jakarta, Penerbit Kencana: .
- Haughey, M. & Anderson, T. (1998). Networked Learning: The pedagogy of the Internet. Montreal: Cheneliere/McGraw-Hill.
- Januszewski, A., and Molenda, M. (2008). Education and technology. New York. Lawrence Erlbaum Associaton.
- Masri Singarimbun dan Sofian Effendi, (1995). Metode Penelitian Survey Jakarta : Pustaka L3ES,
- Meredith G., Joyce P. G., and Borg, W., (2007). Educational Reseach. New York, Pearson Publisher.
- Percival F., and Ellington (1998). Educational Technology. Jakarta : Erlangga
- Rakhmawati, Dwi. (2009). Internet Untuk SMA ; ILT Learning.Jakarta :PenerbitElex Media Komputindo
- Spector, M.J, (2012). Foundation of educational technology. Fisrt published, New York.
- Sudirman Siahaan, E-Learning (Electronic Learning) As One Of The Alternative Learning Activities, ([www.depdiknas.go.id](http://www.depdiknas.go.id))
- Suharsimi A, (2005). Procedure Research: A Practical Approach. PT Bina Aksara Jakarta,
- Tjeer, P. & Donald P. E. (1996). International Encyclopedia of Educational Technology (Cambridge : Elsevier Science Ltd,
- <http://henilblogspot.com/2007/07/e-learning-berbasis-web-sebagai-bahan-html> diakses tanggal 1 Oktober 2013. [www.isekolah.org/cerita\\_view.php3?idx\\_cerita=93](http://www.isekolah.org/cerita_view.php3?idx_cerita=93) diakses tanggal 1 Oktober 2013.

# Linear Measurement Models for Estimation of Corchorus Olitorius Leaf

---

**Ajayi N. O**

*Department of Physics and Electronics, Adekunle Ajasin University. Akungba- Akoko.  
Ondo-State, Nigeria.*

**Abajingin D.D.**

*Department of Physics and Electronics, Adekunle Ajasin University. Akungba- Akoko.  
Ondo-State, Nigeria.  
[abajingindd@yahoo.com](mailto:abajingindd@yahoo.com)*

## **Abstract**

Leaf area measurements are of value in physiological and agronomic studies. The use of prediction models to estimate leaf area is simple, accurate and non-destructive. In this work, we presented linear measurement models for predicting the area (A) of Corchorus Olitorius leaf. Measured leaf length (L), leaf maximum width (W), product of length and maximum width (LW) obtained from 303 leaves randomly selected from a vegetable garden were used to verify the accuracy of the developed models. The leaf area that was obtained from each model was statistically compared with the actual leaf area obtained by photocopying method. The models obtained with their RMSE and r values are as follows:

Model 1:  $\text{Log}A = -0.094 + 0.575\text{Log}L + 0.068\text{Log}W$ , (RMSE = 0.038,  $r = 0.983$ ) .

Model2:  $\text{Log}A = -0.099 + 0.641\text{Log}(LW)$ , (RMSE = 0.032,  $r = 0.983$ ) .

Model 3:  $A = 0.072 + 0.749(LW)$ , (RMSE = 1.140,  $r = 0.998$ ) .

**Key words:** Corchorus Olitorius, Leaf Area, Linear Measurements,

## Introduction

Leaf area estimate is very valuable in the studies of plant nutrition, plant soil-water relations, plant protection measures, respiration, light reflectance, and heat transfer in plants (Mohsenin, 1986). Leaf area estimate therefore is important in plant science in understanding photosynthesis and evapotranspiration (Horsley and Gottschalk, 1993), light interception, crop growth and yield potential (Smart, 1974; Van Volkenburgh, 1994). It is also at times used to assess the effect of different plant treatments (Ali and Anjum, 2004) and growth competition between different plants, (Harper, 1977).

If the structural features of the stomata and its distribution per unit leaf area for leaves of the same cultivar existing under the same condition are the same, the larger the leaf area is, the greater will be its photosynthetic activity and the more the plant will tend to lose water to the surrounding atmosphere. This thus makes leaf area to be associated with plant growth and development and is therefore considered as the most important single determinant of dry matter accumulation.

Studies of plant processes, such as transpiration and photosynthesis, provide the basis for plant improvement and often require a nondestructive method for measuring the leaf area (Wendt, 1967). Nondestructive methods allow replication of measurements during the plant growth and reduce experimental variability that is associated with destructive sampling procedures (Nesmith, 1992).

Leaf area estimation is often costly, time consuming and destructive (Marshall, 1968). However, estimating leaf area from model equations using leaf linear dimensions is inexpensive, rapid and nondestructive.

Several prediction models have been made for determining the area of numerous crops such as faba beans leaves (Pekson, 2007), maize leaves (Stewart and Dwyer, 1999) and bean leaves (Bhatt and Chanda, 2003), but little information is available for *Corchorus Olitorius*. It is therefore the objective of this study to develop a mathematical model for a nondestructive measurement of the area of these leaves for use in physiological and agronomic studies.

*Corchorus Olitorius* is an annual vegetable plant usually cultivated in some African and Asiatic countries for its fiber and also for its leaves which are used for their medicinal purposes. *Corchorus Olitorius* leaves have peculiar geometrical shapes. They are elliptic-lanceolate and apically acute or palmate depending on the species (Sinha, 1999). The prediction models must therefore be determined for each species and cultivars, according to the different leaf shapes.

## 111 Mathematical Formulations

The general shape of ovate leaves, into which *Corchorus Olitorius* leaves are classified, can be approximately described by a figure which lies in between an ellipse and a kite of the same length (L) and maximum width (W). The area of a kite-shape is given by  $A = 0.5 (L \times W)$  and that of an ellipse is given by  $A = \pi/4(L \times W)$ , (Ajayi, 1990). From these two equations, a more generalized equation which captions the leaf area specified by the geometric shapes as described above is of the form

$$A = K(L \times W) \dots\dots\dots (1)$$

It has been pointed out that if the product of leaf length (L) and leaf maximum width (W) is plotted against the leaf area (A), the scatter of the points on the graph usually tends to become larger with increasing leaf area (Kemp, 1960). This observation therefore necessitates the development of a correction procedure through a system of weighting of the experimental points (Kemp, 1960; Lomte et al, 1979), and this is used in the present study.

There are two correction procedures proposed in this work. The first is to obtain possible correction that can be effected in the product of the leaf length (L) and leaf maximum width (W). Within this frame work, equation (1) can be written as:



$$A = (KLW)^\mu \dots\dots\dots (2)$$

where  $\mu$  is the correction factor which accounts for the difference between the exact geometric kite or elliptic shape and that of the true leaf area. The second correction that can be effected is a straight forward correction separately on the length (L) and the maximum width (W) of the leaf before taking the product of the two parameters. On the basis of this, equation (1) becomes

$$A = K^\alpha (L^\beta xW^\gamma) \dots\dots\dots (3)$$

where  $\alpha, \beta$  and  $\gamma$  are constants which are the correction factors in the measurement of length (L) and leaf maximum width (W) of the leaf respectively. Thus in equation (2) and (3)  $\mu, \alpha, \beta$  and  $\gamma$  account for the difference between the exact geometrical shape and that of the true area of the leaf. A simple mathematical transformation respectively reshapes, equations (2) and (3) to simple linear regression equations of the forms

$$\log A = \mu \log K + \mu \log(LxW) \dots\dots\dots (4)$$

$$\log A = \alpha \log K + \beta \log L + \gamma \log W) \dots\dots\dots (5)$$

The constants  $\mu, \alpha, \beta$  and  $\gamma$  are determined from a multiple regression analysis of data.

When there is a difference between the geometrical shape and the shape of the leaf, it is suggested that a simple graphical correction be made by writing equation (1) as

$$A = a + k(LW) \dots\dots\dots (6)$$

where  $a$  and  $k$  are constants.

The shape of the leaf is closer to the geometrical shape as  $a \rightarrow 0$ . If there is a linear relation between L and W, so that  $L = \rho W$  in equation (1) reduces to a simple form

$$A = \sigma L^2 \dots\dots\dots (7)$$

or  $A = \delta W^2 \dots\dots\dots (8)$

where  $\rho, \sigma$  and  $\delta$  are constants.

### 111. Materials and Method

A total of 303 leaf samples of *Corchorus Olitorius* of different sizes were randomly selected for measurement from a farm near Adekunle Ajasin University, Akungba Akoko, Ondo State, Nigeria (lat 7° 28' 11' N; long. 5° 44' 21' E). The leaves were cut and immediately placed in plastic bags to keep them fresh. A photocopier with its magnification set at 100% was used to photocopy the leaves on A4 papers. From these prints, the maximum width (W) and length (L) of each leaf were measured and determined to  $\pm 0.1$  cm. The area  $A_p$  of each A4 paper was determined by measuring the length and breadth, to  $0.01\text{cm}^2$ . The weight  $W_p$  of the paper was first measured after which each leaf print on it was carefully cut out and then weighed, to  $0.0001\text{g}$ . The true area  $A_t$  of each leaf was then estimated from equation

$$A_t = \frac{W_t}{W_p} A_p \dots\dots\dots (9)$$

All data were analyzed using regression analysis and analysis of variance (ANOVA).

The ability to cut out precisely the leaf print from the A4 paper was determined by drawing circles and rectangles of various sizes on A4 paper and equating the weight of the cut out figure to  $W_t$  and calculating its area from equation (9). Two sets of geometrical figures: circles and rectangles, whose areas are respectively ( $7.07\text{cm}^2, 38.48\text{cm}^2$ ) and ( $7.00\text{cm}^2, 38.50\text{cm}^2$ ), were used for this study. The statistical difference between the true area and the calculated area was then made.

**Results and Discussion**

The results from this study are presented in this section. Table 1.0 contains the statistical results obtained for determining the precision of measurement of the true area of the leaves.

Table1.0: The true area, mean of measured area of a geometrical figure and the significant difference between the true area and mean of the measured area.

True area of geometrical figures, (cm <sup>2</sup> )		Calculated mean area from equation (6) cm <sup>2</sup>	n	Students' t	Degrees of freedom	Significance
Circle	7.07	7.1955±0.03354	20	3.7417	19	P< 0.001
Rectangle	7.00	7.0196±0.04945	18	0.3964	17	P< 0.001
Circle	38.48	38.5343±0.09947	18	0.5459	17	P< 0.005
Rectangle	38.50	37.8706±0.37635	15	1.6723	14	P< 0.0001

The table shows the true area, the measured mean area with standard error, the number of geometrical figures used, the students't, the degrees of freedom and the level of significance of the differences between the measured areas and true area of the geometrical figures. It can be seen from the table that the measured mean area of each of the four sets of figures was not significantly different from the true value (P<0.005) and that the true areas are not more than 1.5% different from the measured values. Since the random errors are sufficiently small, the systematic differences can be ignored.

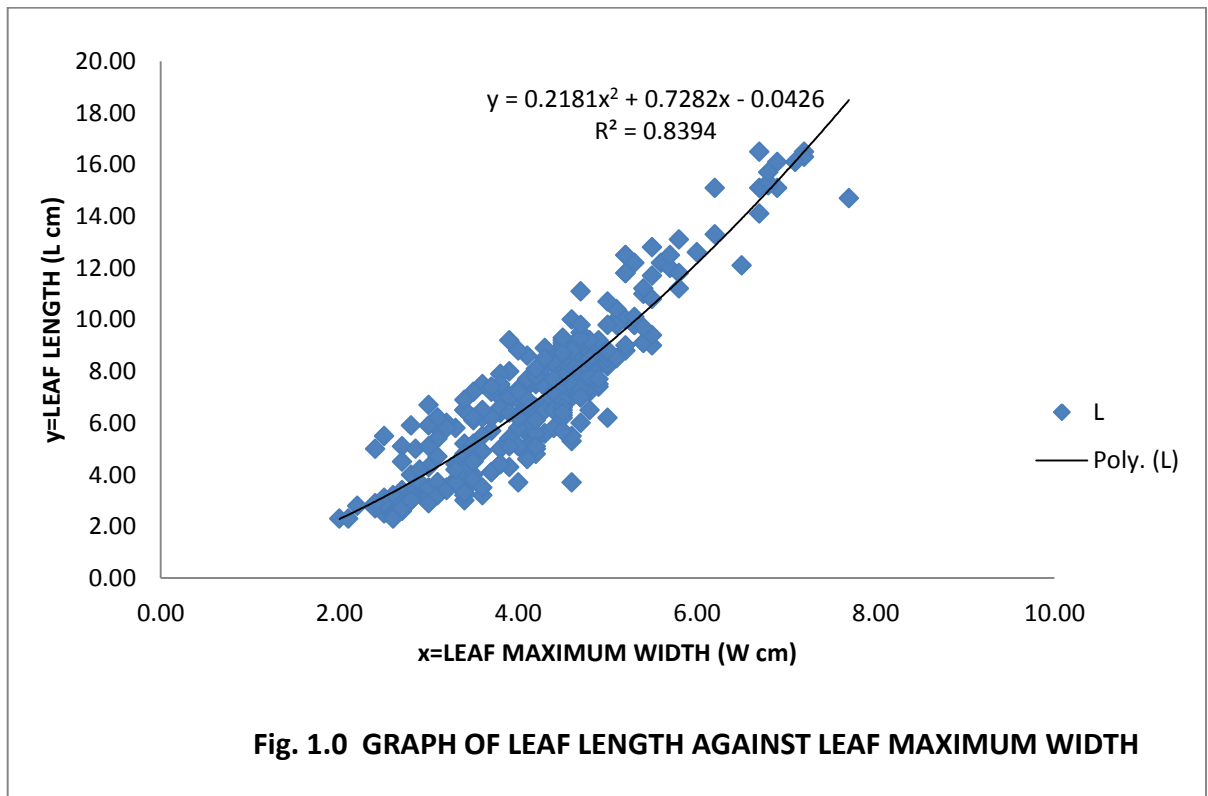


Figure 1.0 shows the regression of leaf length L against the leaf maximum width W. The figure shows that the leaf length, L fits into a quadratic equation and is not linearly-related to the leaf maximum width W. It may be seen from the figure that there is a linear correlation between the leaf length and the leaf maximum width separately for the juvenile (L< 4 cm) and the mature (L> 6 cm) leaves. Thus it may not be advisable to apply the simple equations (7) and (8) to all the leaves grouped together without first checking if there is a linear correlation between L and W. Therefore

only equations (4), (5) and (6) are used in this work to analyze the data of all the leaves grouped together.

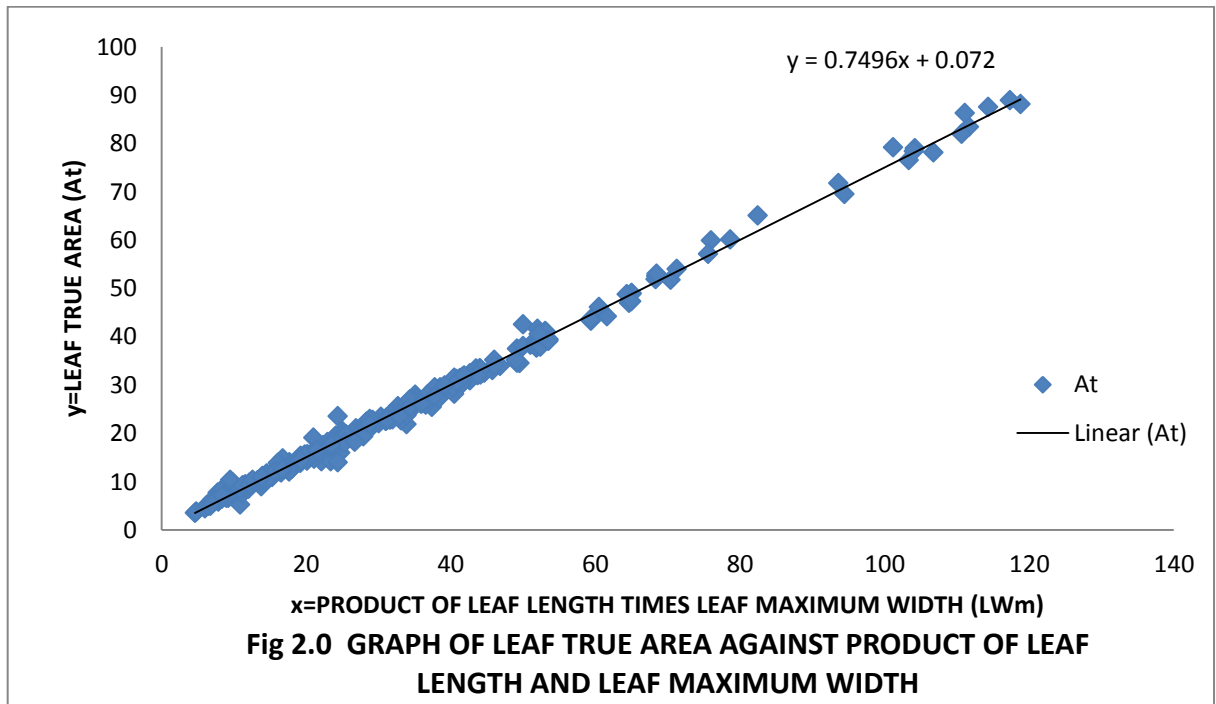


Figure 2.0 shows the regression of the leaf area  $A$  on the product of the leaf length and leaf maximum width. The regression parameters  $a$  and  $b$  and the RMSE of scatter about the fitted model straight line equation (6) are shown in Table 2.0. The value of regression coefficient  $r = 0.998$  and the coefficient of determination of data points (RMSE) about the fitted line is 1.14

When all the leaves have the exact geometrical shape, showing that the correction factors  $\alpha = \mu = \beta = \gamma = 1$ ,  $a = 0$  and the leaf area  $A$  is proportional to the product of leaf length ( $L$ ) x leaf maximum width ( $W$ ) as shown in equation (1), and all the measured value points will fall on the fitted straight line passing through the origin. Hence  $a$  is measure of how close the leaf shape is to the geometrical shape. Table 2.0 equally shows that although the regression coefficient of the data points fitted to equation (6) is large (0.998), the coefficient of determination of 1.14 of the data points about the fitted line is also large, supporting the idea that  $\alpha = \mu = \beta = \gamma \neq 1$  and that the shape of the leaf is different from the accurate geometric shape, making the measured points to deviate from the trend line of equation (6) at various degrees, leading to a large value of RMSE. Therefore the coefficient of determination RMSE is also a measure of how close the leaf shape is to the exact geometrical shape. For our leaf samples of *Corchorus Olitorius*,  $RMSE = 1.14$  when  $A$  is plotted against  $L \times W$  in equation (6).

Figure 3.0 shows the plot of the model equation (4) where the log of the leaf area  $A$  is regressed on the log of the product of the leaf length  $L$  and leaf maximum width  $W$ . The RMSE of 0.032 shown in table 2.0, of the scatter points about the fitted model straight lines is low compared with the RMSE value of 1.14 obtained for the plot of equation (6). Also shown in table 2.0 are the regression parameters  $a$ ,  $b$ , and  $c$  and the RMSE for equations (1) and (7) and the multiple regression equation (5).

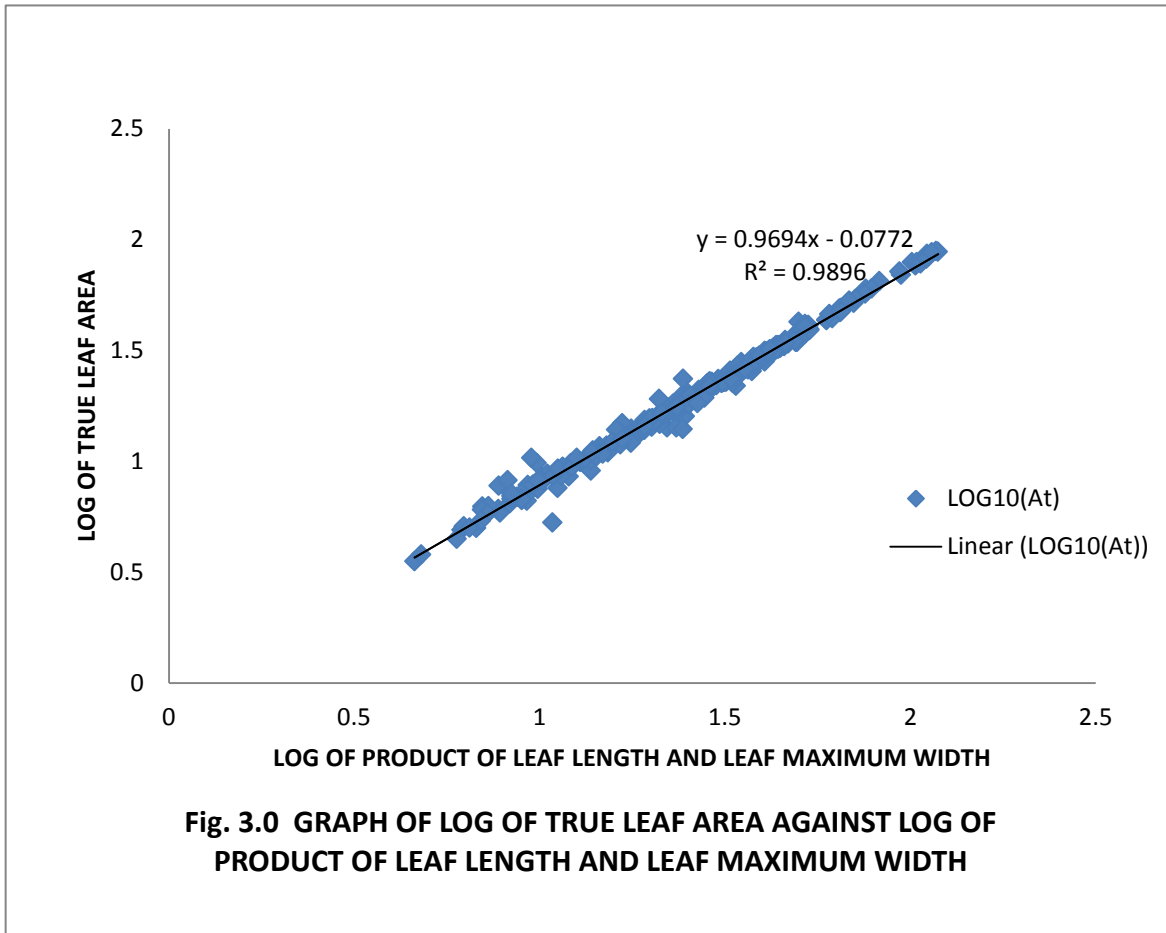


Table 2.0: The regression parameters a, b, c, the correlation coefficients and the RMSE for the models given by equations (5), (4), (1) and (6).

Eqn.	Model equations	Regression parameters			Correlation coefficient R	Residuals	
		a	b	c		d.f.	RMSE
5	$\log A = a + \beta \log L + \gamma \log W$	-0.094 $\pm 0.011$	0.575 $\pm 0.067$	0.068 $\pm 0.069$	0.983	301	0.032
4	$\log A = a + \mu \log(LW)$	-0.099 $\pm 0.010$	0.641 $\pm 0.007$	-	0.983	302	0.032
1	$A = K(LW)$	-	0.751 $\pm 0.002$	-	0.999	302	0.139
6	$A = a + b(LW)$	0.072 $\pm 0.118$	0.749 $\pm 0.003$	-	0.998	302	1.140

In equation (1),  $b = K$ ; In eqn. 4,  $a = \mu \log(K)$ ,  $b = \mu$ ; In eqn. 5,  $a = a \log(K)$ ,  $b = \beta$ ,  $c = \gamma$

Since  $\beta \neq \gamma$  in equation 5, the leaf of *Corchorus Olitorius* does not fit into one perfect geometrical figure, supporting the suggestion of equation (6) for a non zero intercept and showing that the value of  $\mu$  in equation (4) is a rough correction value for the leaf area. It can therefore be said that the leaf of *Corchorus Olitorius* is a compound combination of half of an ellipse at the base and a triangle at the apex.

**Table 3.0: ANOVA table to show the goodness of fit of the models.**

Eqns	Model equations	Residual			Standard error of estimate
		SS	MS	df	
5	$\log A = a + b \log L + c \log W$	0.356	0.001	300	0.03445
4	$\log A = a + b \log(LW)$	0.357	0.001	301	0.03445
1	$A = b(LW)$	391.807	-----	302	1.13917
6	$A = a + b(LW)$	391.324	1.300	301	1.14020

Since the standard error of estimate is much lower equations (4) and (5) than for equation (6), equations (4) and (5) will give more precise values of the leaf area than equation (6).

### Conclusion

In this study three mathematical models are formulated which are found to give accurate area of *Corchorus Olitorius* leaves. Since the RMSE in equation (4) is much less than for equation (6), the graph of  $\log A$  against  $\log LW$ , as shown in fig.3.0 is a better estimate of leaf area than using the graph of  $A$  against  $LW$ , as shown in fig. 2. It was equally observed that since length  $L$  of the leaves are not proportional to the width  $W$ , when all the leaves of *Corchorus Olitorius* are used in this study, plotting the graph of  $A$  respectively against  $L$ ,  $W^2$  or  $L^2$  is only good when  $L < 4$  cm for the juvenile leaves and when  $L > 6$  cm for the adult leaves. A large error in the estimation of leaf area  $A$  will occur when all the leaves are used if the separation noted above is not first carried out. For any leaf cultivar, it is therefore necessary to first check if the leaf length ( $L$ ) is proportional to the leaf maximum width ( $W$ ) before applying the simple relation suggested in equations (7) and (8) for all the leaves.

The area of *Corchorus Olitorius* leaves can be estimated in the field from a pre-prepared gridded straight line graph of  $A$  against  $L \times W$  and also from the graph of  $\log A$  against  $\log(L \times W)$ , drawn from the data of leaf area ( $A$ ), leaf length ( $L$ ) and leaf maximum width ( $W$ ) of over 100 randomly selected leaf samples of the particular cultivar.

## References

- Ajayi, N.O. (1990), Rapid determination of leaf area in ovate vegetables leaves by linear measurements. *Journal of horticultural Science*, 65: 1-5, 1990.
- Ali, H. and Anjum, M. A. (2004). Aerial growth and dry matter production of potatoes (*Solanum tuberosum* L.) Desiree in relation to phosphorus application. *Int J, Agric. Biol.* 6: 458-461.
- Bhatt, M. and Chanda S. V. (2003). Prediction of leaf area in *Pharsalus vulgaris* by non destructive method. *Bulgarian journal of Plant physiology* 29(2): 96-100,
- Harper, J. L. (1977) *Population Biology of plants*, Academic Press, Oxford, UK.
- Horsley, S.B. and Gottschalk, K. W. (1993). Leaf area and net photosynthesis during development of *prunus serotina* seedlings *Tree Physiol*, 12: 55-69,
- Marshall, J. K. (1968). Methods for leaf area measurement of large and small leaf samples. *Photosynthetica*, 2; 41-47.
- Mohsenin, N. N. (1980). *Physical properties of plants and animal materials*, 2<sup>nd</sup> Edn., Gordon and Breach Science publishers, New York, USA Pg. 79.
- Nesmith, D.S. 1992. Estimating Summer squash leaf area nondestructively. *Hort. Science* v. 27: 77.
- Peksen, E. (2007). Non destructive leaf area estimation model for faba bean (*vicia faba* L.) *Scientia Horticulturae* 113(4): 322-328,
- Sinha, N. (1999). Leaf development in angiosperms *Annual review of plant Physiology and Plant Molecular Biology* 50: 419-446.
- Smart, R. E. (1974) photosynthesis by grapevine canopies. *Journal of Applied Ecology*, 11(3): 997-1006.
- Stewart D. W. and Dwyer L. M. (1999). Mathematical characterization of leaf shape and area of maize hybrids. *Crop Science* 39(2): 422-427.
- Van Volkenburgh, E. Leaf and shoot growth, In: Boote, K.J.; Bennet, J.M.; Sinclair, T.R. and Paulsen, G.M. (1994). *Physiology and determination of crop yield*. Madison; ASA. 101 – 120.
- Wendt, C. W. (1967). Use of a relationship between leaf length and leaf area to estimate the leaf area of cotton (*Gossypium hirsutum* L.), castors (*Ricinus communis* L.) and sorghum (*Sorghum vilgare* L.), *Agronomy Journal*, .59: 484 – 486,

# Entrepreneurial Strategic Alliances of Small and Medium Enterprises in Smallholders Agro Monoculture Logistic and Supply Chain

---

Mohd Amin Ahmad

*MARA University of Technology Malaysia*

## Abstract

This research is attempted to examine the various facets of entrepreneurial strategic alliances of Small and Medium Enterprises (SMEs) in Malaysian smallholders' agro monoculture logistic and supply chain collaborations. The strategic alliances will enable the smallholder sector's growth and profits by rendering the services of logistic and supply chain providers in agro monoculture of rubber and oil palm which are in high demand. Entrepreneurs and SMEs in these trades could collaborate and establish a long lasting partnership in producing and logistical perspectives. It also will solve the plight of smallholders in delivering their agro products to the factories in upgrading livelihood and generate economy. Methodologies used are the five dimensions of entrepreneurial strategic alliances and partnership collaboration (producers, agro suppliers, logistic and supply chain, managerial strategy, business culture and practice,) the dimensions were examined to determine the entrepreneurial strategic alliances and partnership collaboration. The results shows there are significant difference among factors stated above with entrepreneurial strategic alliances of SMEs in Malaysian smallholders' agro monoculture logistic and supply chain. The business environment and climate of the sector are also closely related to the business leadership skills and success in gaining profits among businesses of the like.

**Keywords:** Entrepreneurial strategic alliances, smallholders, agro monoculture, logistic and supply chain.

## **Introduction**

Transportation of agriculture products such as scrap rubber or latex and fresh palm fruits from farm to collection centres and the supply of fertilizer vice versa is a key link in the of entrepreneurial strategic alliances of SMEs in Malaysian smallholders' agro monoculture logistic and supply chain. Most of the cultivated land is located far from the dense residential town and cities. The only means to transfer raw agriculture products from smallholders to agro processing plants for processed either to export and consumers or business to business and business to consumers who dwelt in cities are those entrepreneurial agro middleman or organizations that provide and facilitate logistic with high percentage of earning.

However, at the same time, they are the major contributor towards the hardships of the smallholders in the country. Even though this efforts has necessitates in generate economy for the tripartite of smallholders from rural areas, processors or middlemen either in suburban or urban and the everlasting demand from the cities dwellers as well as contributed to the environmental efficiency. It was assumed that a detailed study of the most important material flows and transport operations, from a regional viewpoint, with the application of appropriate tools of logistics and supply chain management, this could promote the agriculture sector economy on national and at the international levels.

The entrepreneurial strategic alliances and partnership between the local Malaysian agro suppliers and the supply chains SMEs of raw agro products from farm and in return sending agro fertilizer and chemicals definitely will reap in profit as there are high demands in agro mono commercial crops like rubber and fresh oil palm fruit bunches from the small holders. This sector has not really been tap into and the profit derive will be tremendous as well as to generate certain percentage of our national economic.

## **Objectives**

The objectives of this study are to determine benefits of entrepreneurial strategic alliances of SMEs in smallholders' agro monoculture logistic and supply chain. The initiative in tapping of cost effectiveness and economic of scale in the supply chain where both parties could create a win-win economic environment that govern inter- dependency and livelihood and maximization in the utilization of resources especially in agro logistic perspectives. This study also seeks to create awareness in the important of entrepreneurial strategic alliances in smallholders' agro monoculture initiative and increase the number of successful rural and suburban agro entrepreneurs, and seeks to provide a long term strategy to help smallholders as well as to create more opportunities for agro entrepreneurs either in the up-stream, middle or downstream business to consumer economy.

## **Literature Review**

The main aspects that needed to address in smallholders' agro monoculture need logistic and supply chain. Example scrap rubber, latex and fresh oil palm bunches produced by smallholders as well as agro chemical and fertilizer is considering bulky. Smallholders who placed orders normally are ranging from 3x 50kgs per every acres of between 4 to 6 months once will be weighting around 150kg from the agro supplies to the farm. On the other hand, agro suppliers could also reap in profits with ferrying function of provide logistic services in fetching out the monoculture products to the town to the hand of those buyers. Normally the logistic service provided could be managed by the agro suppliers with their own between one to three ton lorries. Whereas the big time estates where they have their own logistic service like trailers to facilitate the transportation of the bulky agro products such as rubber and oil palm..

The evolution of purchasing function from the traditional procurement service image that becoming integrated into the supply chain through improving both internal and external interfaces, (Leenders, 1994). The benefits and problems of the service perspectives were briefly mentioned. It



further elaborated that the purchasing function will have to shed its service and operational perspective and take on the challenge of effective contribution to organizational goals and strategies. Therefore it really suited the strategic alliances and smart partnership of marketing and retailing in smallholders' agro monoculture SMEs in supply chain between agro suppliers and their logistic counterparts.

The development of purchasing from a material acquisition function to supply chain management has been presented by researchers, (Fung, 1999). They have discussed the fact that the paradigm had shifted to recognizing every purchase as a sale and that purchasing is more than buying. The two aspect of marketing and retailing of agro supply chain management are actually interdependence, this is due to the nature of the product and the distance that agro suppliers need to send the agro supplies to the smallholders plantations and medium size estates.

The issue of who pays for the additional charge from a single transaction if it is not inclusive to the suppliers list of charges. The development of environment costs usually includes additional charge for the services provided. Logistics management refers to the concept of an organization achieving greater goods-related efficiency, whether those goods are raw materials for manufacturing, getting finished product to distribution centers, or forecasting with greater accuracy. Nearly all aspects of business from design through delivering as being contained within the supply chain (Anon, 1999). This also implies to the entrepreneurial strategic alliances and smart partnership of marketing and retailing in smallholders agro monoculture SMEs in agro mono products like scrap rubber, latex and fresh oil palm fruits bunches to the factory in Malaysia.

The ultimate goal of supply chain management is to integrate many of the aspects of total quality management that contribute to increased manufacturing efficiency and quality while reducing costs and maintaining the customer as the ending station of the production line (Daming, 1981). Therefore as for the smallholders agro monoculture supply chain marketing and retailing business, it is necessary to calculate this perspective, otherwise it may loose out to their competitors. Normally scrap rubber, latex and oil palm fresh fruit bunches will have to sell immediately or otherwise it will spoil and rotten. On the other hand, smallholders' farms need to be fertilizing with fertilizer and agro chemical for the de weeding process. All this will add up to the cost to maintain it. If those process not done immediately, it will also burden the logistic company in term of extra fuel to transport it to the buyers. Therefore properly planning and calculation need to be done.

As far as marketing and retailing are concern, the suppliers must understand that to conduct and survive alone will be a very difficult task. One need to collaborate with other quarters to formed alliances and create a win-win situation especially the supply chain of agro monoculture products and agro supplies which is considers being upstream business. Even they alone could provide logistic facilities but to what extend? Certainly the various task in the supply chain of agro monoculture produces and supplies would not be able to accomplish unless with some other quarter's assistance. Therefore to create a strategic entrepreneurial alliance is important to fulfill the demand in marketing and retailing of both parties. The three main important market driving forces urge supply chain partners to collaborate (Roekel *et. al.* 2002) namely market segmentation, consumers' demand and low cost strategy. Especially for chain partners in developing countries who wish to participate on the global market (far away markets), supply chain collaboration is of utmost importance for the connection with profitable markets and consumer's demands, the flow of information, goods, technology and capital and to limit transaction costs.

Supply chain system is defined as "planning, coordination and control to all business process in the supply chain system to provide the highest value to the consumer at the lowest cost and at the same time to give the highest return to the stakeholder" (Van der Vorst, 2000). Therefore the bulky task to managing the smallholders' agro monoculture produces and agro supplies of rubber and oil

palm have a good supply chain system. What's more of transfer or loading, transportation and reloading on the smallholders' plot of land in the rural areas?

Therefore in the entrepreneurial strategic alliances and partnership of marketing and retailing of smallholders' agro monoculture supplies need to have a good supply chain maximization management system. Supply chain can also be defined as a series of physical activities and decision making is united with good flows, information, rights on goods throughout all levels and the participant of the organization. The supply chain combines various mediator and entities for example factories and its suppliers, logistics, warehouse, wholesaler, processor and consumer. Thus the supply chain can be defined from the perspective of "network" that connects various participant (or agent or entity) in the industry. Supply chain can also be defined as "a network between business entity that is responsible of procurement activity, production and distribution of output of various related output" (Billington, 1994).

Every entity in the chain has different objective and limitations, but they need and depends on each other to make sure the supply chain reached its objective, such as on time delivery, quality and minimizing cost. Thus the performance of every entity in the supply chain depends on the performance of other entity and their willingness and ability to coordinate the activities in the supply chain (Swaminathan, Smith and Sadeh, 1998). Therefore, as for the smallholders' agro monoculture suppliers, they need to be precision in accomplishing their task of delivery. Planning is very important in these perspectives because to prepare the transportation of scrap rubber, latex and fresh oil palm fruit bunches directly to the collecting centers, warehouse, or factory and sending the agro supplies directly to the farms. All this task need precision synchronizing, otherwise it will be too early or too late to supply to the customers and loose out to other supplying competitors. Therefore, the management of the performance in the supply chain is important at both level of individual and organizational. The management of the performance of supply chain system can be defined as a cycle covering problem identification, understanding main problem, taking decision to overcome the problem, validating the data and process (Kuei, Madu, Lin, and Chow, 2002).

The calculation of cost to market and retail the much sort after smallholders' agro monoculture produces and agro supplies, among the important management aspects are delivery cost, efficiency, fast response, high quality services and quality of goods. The management of performance has to be done by all parties in various levels in an organization. In reality, for an entity to maximize profit in business it has to take a strategy that will bring benefit to their entity without disrupting the supply chain system performance. Based on the supply chain system definition in the literature, studies have identified six main elements that have been main indicators that determine the system. These elements are individual, supplier, governance, quality system, technology and logistics.

A good supply chain of agro supplies will also bring additional benefit to business operation. Supply chain models allow emphasis on operational information, especially in material, information and financial flows in a marketing cooperative (Hovelaque, Duvaleix-Tréguer and Cordier (2009). It is also equally important to determine variables used for determining performance. Study has been done on supply chain design and analysis to determine appropriate performance measures to determine efficiency of existing system (Beamon, 1999). Performance measures are also use to design proposed system by placing importance on decision variable that yield highest desirable level of performance. Among performance measure that can be used are to minimize cost, minimize average inventory level and to maximize profit.

On the other hand, this study is most interested to know on what variables that determine or contribute to performance. A conceptual framework has been developed for measuring the performance of agriculture supply chain, that indicators are grouped in 4 main categories which are

efficiency, flexibility, responsiveness and food quality (Aramyan *et. al.* 2007). These are also viewed as key performance indicators to as each supply chain member are also evaluated using these four categories.

### **Framework**

The dependent variable in this research is entrepreneurial strategic alliances of SMEs in agro suppliers' smallholders' agro monoculture logistics and supply chain whereas independent variable comprises of smallholders; agro suppliers; logistics and supply chain; managerial strategies; business culture and practices.

### **Research Methodology**

This study uses survey methodology as researchers are able to gather data from the respondents, namely local Malaysian agro suppliers from four states of Malaysia, namely Johor, Pahang, Negeri Sembilan and Selangor, as these four states are the cradle of Malaysia's smallholders monoculture of rubber and oil palm. This is to determine more about the profits sharing system in the supplying the agro supplies supply chain and logistic of agro monoculture produces, a set of questionnaires has been designed and at the same time sessions of face to face interview the producers in the upstream and agro suppliers in the downstream to gather better insight of the whole smallholders agro monoculture logistic and supply chain enterprises..

Questionnaires tabulated comprised of 4 parts were design, which is the demographic continuum of the smallholders' SMEs and local Malaysian agro supplies suppliers, working experiences, business instinct and managerial quality.

The local Malaysian agro supplies suppliers were selected on the basis of their consistent presence in the market, their having been in business for at least a year and operation. The respondents were randomly selected of 30 agro supplies x4 (120 agro suppliers) and 30 smallholders in the rural region of each of the four states x4 (120 smallholders) were interviewed in this study, representing 20% of all the agro suppliers and smallholders in Malaysia..

### **Result**

Reliability of instruments - Cronbach Alpha statistic is found to be 0.918; therefore the reliability of the questionnaire is acceptable.

### **Data Analysis**

#### **Descriptive Statistics**

The respondents' demographic characteristics of this research comprise of 120 respondents each of local Malaysian agro suppliers and 120 smallholders from four states of Malaysia, namely Johor, Pahang, Negeri Sembilan and Selangor convenient randomly selected. Therefore total respondent in this research is 240 respondents. 83.3% are males and 16.7 are females. Combinations of races are 50 % Malays, 41.7% Chinese and 8.3% Indian. Their age combination is 12.5% between 21 – 30 years old, 33.3% between 31 – 40 years old and 54.2% are above 41 years old.

Education levels of respondents are 50% each of lower secondary and 50% more are upper secondary. 83.3% of the total respondents were married and the remaining are still single. 62% of respondents achieve annual income of less than RM30 000, 10.7% achieve between RM30 001 – RM45 000. 12.5% achieve RM45 001 – RM55 000. Only 6.3% achieve more than RM55 000

**Discussion**

**Table 1: Estimated Yearly Return of Agro Suppliers**

	Frequency	Percentile
>RM500000	10	8.4
RM400000 – RM490000	22	18.3
RM300000– RM390000	25	20.8
RM200000 – RM290000	28	23.3
<RM190000	35	29.2
Total	100	100

	Frequency	Percentile
>RM500000	10	8.4
RM400000 – RM490000	22	18.3
RM300000– RM390000	25	20.8
RM200000 – RM290000	28	23.3
<RM190000	35	29.2
Total	100	100

Based on Table 1 above, it shows there are thirty five agro supplies suppliers received less than RM190000. Twenty eight of them received between RM200 000 to RM290 000. There were twenty five agro suppliers earning more than RM300 000 to RM390 000. There are twenty two of them earning between RM400 000 to RM490 000 annually. On average, these suppliers were generally earn between average of RM300 000 to RM400 000 per year from selling of agro supplies and collecting of agro produces using chartered or self transportation.

**Table 2: Monthly Maintenance Budget /Acre of Agro Monoculture**

	Frequency	%	Valid Percent	Cumulative Percent
<RM1000	40	25.0	25.0	25.0
RM1001 - RM5000	60	50.0	50.0	75.0
RM5001 - RM10000	10	12.5	12.5	87.5
RM10001 - RM15000	10	12.5	12.5	100.0
Total	120	100.	100	

Table 2 above shows half of respondents have to bear maintenance cost of between RM1 001 to RM5 000 for their agro monoculture venture. There are forty of them spent less than RM1 000, and ten each of RM5 001 – RM10 000 and RM10 001 – RM15 000 respectively. The cost of maintenance is a must because to produce the best quality of agro monoculture produces that will yield higher income for the farmers' livelihood through the demand from the consumers.

**Table 3: Type of Agro Monoculture Farmers Used**

	Frequency	%	Valid Percent	Cumulative Percent
D X P GUTHRIE	75	75.0	75.0	75.0
Rubber (RRIM)	45	45.0	45.0	100.0
Total	120	100.0	100.0	

Table 3 above shows all the respondents who planted their smallholding with either oil palm of Guthrie Clone as this type of D X P can maximize its yield by second years after planting with proper maintenance. This variety of oil palm is stunted in nature and smaller font that enable the penetration of sunlight for the high percentage of oil content of its fruit bunches whereas the rubber variety come from RISDA, which is the government agency providing high yielding cloning to the smallholder and pay subsidies in the form of cash and material.

**Table 4: Results of Pearson Correlation tests (Agro suppliers)**

Correlation test	<i>t value</i>	<i>P value</i>	N
Agro suppliers' maintenance of own logistic and supply chain	0.67	< 0.001	120
Independent Logistic Providers' services render in logistic and supply chain in agro monoculture	0.786	< 0.001	120
Quality of agro supplies to stallholders	0.749	<0.001	120
Agro suppliers' work culture and ethic	0.835	<0.001	120

Note:  $\alpha = 0.05$ ;  $r$  = correlation coefficient; N= Total respondents

Table 4 above shows that as far as agro suppliers are concern, the maintenance of agro suppliers' own logistic and transportation of agro produces to factories and transferring agro supplies to the smallholders. The independent logistic providers' who rendering their logistic services and supply chain services to the smallholders and agro suppliers for a profit from the four states also shows high relationship. The quality of agro supplies as well as the ethic and work culture of agro suppliers from the four states in Malaysia shows significantly in high relationship too. Therefore, it is wise for the tripartite to collaborate and form a smart partnership in the smallholders' monoculture entrepreneurial strategic alliance to reap in profit together.

**Table 5: Results of Pearson Correlation tests (Agro Smallholders Monoculture)**

Correlation test	t value	P value	N
Smallholders initiatives in produce quality monoculture produces in logistic and supply chain	0.790	< 0.001	120
The proper maintenance of smallholding	0.673	< 0.001	120
Smallholders collaborative effort with the association and agro suppliers in the agro monoculture supply chain	0.756	< 0.001	120
Smallholders' acceptance of agro produces price.	0.655	< 0.001	120

Note:  $\alpha = 0.05$ ;  $r$  = correlation coefficient;  $N$  = Total respondents

Table 5 above shows that the smallholders from four states in Malaysia also significantly high in relation on their initiatives in produces high quality monoculture produces, as well as proper maintenance of their holdings. Therefore they are willing to spend money in buying adequate agro supplies such as fertilizers and agro chemical to increase the productions for the ever demanding both local and foreign market.

It also show that smallholders are willing to collaborate with each others through their smallholders association and agro suppliers in the agro monoculture logistic and supply chain ventures, this is due to they knew that they need each others for their survival and country's economy. With the smallholders willingness to collaborate, this also show that they are complement with the price paid to their agro produces.

Smallholders tends to demanding for more value added services from logistic services providers (LSPs), (Wagner, 2008 and Van Laarhoven *et. al.* 2000). Therefore the agro supplies suppliers need to employed foreign workers like Indonesian, Nepalese, Bangladeshis or local part time laborers to carry out the work of loading and unloading the agriculture supplies as those materials like fertilizer and chemical are heavy in nature. This will added up extra cost if the agro suppliers were to using their own transportation or otherwise they can outsource to the logistic services provider itself to deal with the demanding smallholders. They deliver two to three time per week either to the smallholders' house or plantation.

Many times, the smallholders will have to carry by themselves with their station wagon or motorcycle. Minimum weight of agro fertilizer per bag will be approximately 50 kg unless the smallholders order in quantity that is big enough for the agro supplier to send through their own lorry or otherwise, the smallholders have to carry by themselves.

On the other hand, they will buy the agro produces from the smallholders at a very low price. Therefore, in actual sense, the agro suppliers are actually profiteering from this venture. The victims are the smallholders.

The cost of transferring agro supplies to the smallholders were borne by the smallholders, unless they are willing to carry themselves, which is very bulky and heavy. But to carry in small quantity to the smallholding with motorcycle or station wagon sometime is advisable due to the nature of the route, namely red mud route to the smallholding or if the smallholders are not going to put fertilizer yet, they will prefer to be sending to their home temporary.

In term of agro produces like rubber and fresh oil palm bunches. Definitely that the smallholders need to send or sell it to the agro collecting centers which located about between 3 – 8 kilometer away from their smallholders. Therefore the earning of the smallholders is dilute again due to the scavenging nature of the agro middlemen who act as the agro produces collectors.

It is in fact that the entrepreneurial strategic alliances and smart partnership of marketing and retailing in small and medium enterprises in agro supplies and agro monoculture produces supply chain would be most advantages and beneficial if the various agro supplies suppliers and the smallholders association as well as government agro agencies could participate together and form a cartel that enable the flow of transactions with the industry and logistic providers. Most of the smallholders want the suppliers of agro supplies to provide quality and guaranteed agro supplies to the smallholders. Most importer are not uniformly pessimistic about the ability of smallholders to meet their demand and almost one third agreed that they would work with smallholders because importers are interested in transactions in which the product meets consumer and government expectations and is grown on the buyer's term, the grower is reliable over time, the transaction is simplified and the grower handles transportation.

Local agro supplies supply chain need to gain the trust from the consumers whom consist of land owner, smallholder, estate operator and contractor as well as the government agencies like RISDA, Felda and Felcra that place large amount of orders from time to time since their land areas cover thousands of hectares and planting and replanting from stages to stages. These ventures need a lot of agro supplies from time to time. Customer satisfaction and service is perceived as more enduring than cost savings (Fawcett, et. al. 2008) All managers recognize technology information and measurement system as major barriers to successful supply chain collaboration. However, the people issues such as culture, trust, aversion to change, and willingness to collaborate are more intractable. People are the key bridge to successful collaboration innovation and should therefore not be overlooked as companies invest in supply chain enables such as technology, information and measurement systems.

There is another issue pertaining to the strategic alliances between the agro supplies suppliers – logistic – smallholders in the supply chain of agro supplies and agro mono produces, namely social exchange and goal interdependence. The importance of relationship stability, trust of supplier, relational capital and commitment exert significant effects on the performance of supply chain alliances (Yang, 2009). Collaboration from the perspective of social exchange and goal interdependency will yield perfect combination among the various quarters. The antecedents of relational stability in supply chain alliances and if the stability affects alliance performance in supply chain (Yang, et. al., 2008). Then both the relational commitment and trust of supplier have positive effects on relational stability in supply chain alliance which in turn positively affects the alliance performance

Due to competitions, the agro supplies suppliers and agro logistic not only need to collaborate among themselves but also with the logistic providers. Companies nowadays will try to find ways to conduct their business and transactions in order to cope with the said increasing competitions more efficiently and effectively. Companies are increasingly aware that they need to work together with their logistics partners in order to best serve their customers and achieve business excellence (Buyukozkan, et.al., 2008). However, the selection of a suitable partner for strategic alliance in a logistics value chain is not an easy decision and is associated with uncertainty and complexity.

### **Conclusion and Recommendations**

The Malaysian government's national agriculture economic plan has chart the growth of agriculture sector as the third engine of national economic growth, the expectation of more individual and groups to involve in this sector has increase. This includes the upstream and downstream entrepreneurial ventures. Education is the most important tool to push forward the ideals. With education, the individual who involve could also utilize the know-how from the digital technologies especially ICT to constantly improve the sector.

Government intervention is necessary because the logistic provider will prey on the smallholders and they themselves always fall prey to the unscrupulous traffic enforcers if they carried or overloaded the lorry with agro produces especially oil palm and rubber. There must be some form of standard procedure set by the transport ministry to enable the small logistic companies to earn a living by collaborate with the smallholders agro monoculture venture and supplier to form a supply chain platform in providing services for this sector. Another way is to grant more licenses and reduce road tax of the logistic to make the supply chain business more competitive.

A nation-wide smallholder's agro monoculture and supplies logistic supply chain cooperative should be set up to facilitate the business competitiveness in supplying agro supplies throughout the country. This could bring sustainability and growth in this sector. Collaboration between agro supplies suppliers-logistic to form a national supply chain systematic platform and create entrepreneurs in this sector would be another option to boost the trade of agro monoculture supply chain in Malaysia.

A high impact logistic smallholders agro mono culture supply chain for oil palm comprising of oil palm smallholders - RRIM – MARDI –FAMA- MPOB – PORIM strategic alliances should be form at the national level and supervise by the collaborations of the Ministry of Agriculture and Ministry of Transport whereas another strategic alliances of rubber smallholder – RRI- RISDA and rubber suppliers cum logistic entities at national level should form. This would spur further the growth of smallholders' agro monoculture supply chain in Malaysia.

The Strategic alliances between smallholders and agro suppliers in logistic and supply chain may set forth an entrepreneurial venture and equity shared equally among them in the combine effort to prosper the agriculture community in Malaysia.

The Malaysian government may consider granting subsidies to individual or groups of agro suppliers and private logistic providers and companies for them to be competitive and further encourage the communal support especially from the smallholders and rural farmers' community. This would enable the realization and prosper of entrepreneurial strategic alliances and smart partnership of marketing and retailing in small and medium enterprises in smallholders' agro monoculture supply chain



## References

- Anon (1999). "LRN Automotive Supply Chain Re-Engineering Workshop." *Logistics Focus*, May, 7 (4), 43-44.
- Aramyan L.H., Lansink A.O., Van der Vorst J.G. and Van Koten O. (2007), Performance measurement in agri-food supply chains: a case study, *Supply Chain Management: An International Journal*, 12( 4), 304–315.
- Beamon, B. M. (1999). Measuring Supply Chain Performance. *International Journal of Operations & Production Management*. 19(3-4), 275-92.
- Billington C. (1994). Strategic Supply Chain Management. *OR/MS Today*, April . 20-27.
- Buyukozkan G., Feyzioglu O. and Nebol E. (2008). Selection of the Strategic Alliance Partner in Logistics Value Chain. *International Journal of Production Economics*, 113 (1), 148-158.
- Daming W.E (1981). Improvement of Quality and Productivity through Action by *Magement*, *National Productivity Review*, Winter 1981 -1982, Pp.12-22.
- Fung, P. (1999). Managing purchasing in a supply chain context - Evolution and resolution. *Logistics Information Management*, 12(5), 362-367.
- Fawcett, S.E., Magnan, G.M., and McCarter, M.W. [2008], 'Benefits, barriers, and bridges to effective supply chain management', *Supply Chain Management: An International Journal*, 13(1), 35-48.
- Hovelaque V., Duvaleix-Tréguer S. and Cordier J. (2009). Effects of constrained supply and price contracts on agricultural cooperatives, *European Journal of Operational Research* 199 (2009), pp. 769–780.
- Kuei, C., Madu, C.N., Lin, C., and Chow, W.S. (2002). "Developing strategies based on the survey of supply chain quality and technology management," *The International Journal of Quality & Reliability Management*, 19(7),889-901.
- Leenders, M.R. (1994). Adapting purchasing to supply chain management. *International Journal of Physical Distribution & Logistics Management* 24(1), 40-42.
- Roekel, J. V., Willems, S., & Boselie D. M., (2002). To Stimulate Cross-Border Trade I developing Countries and Emerging Economics. *World bank Peper Cross Border Agri Supply Chain Management*. S-Hertogenbosch, 19 August 2002
- Swaminathan J.M., Smith and N. M. Sadeh (1998). Modeling Supply Chain Dynamics: A Multiagent Approach, *Decision Sciences Journal*, 29 (3), 607-632.
- Van der Vorst, J.G.A.J., (2000). Effective food supply chains: generating, modelling and evaluating supply chain scenarios. Proefschrift Wageningen 24, available at: [<http://www.library.wur.nl/wda/dissertations/dis2841.pdf>] [accessed on 27 July 2012]
- Van Laarhoven, P., Berglund, M., Peters, M. (2000), "Third-party logistics in Europe –five years later", *International Journal of Physical Distribution & Logistics Management*, 30(5), 425-442.
- Wagner, M., Franklin, J. (2008), "Why LSPs don't leverage innovations", *CSCMP's SupplyChain Quarterly*, 4, 67-71.
- Yang, J., Wang, J., Wong, C.W.Y., Lai, K-H. (2008). "Relational stability and alliance performance in supply chain", *Omega*, 36(4), 600-608.

Yang, J (2009) The Determinants of Supply Chain Alliance Performance: An Empirical Study.  
*International Journal of Production Research*, 47(4)105 -1069.

# Leveraging Environmental Sustainability in West Africa: From Crossroads to Concrete Plans

---

**Peter Elias**

*Department of Geography, University of Lagos, Akoka-Yaba*

[pelias@unilag.edu.ng](mailto:pelias@unilag.edu.ng) & [po\\_elias@yahoo.com](mailto:po_elias@yahoo.com). Tel: +234-803401411

**Olatunji Babatola**

*Department of Geography, University of Lagos, Akoka-Yaba*

## **Abstract**

This paper proposes concerted, coordinated and concrete response to leveraging environmental sustainability that is mutually agreed and beneficial across states, levels and sectors in West Africa. The issues of environmental sustainability have continued to generate concern among researchers, practitioners and policy makers. Knowledge, technology and resources in the West African sub-region to ensure environmental sustainability are available today and hopes of future progress are indeed cheering. Yet, the sub-region has remained at the crossroads of development too long. The failures that add up to extreme poverty and hunger are mindboggling, from environmental changes, desertification and deforestation, social exclusion, indiscriminate extractive activities, and energy poverty to unguided urbanization, explosive demographic changes, energy poverty, armed conflicts and human insecurity, weak governance and institutions. The millennium development goal one: to eradicate extreme poverty and hunger may not be easily achieved without concrete steps and action plans to ensure environmental sustainability (goal seven). This paper focuses on the West African sub-region where most of the states rank lowest in global indicators and the prospects of achieving the millennium development goals are slow. By using extensive review of basic global indicators, policies of national governments and analysis of existing data, the paper examines the nexus between environment, poverty and hunger in West Africa. The paper underscores the need for national governments to understand the linkages between environment and other sectors and pursue developmental agenda that will eradicate poverty, inequality, climate change, human insecurity among others. Such policies must also reduce the negative impacts of urbanization and over-reliance on foreign aids. It is desirable that national governments within the sub-region seek to sponsor home grown initiatives and policies that recognize local resources, capacities and peculiarities.

**Key words:** millennium development goals, poverty, inequality, urbanization, policy

## 1. Introduction

There is undeniable nexus between environment, poverty and hunger in the West Africa sub-region. The quality of the environment and sustainable development are the determinants of human livelihoods and welfare. Most human activities and infrastructure including water, agriculture, food production, health, education, and employment are dependent on these. The West Africa sub-region is the most endowed in environmental resources and yet highly impoverished in Africa. It is plagued with lassitude, extreme poverty and underdevelopment with implications for ecosystems, human health, food security, economic activity, water, environment and sustainability. Global indices such as wellbeing (quality of life, human development index, life expectancy, inequality, poverty, malnutrition, literacy and education), urbanization, Gross National Income (GNI) and governance with respect to the sub-region are worrisome (See Table 1).

**Table 1: Socioeconomic indicators of West Africa**

Country	Land Area (thousands of sq km)  2010	Population			Migrant s (exclud ing refugee s) As % of total 2000	Life expecta ncy at birth (%) 2009	Literacy (as % of adults 2010 or latest)	Education (primary enrolment % 2010 or latest)	Under- Nourished (as % of population 2007)	Improved facilities (% of total with access to)	
		1,000s (2010)	% growth rate (2005- 10)	Pop. Density						Water 2010	Sanitation 2010
Benin	111	8,850	3.0	80	2.5	57	42	92	12	75	13
Burkina Faso	274	16,469	3.0	60.2	6.4	52	29	63	8	79	17
Cape Verde	4	496	1.0	123.1	2.4	71	85	83	11	88	61
Cote d'Ivoire	318	19,738	1.8	62.1	11.2	50	55	57	14	80	24
The Gambia	10	1,728	2.8	172.8	16.6	60	46	67	19	89	68
Ghana	228	24,392	2.4	107.2	7.6	60	67	76	-	86	14
Guinea	246	9,982	2.0	40.6	3.8	52	39	73	16	74	18
Guinea Bissau	28	1,515	2.0	53.9	1.2	49	52	52	22	64	20
Liberia	96	3,994	4.5	41.5	2.3	56	59	75	32	73	18
Mali	1,220	15,370	3.1	12.6	1.2	53	26	75	12	64	22
Mauritania	1,031	3,460	2.5	3.4	2.9	58	57	76	8	50	26
Niger	1,267	15,512	3.5	12.3	1.3	57	29	57	16	49	9
Nigeria	911	158,423	2.5	173.9	0.7	54	61	61	6	58	31
Senegal	193	12,434	2.7	64.6	1.6	62	50	73	19	72	52
Sierra Leone	72	5868	2.6	81.9	1.8	49	41	-	35	55	13
Togo	54	6,028	-1.3	110.8	2.7	59	57	93	30	61	13

**Source:** Smith Dan, State of the World Atlas, 2012

It shows global indicators of UN and World Bank which suggests that the sub-region is the worst off. The UNDP Human Development Indicator, for instance, ranks some countries in the sub-region between 144 and 173 out of 174 countries surveyed (UNDP, 1998). In all, with a population of over 260 million the sub-region is under the burden of rapid population growth, poverty and disease, inappropriate services and poor infrastructures, inadequate health services and growing food insecurity with the results of civil unrests and armed conflicts (Denton et al, 2001).

A number of reasons for this situation include state of the environment; lack of capacity to carry out strategies for development; the susceptibility of markets to external shocks; internal

conflicts and insecurity; and the lack of demographic policy. Environmental sustainability is the key factor for the realization of the millennium development goals (MDGs) in the sub-region as all these goals are interdependent. Environment is complex and dynamic when understood to comprise of all living and non-living components of the earth systems together with their interactions. The core targets of environmental sustainability in the millennium development goal are to halt the unsustainable use of environmental resources, biodiversity loss, proliferation of slum settlements, water scarcity and indiscriminate dumping of waste.

This makes it imperative for the sub-region to integrate the values of environmental sustainability into their policies and programmes for the realization of the MDGs. In this context, it is necessary to examine the specific issues of environmental sustainability in the sub-region within the broader global Millennium Development Goals (MDGs) and continent-based National Economic Empowerment and Development (NEPAD) framework. This paper is organized into four sections viz; (1) introduction; (2) overview of policies on environmental sustainability; (3) challenges of environmental sustainability; and (4) moving from crossroads to concrete plans. It concludes with section (5) dealing with some concluding remarks and recommendations.

## **2. Overview of policies on environmental sustainability in West Africa**

Although this paper is concerned with environmental sustainability there is the need to discuss other related issues to show their synergy in the overall sustainable development of the sub-region. More so, the environment has direct and indirect linkages with these components and together contributes to sustainable development. The West African states are beginning to adopt aggressive economic reforms precipitated by the failure of the state-led economic initiatives. In the new regime, the economic sector is being largely driven by private-sector led strategies. This is also due to the fact that the states could not mobilize the enormous resources required for economic development and poverty reduction (NEPAD 2006a). There are concerted efforts aimed at creating enabling environment for businesses in the sub-region to attract foreign investors and to encourage the growth and development of home grown small and medium enterprises (ECA, 2005). Furthermore, the sub-region is emphasizing economic growth and development that considers environmental concerns that are peculiar to the member states rather than strictly pursuing a global agenda. Considering the proportion of the rural population involved in agricultural activities; it shows clearly why poverty is entrenched in the sub-region. To successfully reduce poverty (by 2015) as proposed in the MDG means that there must be sincere strategies to raise the lives of the rural population and change their livelihoods (Jean-Philippe and Sappo, 2005).

This has led to the revival of interests in pro-poor development strategies focusing on diversification of agricultural production, market liberalization and increasing competitiveness of local commodities. The sub-region also has other micro-economic objectives including to: (i) achieve real gross domestic product (GDP) increase between 4% and 6% per annum; (ii) reinforce public finance by improving the recovery of receipts and the control of payments; and (iii) deepen and accelerate the structural reforms involving the reform and privatisation of public enterprises (Denton, et al, 2001). Furthermore, the sub-region pursues regulatory authorities in regional issues modelled after the EU and this includes five cardinal objectives to: (i) encourage competition; (ii) achieve fusion between sectoral policies and macro-economic policy indicators; (iii) create a common market; (iv) co-ordinate sectoral policies; and (v) align budgetary policies. Another policy of the sub-region is the prohibition of the introduction of protectionist trade barriers between member states and measures of surveillance of the alignment of economic policy with a provision for sanctions (Denton, et al, 2001).

To propel the African continent and the West African sub-region specifically to economic progress and environmental sustainability African leaders have also put in place strategies to create a

common platform for integrated development of the region and sub-regions. There have been giant strides in sectors such as trade, communications, macroeconomic policies and transportation in the West African sub-region. Notable examples of such progress in the sub-region include the ECOWAS passport to facilitate cross-border movements of their nationals. It has also taken great strides in the areas of peace and security within the sub-region. There are concerted efforts towards combating energy poverty, HIV/AIDS, crimes, technology backwardness and natural resource development.

The link between environmental sustainability and economic growth on the one hand and between economic growth and sustainable development on the other has increased the number of programmes and policies addressing environmental concerns. It has also influenced the general way development in the sub-region is carried out. There is also increasing modification of national environmental policies from large-capital intensive, single-sector projects toward a new emphasis on bottom-up, participatory and multi-sectoral approaches since the last three decades.

While recognizing and committing to global initiatives, governments of nations of the sub-region are emphasising location- and sector –specific platforms for tackling the challenges of environmental degradation, pollution and other environmental stresses. This is based on the need to promote local experiences, capacities and resources for the enhancement of agricultural productivity and environmental sustainability.

For instance, energy drives all sectors of the economy. This underscores the need for safe, secure and efficient energy supply. Electricity is the major energy for public use and it is usually provided by national governments or private utility companies. Owing to the growing inefficiency associated with electricity supply most governments have begun to embrace privatization and liberalization of the energy sector for competitiveness and consumer choice. The national government is however responsible for providing enabling environment by checking market abuse, ensuring good service and promoting transparency. The introduction of Independent Power Projects (IPPs) and Independent Power Distributions (IPDs) are examples of private public partnership. Ghana and Cote D'Ivoire have made substantial progress in IPPs while only Ghana has introduced IPDs as part of their power sector reforms (ECA, 2008). Furthermore, over ninety per cent of the populations of this sub-region do not have access to regular electricity and lack clean and sustainable energy for domestic uses. This underlies the constraints on the path to economic progress and prosperity which results in indoor air pollution with its environmental and health implications. There have been initiatives from global to national to local levels addressing issues of engaging small and medium scale entrepreneurs to promote and provide clean energy services using renewable energy sources and technologies. The efforts will hopefully develop new capacities and skills involving small and medium scale enterprises (SMEs), nongovernmental organizations (NGOs), financial institutions and development agencies to nurture local energy enterprises while fast-tracking the use of renewable energy expertise.

Thus, in recognizing the place of traditional biomass in rural lives and economies, there have been public policies aimed at sustainable use and management of forest ecosystems and services. With global support and funding from international agencies such as Global Environmental Facility (GEF) and United Nations Environmental Programme (UNEP) aimed at creating awareness and enlightenment, enforcing environmental protection and conservation and community-based management of forests have been on the increase in many rural communities of the sub-region. Given the level of understanding and commitments from governments at the local and national levels, more positive impacts are being recorded.

Moreover, the increasing recognition of the contribution of human settlements to sustainable development has received considerable attention globally and has been adopted in major policies of the sub-region. The constraints and prospects of rural-urban linkages have generated integrated rural and urban planning strategies enshrined in the philosophy of sustainability. At the local, national and

sub-regional levels, there are strategies aimed at improving the economies of rural areas including agricultural productivity, improved livelihoods, stabilizing prices of agricultural products, diversification of rural economies, and local capacity building. These strategies could result in lasting poverty reduction of the rural populations. Besides, by promoting bottom-up development initiatives, increased access and participation in public governance is beginning to bloom. The complexity of urban areas and problems has led to proactive policies based on popular participation and decentralization of governance to local levels. The institutionalization of local administration is giving voice to vulnerable groups in the urban areas including women, youths and children. For example, The Cities Alliance and the Energy Sector Management Assistance Program (ESMAP) have galvanized great partnership and institutionalized local level programmes with Slum Dwellers International (SDI) in the Cities Alliance global program: Land, Services and Citizenship for the urban poor. At the heart of the programme is the passion to reduce the impacts of rapid urbanization, growing cities and deepening urban poverty in the sub-region that have shown considerable desire and prospects to change.

### **3. Challenges of environmental sustainability**

From the foregoing it is obvious that there are a number of policies already implemented or being implemented in the sub-region with regards to environmental sustainability. However, these initiatives are bedevilled with a number of threatening issues highlighted hereunder. Poverty is a progress and prosperity threatening issue in the sub-region. At the 2000 United Nations Millennium Summit, the world rich nations committed themselves to the Millennium Development Goals to eradicate poverty and the associated ills of hunger, disease, illiteracy, environmental degradation and discrimination against women (UN, 2006a). There are 11 out of 16 West African countries classified as Least Developed Countries (LDCs) with one citizen out of two in the least developed countries living on less than US\$ 1 a day and projections even show that this number will increase rather than reduce until 2015. This situation seriously threatens the achievement of the MDG in the sub-region. Besides, there is marked income inequalities in the sub-region without obvious strategies for income redistribution. This has entrenched poverty and increased civil disturbance and political instability across the sub-region. Closely linked to this is the nature and process of harnessing environmental resources (See Table 2). The disheartening status of the sub-region with regards to Human Development Index is further amplified in the indices of gender inequality, corruption perception, and Gross National Income (GNI) per capita. Moreover, the disparities in economic and environmental indicators among the states are clearly demonstrated in the statistics shown below.

**Table 2: Economy and Environment in West Africa**

Country	Human Development Index	GNI PPP\$		Gini Index	Gender Inequality Index	Govt. Gross Debt Index	Corruption Perception Index	Shadow economy	Energy Use		Military expend.	CO <sub>2</sub> emissions	Water withdrawals	
		Total millions 2010 or latest	Per capita 2010 or latest						Million tonnes oil equiv. 2009	kg oil equiv. per capita 2009			Cubic metres per capita 2010 or latest	As % of renewable resources 2008 or latest
Benin	0.427	14,048	1,580	38.6	0.63	31	3.0	50	3	404	1.5	0.5	19	1
Burkina Faso	0.331	20,658	1,250	39.8	0.60	28	3.0	41	-	-	1.3	0.1	76	8
Cape Verde	0.568	1,841	3,790	50.5	-	80	5.5	35	-	-	0.6	0.6	49	7
Cote d'Ivoire	0.400	35,756	1,800	41.5	0.66	67	2.2	45	10	535	1.4	0.4	82	2
Gambia	0.420	2,246	1,290	47.3	0.61	57	3.5	44	-	-	0.7	0.3	52	1
Ghana	0.541	39,439	1,600	42.8	0.6	41	3.9	41	9	388	0.7	0.4	49	2
Guinea	0.344	10,211	1,020	39.4	-	89	2.1	39	-	-	1.6	0.1	188	1
Guinea Bissau	0.353	1,1795	1,180	35.5	-	48	2.2	41	-	-	1.6	0.2	136	1
Liberia	0.329	1,365	340	38.2	0.67	119	3.2	44	-	-	0.9	0.2	60	0
Mali	0.359	15,758	1,020	38.0	0.71	28	2.8	41	-	-	2.0	0	545	7
Mauritania	0.45	8,338	1,950	40.5	0.61	86	2.4	-	-	-	3.8	0.6	572	14
Niger	0.295	11,178	720	34.6	0.72	18	2.5	-	-	-	1.0	0.1	202	1
Nigeria	0.459	354,946	2,160	48.8	-	16	2.5	-	108	701	0.9	0.6	79	4
Senegal	0.459	23,810	1,910	39.2	0.57	38	2.9	44	3	243	1.7	0.4	222	6
Sierra Leone	0.336	4,851	820	42.5	0.66	57	2.5	46	-	-	0.6	0.2	110	0
Togo	0.435	5,391	890	34.4	0.60	28	2.4	-	3	445	1.6	0.2	33	1
Average	6.51	561631	23320	651.6	7.64	831	46.6	511	136	2716	21.9	4.9	2474	56
Std Dev.	1.48	152473.6	5358.6	148.23	1.94	191.09	10.63	129.97	57.44	866.98	5.04	1.13	585.88	13.29

**Source:** Smith Dan, State of the World Atlas, 2012

The unsustainable extraction of natural resources in the sub-region has generated global concern as it poses great environmental challenge. The present desire in the region to achieve its development objectives through the extraction of natural resources has negative implications for the environment. This will result in undesirable consequences for future generations. The need to prevent this condition is more pertinent now than ever. This necessitates the pursuit of development that is both sustainable and ecologically friendly for the sub-region. Furthermore, the economic growth resulting from oil and gas, and mining has no capacity to create jobs and eliminate poverty. The sub-region perpetuates the culture of subservience and docility since all that the sub-region does is to directly export these resources as raw materials to the ever expanding European and American markets. Without concerted efforts to add value it will be impossible to propel the growth of local industries and effectively and sustainably create employments. Furthermore, the extractive activities are known to be unevenly distributed leading to inequality among places and peoples. This calls for aggressive and sustainable pursuit of an inclusive growth that affects all regions, sectors and populations of the sub-region.

At the heart of the current challenges confronting the region is the rapid population growth and demographic changes. These changes including the rate, size and spread of population in the sub-region are increasing the pressure on available natural resources and urban infrastructure leading to increasing natural resource based conflicts, migrations and urban poverty. With an average annual



growth rate of about 3 per cent the sub-region is one of the fastest growing regions of the world. The challenge is that Gross Domestic Product (GDP) has not kept with the pace of population growth thus leading to increasing decline in the quality of life and extreme poverty. Indeed, the evident disparities among states in the sub-region are further highlighted in Table 3 below.

**Table 3: Gross Development Products Current values (\$ millions)**

Country	1980	1990	2004	2005	2006	2007	2008	2009	2010
Benin	1,405	1,845	4,047	4,287	4,735	5,546	6,683	6,585	6,558
Burkina Faso	1,929	3,101	5,109	5,463	5,845	6,756	8,351	8,348	8,825
Cape Verde	142	307	924	972	1,108	1,331	1,562	1,601	1,659
Cote d'Ivoire	10,175	10,796	15,481	16,363	17,367	19,796	23,414	23,042	22,921
Gambia	241	317	579	636	667	833	1,037	983	1,050
Ghana	4,445	5,886	8,872	10,720	20,388	24,632	28,527	25,979	32,175
Guinea	-	2,667	3,666	2,937	2,821	4,209	3,778	4,165	4,736
Guinea Bissau	111	244	523	573	579	691	847	835	835
Liberia	855	384	467	542	604	739	851	879	988
Mali	1,787	2,421	4,874	5,305	5,866	7,146	8,738	8965	9,422
Mauritania	709	1,020	1,833	2,184	3,041	3,357	3,585	3,027	3,614
Niger	2,509	2,481	3,053	3,405	3,645	4,291	5,370	5,254	5,411
Nigeria	64,202	28,472	87,845	112,249	146,867	165,921	207,118	168,568	196,838
Senegal	3,503	5,717	8,030	8,714	9,378	11,320	13,386	12,769	12,855
Sierra Leone	1,101	650	1,096	1,239	1,422	1,664	1,955	1,856	1,910
Togo	1,136	1,628	1,937	2,115	2,203	2,523	3,163	3,156	3,176
Average	75913	43017	109658	136326	173605	197652	245013	205309	235049
Standard deviation	29069.03	14794.72	40876.55	51508.12	66504.47	75416.34	93825.6	77460.6	89570.45

**Source:** Smith Dan, State of the World Atlas, 2012

The nature, scale, type and distribution of urbanization have brought with it intractable problems of urban governance and proliferation of slums and informal settlements. According to UN estimates approximately 33% of the population in this sub-region live in slum areas while the total number of slum-dwellers is projected to be twice the current number by 2030 with obvious impacts on human settlements, security and food security. The lack of clear policies to grow the economy of rural areas have continued to push human populations from the rural to urban areas with implications for infrastructure and social amenities (water, sanitation, hygiene, schools, recreation facilities, housing, development land, security, food, etc.). Meanwhile, the poor in urban areas are pushed to the edges of the cities due to insufficient or diminishing capacity to participate in the tenure of urban land and housing. To mobilize enough funds for the rapidly expanding urban populations have been a big challenge in the sub-region.

By mapping life expectancy against gross domestic products per capita the picture of prosperity without growth is evident (Figure 3). Overall, life expectancy is generally low in the sub-region and it reduces further despite increasing opulence. In contrast, a few countries have life expectancy comparable with developed countries yet with low gross domestic product per capita. The implication of this for human development and opulence is that majority of the population of the

sub-region is living in poverty as wealth does not trickle down equally. This is also comparable to the picture of the relationship between literacy level and primary education enrolment (Figure 4) which are also the key to human development index in the sub-region.

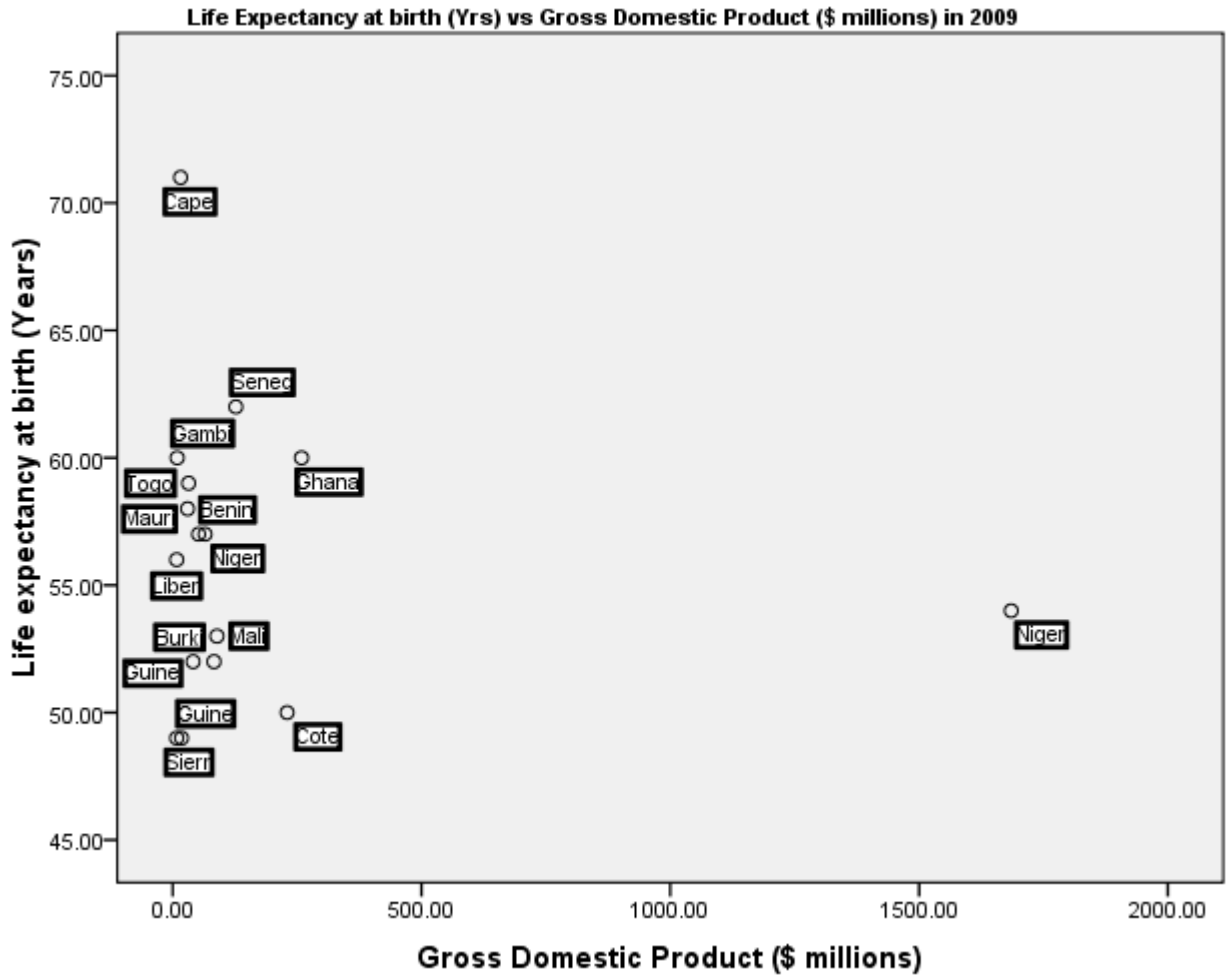


Figure 1: Life expectancy and Gross Domestic Product per capita in 2009

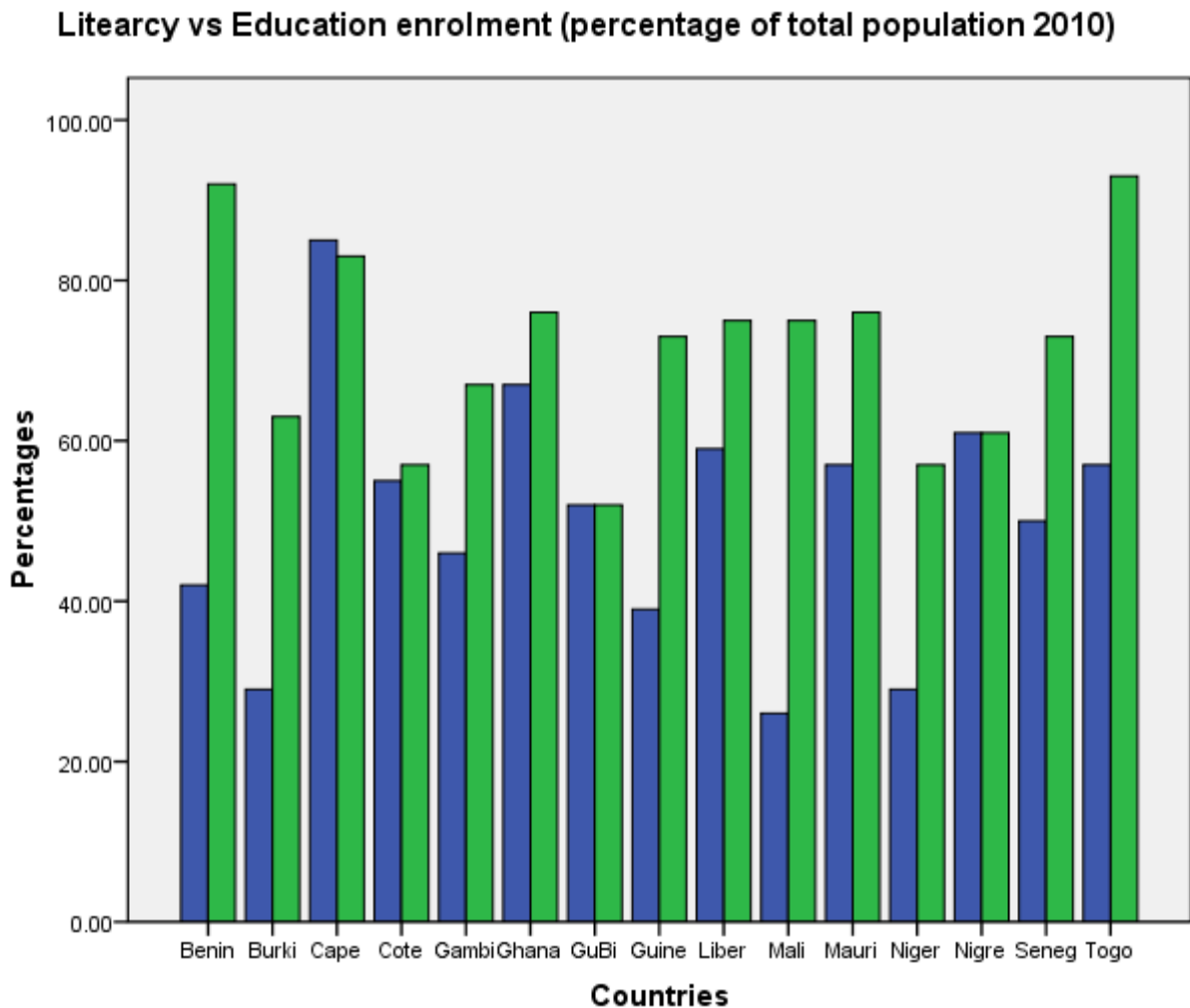


Figure 2: Literacy level and education enrolment (percentage total of population) 2010

Rapid demographic changes, exploding urbanization, local economy such as logging and extensive farming are the major drivers of deforestation in the sub-region. The amount of forest and protected areas as a percentage of the total land of states in the sub-region is generally low (See Table 4). Similarly, Table 4 shows that the amount of forest area as a percentage of total land in the sub-region apart from Cape Verde and the Gambia was declining while that of protected area remains virtually the same all through the period of interest. The implications of these on environmental sustainability are disturbing. Furthermore, the over dependence on traditional biomass such as charcoal, fuel wood, wood chips and agricultural residues and dungs as sources of energy in the rural communities are great threats to forest ecosystems. The consequences include loss of fallow lands, water-related challenges, climate-related stresses and farmer-herder conflicts (Fasona et al, 2013).

The fragile soils, the erratic rainfall and poor land management practices account for the increasing desertification of a good portion of the sub-region. Until the Earth Summit of 1992 not much interests was shown on the environment among leaders of the sub-region, this has changed ever since. There is however the current challenge of giving political weight to policy and scientific issues of the environment including education and capacity building, research and training and monitoring and evaluation. Moreover, the absence of community based ecosystem management and

lack of social and environmental safeguards as is the case in other climes is a threat to environmental sustainability.

**Table 4: Land Characteristics in West Africa**

Country	Forest area (% of total land area)			Terrestrial protected areas (% of the total land area)		
	1990	2000	2010	1990	2000	2010
Benin	52.1	45.8	41.2	23.8	23.8	23.8
Burkina Faso	25.0	22.0	20.7	30.3	30.9	30.9
Cape Verde	14.4	20.4	21.1	2.5	2.5	2.5
Cote d'Ivoire	32.1	32.5	32.7	22.6	22.6	22.6
Gambia	44.2	46.1	48.0	1.5	1.5	1.5
Ghana	32.7	26.8	21.7	14.6	14.7	14.7
Guinea	29.6	28.1	26.6	6.8	6.8	6.8
Guinea Bissau	78.8	75.4	71.9	7.7	16.1	16.5
Liberia	51.2	48.1	44.9	-	-	-
Mali	11.5	10.9	10.2	2.3	2.3	2.4
Mauritania	0.4	0.3	0.2	0.5	0.5	0.5
Niger	1.5	1.1	1.0	7.1	7.1	7.1
Nigeria	18.9	14.4	9.9	11.6	12.8	12.8
Senegal	48.6	46.2	44.0	24.1	24.1	24.1
Sierra Leone	43.5	40.8	38.1	5.0	5.0	5.0
Togo	12.8	8.9	5.3	11.3	11.3	11.3
Average	497.3	467.8	437.5	171.7	182	182.5
Standard deviation	114.93	108.18	101.33	41.12	43.48	43.60

**Source:** Smith Dan, State of the World Atlas, 2012

The West African sub-region is a major theatre of climate change and the most vulnerable. The sub-region is vulnerable to weather events including extreme events, increasing temperatures, declining rainfalls, heat waves, droughts, and colds. The vulnerability of the sub-region is exacerbated by the degree of exposure to these variations in weather parameters and poor coping and adaptive capacities. For example, agricultural productivity has been plummeting in the face of unpredictable market prices leading to food insecurity and declining incomes (African Economic Outlook, 2010). Climate change does not only have constraints it also offer incentives for sustainable development. By recognizing the risks associated with climate change in the sub-region could lead to strategies which would ultimately not only mitigate climate change but also propel adaptation and ultimately environmental sustainability. For example, by realizing the potential losses from agricultural production from extreme weather events could lead to identification and harnessing of alternative livelihoods and adjustment options to combat climate change. These if properly mainstreamed into policies and programmes could lead to bustling of activities in the sub-region.

There is also a growing recognition of the link between environmental sustainability and good political governance with increasing demand for continuous monitoring of the quality of governance across and within individual countries. Although there has been great improvement in the continent in the last twenty five years or more there are some notable challenges confronting democracy and good governance in the sub-region. Among these are: fragile democratic processes; poorly structured and weak political systems; inefficient and uninformed legislatures; suppressed and subdued Civil Society Groups; poorly constituted and spineless judiciaries, undue hold to power by the political class; etc.

Factors responsible for armed conflicts and human insecurity have been grouped into root causes, enabling factors, mobilizing factors and triggering events by the Secretary General of the United Nations (ECA, 2008). Root causes according to the theory are precipitated by deep political, social, economic and cultural divisions that can be manipulated. The underlying factors include extreme poverty, gross inequalities and weak State capacity. While enabling factors do not on their own lead to insecurity but they could boost root causes or create the impetus for armed conflict to bloom. The common examples of these factors include unconstitutional takeovers, tenure elongations, disqualifications of opposition candidates, incitement of hatred and attacks for political and electoral gains, exclusionary government policies, external support for tyrannical regimes, and proliferation of small arms. The recent event in Mali readily comes to mind. Mobilizing factors relate to issues of personal importance such as religion, ethnicity and economic conditions that could lead to armed conflict such as the Boko Haram insurgency in Nigeria. These factors include religious intolerance, youth unemployment and devastating social, economic and political impacts of HIV/AIDs among others. Trigger events are immediate causes that affect the timing and commencement of armed conflicts without necessarily providing explanation for them. The sub-region must however be prepared to address the challenge of overlapping and duplication of integration alliances and multiplicity of affiliation (ECA, 2008).

Access to electricity in the West African sub-region is less than 15 per cent and the supply of energy services is epileptic. With this backdrop poverty is perpetuated, social and infrastructural services are unreliable, economic growth is unsteady and environment is unsustainable in the sub-region. Although, there have been a number of initiatives to improve energy access and efficiency in the sub-region but as it stands the challenge of creating sustainable uses of modern energy for the urban poor is intractable. There is also the absence of a network of energy technologies to develop and support modern energy services for the urban poor and rural electrification.

#### **4. Moving from crossroads to concrete plans**

Having looked at the constraints and prospects of environmental sustainability in the West African sub-region there is the need to consider plausible action plans that are globally conceived and delivered, nationally acknowledged and adopted and locally relevant and institutionalised. At each level, there are clear responsibilities based on mutually agreed prospects of achieving MDG seven (environmental sustainability). The capacity of the sub-region to adopt and implement multi-lateral economic and environmental agreements must be enhanced at the global level. This is the beauty of the Global Partnership for Development which recognises the importance of providing assistance to improve the effectiveness of institutions, policies and regulatory bodies. The efforts of UNEP, Energy Sector Management Assistance Programme (ESMAP) and others in this regards have been well documented. At the national level, focus must be to develop capacity to carry out strategic environmental assessments for current policies and programmes. This calls for research and training on the synergy between science and policy on the one hand and between policy and practice on the other. Only a good understanding of the interdependence of science, policy and practice can make the sub-region or any other region for that matter to attain the goal of environmental sustainability. There must be community level actions aimed at increasing awareness, value re-orientation and the provision of alternatives. It should be recognized that individuals and communities are key players on the long run in achieving ecologically friendly sustainable development. Efforts at the local level must therefore involve the integration of African values while communicating environmental strategies and programmes. It should be stressed further that global goals and strategies should only help to build national and local initiatives. The direction provided for globally evolved actions must be locally implemented and relevant for the impact to be well articulated, coordinated and institutionalized. Given global directives, local faces will be instrumental to alleviating poverty and reducing inequality. This is how global benefits can trickle down to individuals and households.

The paper has given an environmental outlook of the sub-region which should dovetail into concrete action plans towards leveraging environmental sustainability. Having highlighted the present status what must be done to move the sub-region forward should among other things include the following:

- Evolve participatory, pro-poor natural resource and ecosystem management systems for the region
- Introduce innovative financial systems to mobilize funds for the environment
- Mainstream climate change adaptation into programmes and policies thereby reducing the impact of climate change on vulnerable places and peoples
- Enhance climate-friendly and climate change adaptation technologies
- Ensure the measures/mechanisms to keep sub-regional greenhouse gas emissions as low as possible
- Increase strategies for discriminatory bio-fuel development without compromising the integrity of forest ecosystems
- Reduce the proliferation of slums and scale-up upgrading of existing slums through radical infrastructural provision and housing delivery systems
- Raise the percentage of the total population with access to water and sanitation facilities
- Reduce drastically annual spending on military to as low as 0.5 per cent
- Galvanize interests by creating incentives and financial support for community-based forest ecosystem management
- Promote effective conservation and management to arrest the decline in forested areas and strategically encourage participation in the REDD+ project
- Support urbanization policy and planning framework that will stabilize urban growth in the sub-region and reduce impacts on urban fringes
- Create policy that will make cities and villages in the sub-region work as vehicles of prosperity leading to reduction in poverty and misuse of natural resources

## 5. Conclusions

The subject of environmental sustainability has been reviewed in the context of opportunities and constraints in the West African sub-region. While the challenges threatening the existing policies and their implementation appear daunting the progress made so far are cheering. More holistic approaches that are transnational, inclusive, multi-sectoral and multi-dimensional should be rigorously pursued in the sub-region. What nature has endowed the sub-region with should propel individual nations to embrace the environmental sustainability agenda. More urgently, national governments within the sub-region must seek to understand the linkages between environment and other sectors and pursue developmental agenda that will eradicate poverty, inequality, climate change, human insecurity among others. Such policies must also reduce the negative impacts of urbanization and over-reliance on foreign aids. It is desirable that national governments within the sub-region seek to sponsor home grown initiatives and policies that recognize local resources, capacities and peculiarities.

To strengthen the capacity of the sub-region and increase the prospects of regional integration all prejudices, distrusts and scepticisms must be eliminated. Let the markets be open, products be accepted and programmes be received without any acrimony. This will require the purposeful engagement of all stakeholders until they realize the collective responsibility of everyone towards environmental sustainability.

The prospects of environmental sustainability will be enhanced if capacity building through training and research is given significant attention. The subject of the environmental sustainability must be included in the curricula of schools, colleges and universities. Besides, there must be

concerted efforts to raise future environmental sustainability experts through increased research opportunities and funding in relevant sectors. Moreover, it is high time that national governments and their agencies made policies that are research-driven and encourage the communication of research findings to relevant stakeholders.

Human beings are the major determinants of the state and quality of the environment. The true face of environmental sustainability therefore is improved livelihoods and human well-being. There is urgent need to promote an inclusive growth agenda in the sub-region which seeks to increase access, multiply opportunities and build capacity of individuals to actualize their life goals and aspirations. Let human beings be encouraged to seek fulfilment of personal goals through less harmful activities, nature replenishing enterprises and ecologically friendly vocations in the sub-region. This will guarantee an environment that satisfies present generation and secure the hope of future generations.

## References

- African Economic Outlook. 2010. Millennium Development Goals Report 2010, African Development Bank, UNDP, Tunisia.
- Denton, Fatma, Sokona, Youba and Thomas, Jean Phillippe. 2001. Climate Change and Sustainable Development Strategies in the Making: What should West African Countries Expect? Environment et Development du Tiers Monde (ENDA – TM), Dakar, Senegal
- Economic Commission for Africa. 2008. Sustainable Development Report for Africa, Five-Year Review of the Implementation of World Summit on Sustainable Development Outcomes in Africa (WSSD+5). United Nations Economic Commission for Africa, Addis Ababa, Ethiopia.
- Economic Commission for Africa. 2005. African Governance Report 2005.
- Fasona, Mayowa, Grace Adeniji-Oloukoi, Felic Olorunfemi, Peter Elias, and Vide Adedayo (2013) Community-Based Management of Ecosystems and Natural Resources for the Improvement of Rural Livelihoods and Food Security in the Nigerian Savanna- Summary for Stakeholders. Global Tecknopress, Lagos, Nigeria 23pp
- Jean-Phillippe Audinet and Sappo Haralambous 2005. Achieving Millenium Development Goals: Rural Investment and Enabling Policy, Panel Discussion Paper, 28<sup>th</sup> Session of the IFAD Governing Council
- NEPAD Secretariat. 2006. New Partnership for Africa's Development Annual Report 2004/ 2005.
- Smith Dan (2012), State of the World, 9<sup>th</sup> edition, The Pengium Books, Brighton, United Kingdom
- Thomas, J.P., Sokona, Y., Humphreys February 1999. After Buenos Aires: a Development and Environment NGO perspective. ENDA-TM, Dakar
- United Nations, 2006a. Progress report of the Secretary General: The New Partnership for Africa's Development: progress in implementation and international support- second report of the Secretary-General's Advisory Panel on International Support for the New Partnership for Africa's Development.



# Studying the Drying Parameters of Calcium Based Edible Soap from Sunflower Oil for Ruminants

---

**Momoh O.R.,**

*Department of Chemical Engineering, Ahmadu Bello University, Zaria, Nigeria.*

**Oyawoye, M.R.**

*Department of Chemical Engineering, Ahmadu Bello University, Zaria, Nigeria.*

**Otaru S.M**

*Small Ruminants Unit, National Animal Production Research Institute, NAPRI, Shika-Giwa, Zaria, Kaduna State, Nigeria*

**Ajinomoh C.S.**

*Department of Chemical Engineering, Ahmadu Bello University, Zaria, Nigeria.*

**Otuoze H.S.**

*Department of Civil Engineering, Ahmadu Bello University, Zaria, Nigeria.*

*Tel: +2348069111718, Corresponding E-mail: [omuyar2002@yahoo.com](mailto:omuyar2002@yahoo.com)*

## **Abstract**

Calcium – base edible soap is significant in providing animals with energy, especially, during lactation and/or when there is loss of appetite. This study was carried out to produce the calcium soap and determine its optimum drying parameters employing cabinet dryer. The soap was prepared using sunflower oil and was dried at temperatures of 65°C, 55°C, 45°C and 35°C. The relative air humidity was 25% - 47.5%. Air velocity of 2m/s was used throughout the drying experiment. The results indicated that increasing air temperature reduces the drying time, increases drying rate and effective moisture diffusivity. The drying curve indicates that drying process takes place mostly in the falling rate period. Two drying models, Newtonian and Henderson and Pabis were fitted to the experimental sets of data that were obtained. Henderson and Pabis model was found to better describe the drying curves of the soap.

## 1.0 Introduction

Soaps are generally made from natural animal or plant fats containing triglycerides that comprise usually long-chain fatty acids, attached to the glycerol skeleton, which form salts by means of a process of saponification in the presence of bases (Perez, 2009). In saponification, the fats are broken down, and the base is 'reacted out', leaving soap.

The fatty acids that most commonly form part of these triglycerides are long-chain fatty acids such as oleic, stearic, palmitic, myristic, lauric, linoleic and linolenic acids. Fatty acids with much shorter chains also appear, such as butyric, capric, caprylic and caproic acids. Eke *et al.* (2004) reported that metals commonly used in soap making are sodium and potassium (inorganic alkaline metal bases), which produce water-soluble soaps. These are characteristically different from soaps made from divalent metals such as calcium, magnesium, iron or aluminium which are not water soluble.

Calcium soap is a combination of fatty acids and calcium that is linked together by a chemical bond. It has been developed for the animal feed industry and provides animals, in particular high yielding dairy cows and sheep, with a vital source of energy during lactation. It is an energy-dense feed material, which delivers fatty acids to the small intestine whilst avoiding the negative effects on the rumen (Perez, 2009). The produced soap is in slurry form, hence the need for drying as a final production step. Usually, the separation operation of drying converts a solid, semi-solid or liquid feedstock into a solid product by evaporation of the liquid into a vapour phase via application of heat (Mujumdar and Devahastin, 2000).

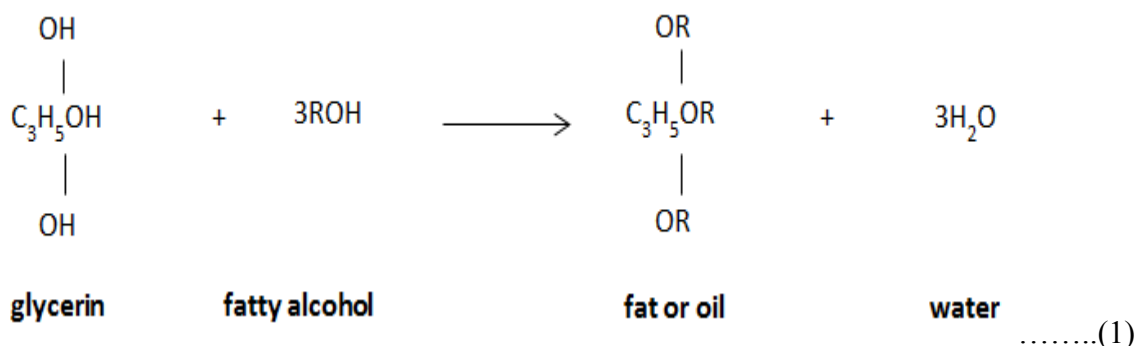
Therefore, the aim of this project is to determine the drying parameters that are suitable for the production of calcium-base edible soap from sunflower oil for ruminants.

## 2.0 Background

In this section the discussion will be limited to areas such as the nature of fats that can be used for soap manufacturing, an overview of studies on calcium soap production as well as the general knowledge of drying curves. The section is concluded with brief understanding of how drying models could be fitted with experimental data for the drying process being investigated. For further interest one is hereby referred to Ahmed *et al.*, (2001).

### 2.1 Nature of Fat or Oil Used For Soap Manufacture

Glycerine, being a trihydric alcohol, has three atoms of hydrogen which are replaceable by three univalent radicals of the higher members of the fatty acids, *e. g.* as in Equation 2.1



Thus three fatty acid radicals combine with one glycerine to form a true neutral oil or fat which are called triglycerides. The fatty acids which most commonly enter into combination of fats and oils are lauric, myristic, palmitic, stearic and oleic acids and form the neutral oils or triglycerides

derived from these, *e. g.*, stearin, palmitin, olein. Mono and diglycerides are also present in fats (Thomssen, 2008).

### 2.1.1 Sunflower Oil

Sunflower oil is the non-volatile oil compressed from sunflower (*Helianthus annuus*) seeds; it is well suited to dishes that require low or no heat ([http://en.wikipedia.org/wiki/Sunflower\\_oil](http://en.wikipedia.org/wiki/Sunflower_oil), 2013). The typical constituent is the profile as listed below:

Palmitic acid:	4 - 9%
Stearic acid:	1 - 7%
Oleic acid:	14 - 40%
Linoleic acid:	48 - 74%

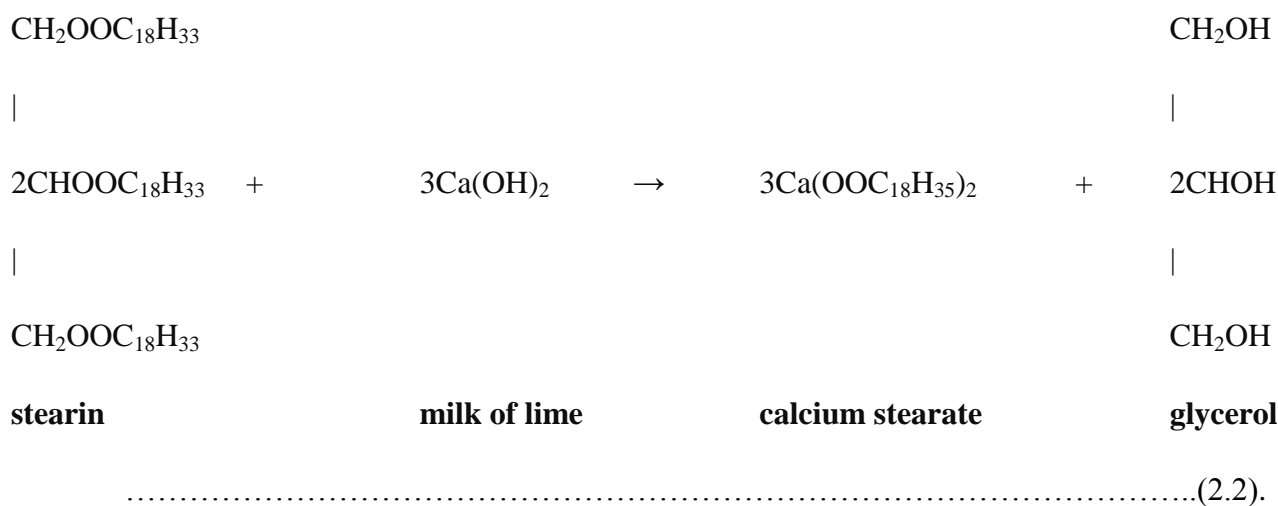
Thus judging from the profile as shown above, sunflower oil can be excellent fatty material which can be used for production of edible soap for the ruminants.

### 2.2 Overview of Studies on Calcium Soap for Ruminants

A number of studies have been carried out on calcium based edible soap majorly on its production and feeding effects on ruminants, for instance:

Prasad *et al.* (2002) studied the effect of supplementing sheep with sunflower acid oil or its calcium soap on nutrient utilization. They concluded that sunflower acid oil supplementation in free form as low as 5% of dietary DM is deleterious to fibre digestion in sheep while as calcium soap, it can be fed up to 10% of dietary DM as an energy source without any adverse effect.

Perez (2009) invented a method for producing calcium soaps for animal feed. The invention consists of a novel process for producing calcium soaps, comprising the saponification of fats and natural oils with CaO, in which the reaction mass is heated and subjected to reduced pressure. (See Equation 2.2).



In this way, calcium soaps with a fatty acid content of more than 80% can be obtained without requiring any subsequent washing or concentration process. The high fatty acid content renders the soaps particularly suitable for use as a component of animal feed.

Perez (2009) also described a procedure for the production of calcium, sodium or magnesium fatty acid soaps or vegetable or animal soapstocks and their use as nutrients in monogastric animal feeds. This procedure made it possible to add glycerol, glycerol plus emulsifier or emulsifier in proportions that make them cheaper due to the cost and efficiency of the use of triglycerides in monogastric animals. Thus, it was concluded that using palm fatty acid distillate soap with glycerol

to replace soya oil could give higher energy efficiency from nutritional point of view; improves fatty acid digestibility in diets as well as reduces feeding costs.

Wada (2011) studied the production of edible soap and feeding by ruminants from palm oil and also concluded that calcium soap is good for supplementing ruminants' feed. All of these works did not consider the drying characteristics of the calcium soap.

### 2.3 The Drying Curves

For each and every product, there is a representative curve that describes the drying characteristics for that product at specific temperature, velocity and pressure conditions. This curve is referred to as the drying curve for a specific product. The curve is our source of guidance in the interpretation of the data as derived from the experiment. A typical drying curve is referenced in <http://server.fst.uga.edu/kerr/> (2013)

### 2.4 Modeling of Drying Curves

The drying curves can be processed for drying rates to find the most convenient model for the drying process under given conditions. There are many statistical-based models correlating experimentally obtained moisture ratio values in terms of time (t) in the literature (Dikbasan, 2007). Four but not limited commonly used thin-layer drying models are listed in Table 2.1. In these models, the moisture ratio (MR) is termed as:

$$MR = \frac{M - M_e}{M_o - M_e} \dots\dots\dots (2.1)$$

Where,

M is the moisture content of the product at any time,  $M_o$  is the initial moisture content and  $M_e$  is the equilibrium moisture content

**Table 2.1: Models applied to drying curves**

S/N	Model	Equation	Reference
1	Newton	$MR = \exp(-k_1 t)$	Ayensu (1997)
2	Henderson and Pabis	$MR = a. \exp(-k_2 t)$	Henderson and Pabis (1961)
3	Page	$MR = \exp(-k_3 t^n)$	Page (1949)
4	Modified Page	$MR = \exp[-(k_4 t)^n]$	Ozdemir and Devres (1999)

Correlation coefficient ( $R^2$ ) is one of the primary criteria for selecting the best equation to define the drying curve (Dikbasan, 2007).

### 3.0 Experimental

This briefly gives the list and descriptions of the major sets of instruments /equipment, materials and the methodology that were employed in this work.

#### 3.1 Materials/ Reagents

**Table 3.1: Materials/reagents used**

S/N	Material	Specification	Manufacturer/Date
1	Leema <sup>®</sup> (sunflower oil)	Food grade	AVOD. S.A.O.G., Sultanate of Oman. 01/07/2011
2	Calcium hydroxide	Minimum assay (acidimetric): 98.5%	Vickers Laboratories Ltd., England

### 3.2 Methodology

Below is the stage wise and sequential description of the procedures that were followed in this research work:

#### 3.2.1 Preparation of the Calcium Soap

306.25 g of sunflower oil was heated to a temperature of 130 °C, thereafter allowed to cool to a temperature of 84 °C. While the oil was cooling, 77g of calcium hydroxide was added to 116ml distilled water and stirred vigorously for good solution of the powder.

The calcium hydroxide solution was gently poured into the oil in a 250ml beaker and glass rod was used to stir the resulting content vigorously, for 26mins, until a homogenous mixture was obtained.

The mixture was then left to stand for 7hrs, thereafter the soap slurry was poured into a filter cloth and was left for another 11hrs as a way of pre-concentrating it to a good solid content making it suitable for cabinet drying.

#### 3.2.2 Drying of the Soap

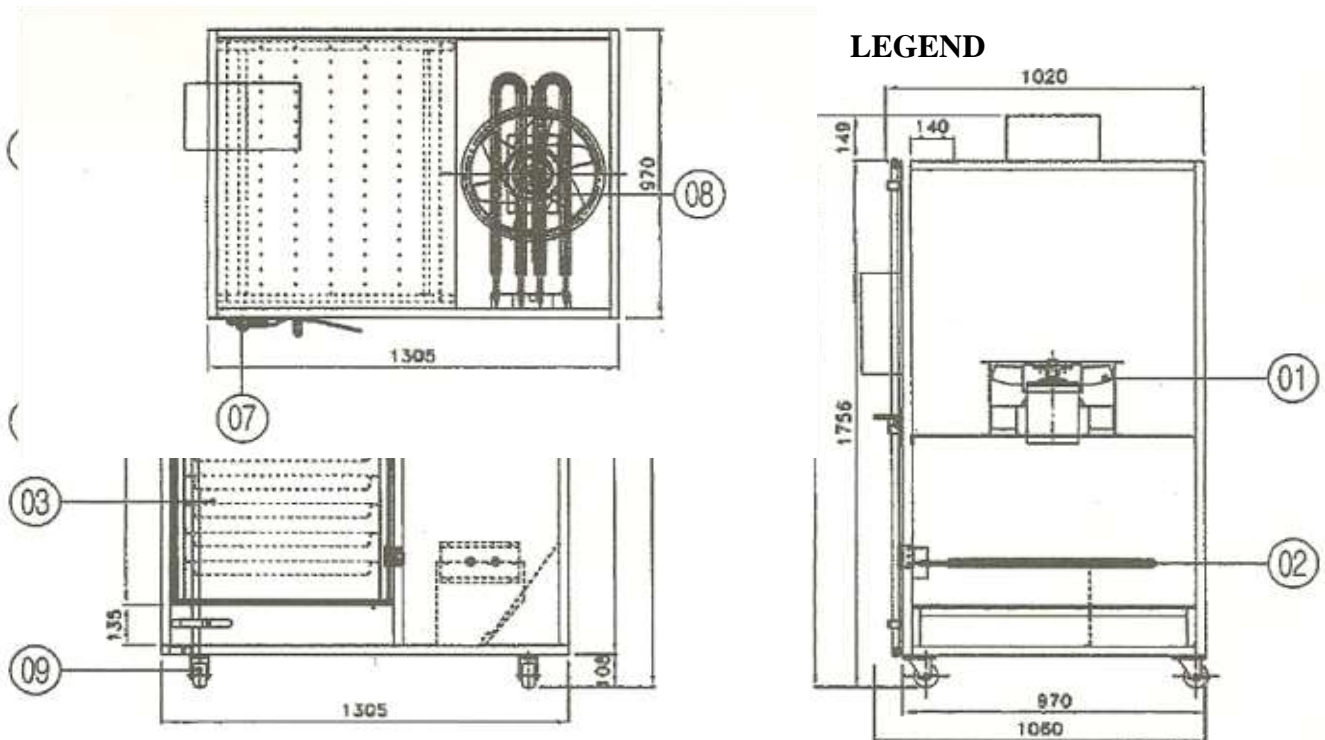
First of all measurement of inlet air temperature (wet bulb and dry bulb) was made. Dry and wet bulb temperatures were measured with the usual immersion thermometer. To measure the wet bulb temperature, the thermometer bob was covered in a wet wick.

The measured temperature was used to obtain air humidity from the psychrometric chart and psychrometric relation. Thin-layer drying experiments were carried out- 45g of fresh product was dried over an area of 16.4cm × 8cm of a tray (see Figure 3.2); the product was spread as a thin layer on the tray placed in the dryer and dried from an average initial moisture content of 48% to .5% (dry basis). The drying time was recorded.

Weight loss was determined every 15mins, by removing the tray along with its content then weighing until a constant weight was achieved. This was done within seconds to minimize errors. The air velocity was set at 2m/s throughout the experiment while temperatures of 65 °C, 55 °C, 45 °C and 35 °C were studied for the drying



Figure 3.1(a): A view of the cabinet dryer



- 01- Fan
- 02- Heating Coil
- 03- Tray
- 04- Air Exhaust
- 05- Control Panel
- 06- Tray Railing

- 07- Door Lock
- 08- Air Inlet
- 09- Dryer Roller

**Figure 3.1 (b): A schematic view of the dryer**

Source: Lee Hwa Industry Co. LH-130/ LH-260 dryer manual



Figure 3.2: Specified drying point on the tray

## 4.0 Results and Discussion

### 4.1 Results

This section presents the sets of data on moisture content/ratio as the soap was being dried at various time until an equilibrium was reached. Thereafter, the Effective Moisture Diffusivities ( $D_{eff}$ ) were generated and finally, Modeling of the Experimental Data for best fit model selection was undertaken.

#### 4.1.1 Moisture Content Determination

The initial moisture content of 45g of the product was determined by first heating at 35°C for three hours before being heated at 105°C for another one hour. Heating was terminated at constant weight.

The initial moisture content was calculated using Equation 3.1.

$$MC = \frac{m_i - m_f}{m_i} \dots\dots(3.1)$$

Where,

$m_i$  is mass of wet product,  $m_f$  is mass of dried product which is 13.5g.

Hence,

$$MC = \frac{20 - 13.5}{13.5} = 0.481481$$

From Equation (3.1), moisture content at 65 °C drying temperature is given as:

$$MC = \frac{30.1 - 26.8}{23.1} = 0.142857$$

$$MC = \frac{26.1 - 25.2}{23.1} = 0.069264$$

$$MC = \frac{25.2 - 24.6}{23.1} = 0.025974$$

Similar moisture content calculations for other temperature readings were carried out. See Appendix 1 (Tables 4.2 and 4.3).

#### 4.1.2 Moisture Ratio

The moisture ratios were obtained from Equation (3.2) below

$$MR =$$

$$\frac{M - M_e}{M_i - M_e} \dots\dots\dots(3.2)$$

For instance at 65°C drying temperature,

$$MR = \frac{.481481 - .004329}{.481481 - .004329} = 1$$

$$MR = \frac{.142857 - .004329}{.481481 - .004329} = 0.290323$$

$$MR = \frac{.069264 - .004329}{.48177489 - .004329} = 0.136089$$

Just like before similar moisture ratio calculation for other temperature readings were carried out.

#### 4.1.3 Effective Moisture Diffusivities (Deff)

The effective moisture diffusivities ( $D_{eff}$ ) were thereafter calculated from the equations below:

$$MR = \frac{M - M_e}{M_o - M_e} =$$

$$\frac{8}{\pi^2} \exp\left(\frac{\pi^2 D_{eff} t}{4 L_o^2}\right) \dots\dots\dots(3.3)$$

where,

t is drying time and  $L_o$  is the thickness of layer of drying material and is determined as 2.818mm for this study.

Then, equation (3.3) is rewritten in a logarithmic form as:



$$-\ln MR = \frac{\pi^2 D_{eff} t}{4 L_0^2} \dots\dots\dots(3.4)$$

or

$$-\ln MR = 0.310712 D_{eff} t - 0.21 \dots\dots\dots(3.5)$$

It was determined by plotting experimental drying data in terms of  $\ln MR$  versus drying time  $t$  using Microsoft Office Excel 2007. As it can be seen from the Equation (3.5), the plot gives a straight line with a slope as  $(\pi^2 D_{eff} / 4 L_0^2)$  (Dikbasan, 2007) as follows:

Thus, at 65°C drying temperature,

$$-\ln MR = 0.069t - 0.21 \dots\dots\dots(3.6)$$

combining Equations (3.5) and (3.6) gives

$$0.310712 D_{eff} = 0.069$$

$$D_{eff} = 2.2207 \times 10^{-7} m^2/s$$

See Table 4.5 for data generated for effective moisture diffusivities ( $D_{eff}$ )

#### 4.1.4 Modeling of the Experimental Data

The moisture content sets of data obtained at different air temperatures were converted to dimensionless moisture ratio (MR) and then fitted to the four thin-layer drying models as shown in Table 4.1. Correlation coefficients were calculated.

The results from section 4.1.1 to 4.1.4 are hereby presented in Figures 4.1, 4.2 and 4.3.

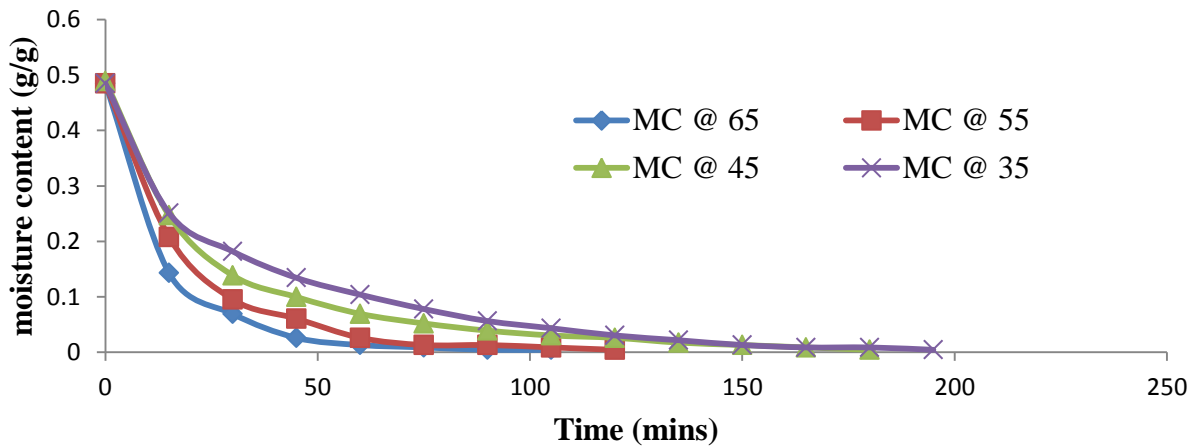


Figure 4.1: The Drying Curve of the Soap

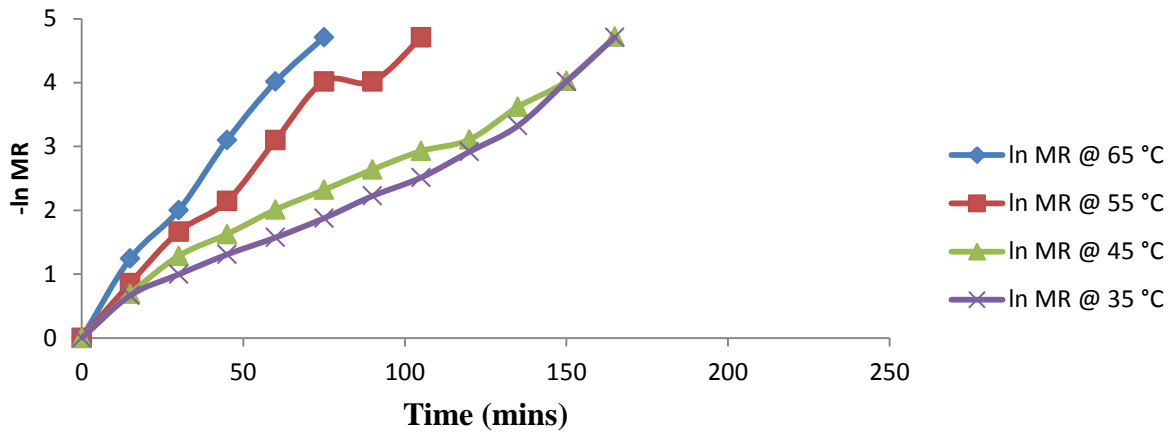


Figure 4.2: Moisture ratio versus drying time at each drying temperature

Table 4.1: Result of best fitted Models

Temp (°C)	$k_1$	$k_2$	a	$R_1^2$	$R_2^2$
35	.026	.025	.9324	.977	.978
45	.028	.025	.7240	.966	.983
55	.047	.045	.8204	.974	.979
65	.065	.062	.8547	.991	.994

Note: subscripts 1 and 2 refer to model numbers 1 and 2 of Table 2.1

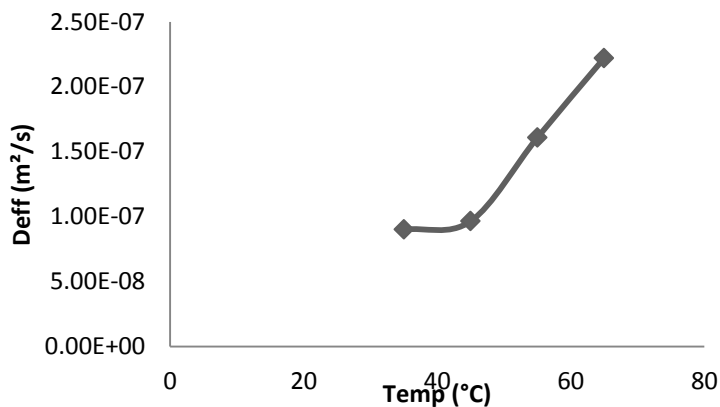


Figure 4.3: Variation of effective moisture diffusivity with temperature

## 4.2 Discussion

In this section, most of the sets of data (Charts and Tables) that were generated in the cause of carrying out this work are discussed. The results and/or problems would be interpreted by trying to speculate it in terms of cause and effect phenomenon.

#### 4.2.1 Drying Curves Assessment

The effect of temperature on the dehydration of edible (calcium-based) soap is shown in Figure 4.1; it was observed that between the temperatures of 35 °C - 65 °C, drying time decreases while drying rate increases. This drying behavior was described by Ahmed *et al.* (2001) and Silva *et al.* (2008) when studying the drying kinetics of coriander leaf and stem. High drying rate could be related to a function of temperature difference between temperature of soap and drying air - the higher the temperature difference the higher the drying rate. Relative humidity of ambient air changes between 25 - 47.5%; ambient conditions are uncontrollable.

Moreover, it is observed in Figures 4.1 that drying of the soap occurs largely in the falling rate period. This behavior leads to consider diffusion as being the main mechanism of the migration of moisture in the drying process of calcium-base edible soap wherein drying rate declines over time and there is transfer of internal moisture to the surface of the soap. A similar observation was made by Silva *et al.* (2008).

The results of the thin layer models which are fitted to experimental results are as given in Table 4.1. The best fit for the experiments is obtained by Henderson and Pabis model (model 2). Page and Modified Page (models 3 and 4 respectively) did not fit.

Also, Table 4.1 indicates that the coefficients  $k_1$  and  $k_2$ , which is a measure of the drying rate, increased with the drying air temperature. Similar observations have been reported by Ahmed *et al.*, (2001).

The effective moisture diffusivities ( $D_{\text{eff}}$ ) also show a direct relationship with temperature as presented in Figure 4.3; it can be seen that  $D_{\text{eff}}$  values increased with increasing temperature. Similar observation has been reported by Meisami-asl *et al.*, (2010). The effective diffusivity values of dried samples at 35 - 65°C were varied in the range of 9.0116E-8 and 2.2207E-7m<sup>2</sup>/s.

#### 5.0 Conclusions

In the course of this project, calcium-base edible soap was successfully produced, dried and analyzed. The following conclusions can be made:

Low temperature favours drying of edible soap in cabinet dryers therefore the drying process is not energy intensive and at the same thermally efficient. The results indicate that increasing air temperature for the same condition of velocity and relative humidity of air reduces drying time. This result is in agreement with (Dikbasan, 2007). Also, drying process takes place mostly in the falling rate period.

Effective moisture diffusivity tends to increase with temperature.

Henderson and Pabis model best describes the drying characteristics of the soap for the drying conditions tested. Drying air temperature of 35 °C is determined as the optimum condition among the others tested in this study.

## Reference

- Ahmed, J., Shivhare, U. S. and Singh, G. (2001). *Drying characteristics and product quality of coriander leaves*. Institution of Chemical Engineers, 79 (Part C).
- Dikbasan, T. (2007). *Determination of effective parameters for drying of apples* (Unpublished master's thesis). İzmir Institute of Technology, İzmir, Turkey. <http://library.iyte.edu.tr>. (Retrieved July 28, 2012).
- Drying Curves* (2013). <http://server.fst.uga.edu/kerr/>. (Retrieved March 6, 2013).
- Eke, U. B., Dosumu, O, O, Oladipo, E. and Agunbiade, F. O. (2004). Analysis of locally produced soap using sheabutter oil (SBO) blended with palm-kernel oil (PKO). *Nigeria Journal of Science*. Vol. 38, 19-22. <http://www.unilorin.edu.ng> (Retrieved July 28, 2012).
- [http://en.wikipedia.org/wiki/Sunflower\\_oil](http://en.wikipedia.org/wiki/Sunflower_oil) (Accessed January 10, 2013).
- <http://sintak.unika.ac.id> (Accessed November 23, 2012).
- <http://www.apag.org/images/MetalSoaps/menu02.html> (Accessed March 22, 2003).
- Meisami-asl, E., Rafiee, S., Keyhani, A. and Tabatabaeefar, A. (2010). *Drying of apple slices (var. Golab) and effect on moisture diffusivity and activation energy*. *Plant Omics Journal*, 3(3):97-102. <http://www.pomics.com>. (Retrieved March 11, 2013).
- Mujumdar, A. S. and Devahastin, S. (2000). Fundamental principles of drying. <http://serve.me.nus.edu>. (Retrieved November 23, 2012).
- Perez, E. P. (2009). *Method for producing calcium soaps for animal feed*. <http://www.faqs.org> (Retrieved May 10, 2012).
- Prasad, J. R., Alexander, G. and Rao, Z. P. (2002). Effect of supplementing sheep with sunflower acid oil or its calcium soap on nutrient utilization. *Asian-Aust. J. Anim. Sci.* 15 (9): 1288-1293. <http://www.ajas.info> (Retrieved July 28, 2012).
- Silva, A. S., Almeida, A.C., Lima, E.E., Silva, F. L. H. and Gomes, J. P. (2008). *Drying kinetics of coriander (Coriandrum Sativum) leaf and stem*, 6(1): 13-19. Reynosa: Ciencia y Tecnologia Alimentaria. <http://redalyc.uaemex.mx> (Retrieved December 2, 2012).
- Thomssen, E. G. (2008). *Soap-making manual, a practical handbook on the raw materials, their manipulation, analysis and control in the modern soap plant*. New York: D. Van Nostrand Company. <http://www.gutenberg.org> (Retrieved January 15, 2013).
- Wada, S. S. (2011). *Studying the production of edible soap by ruminants from palm oil* (Unpublished bachelor's thesis). Dept. of Chemical Engineering, Ahmadu Bello University, Zaria, Nigeria.

## Appendix 1

**Table 4.2: Drying data**

time(mins)	MC @ 65	MC @ 55	MC @ 45	MC @ 35
0	0.484848485	0.484848485	0.489177489	0.484848485
15	0.142857143	0.207792208	0.246753247	0.246753247

30	0.069264069	0.095238095	0.138528139	0.181818182
45	0.025974026	0.060606061	0.0995671	0.138528139
60	0.012987013	0.025974026	0.069264069	0.103896104
75	0.008658009	0.012987013	0.051948052	0.077922078
90	0.004329004	0.012987013	0.038961039	0.056277056
105	0.004329004	0.008658009	0.03030303	0.043290043
120		0.004329004	0.025974026	0.03030303
135			0.017316017	0.021645022
150			0.012987013	0.012987013
165			0.008658009	0.008658009
180			0.004329004	0.008658009
195				0.004329004
210				
225				

**Table 4.3: Moisture ratio (-ln MR) data**

time(mins)	ln MR @ 65 °C	ln MR @ 55 °C	ln MR @ 45 °C	ln MR @ 35 °C
0	0	0	0	0
15	1.243794299	0.8593826	0.693147181	0.684178511
30	2.00148	1.665007764	1.284511667	0.995958135
45	3.100092289	2.144580844	1.627456418	1.275542997
60	4.016383021	3.100092289	2.01044867	1.574035985
75	4.709530201	4.016383021	2.320603598	1.876316857
90		4.016383021	2.63905733	2.224623552

105	4.709530201	2.926739402	2.512305624
120		3.109060959	2.917770732
135		3.619886583	3.32323584
150		4.025351691	4.016383021
165		4.718498871	4.709530201
180			
195			
210			
225			

---

**Table 4.5: Effective diffusivity variation with temperature**

Temp (°C)	$D_{\text{eff}}$ (m <sup>2</sup> /s)
35	9.0116E-8
45	9.6552E-8
55	1.6092E-7
65	2.2207E-7

---

# The Conflicts of Academic Programme and Fund's Influence on Athletes' Performance in Nigeria University Games

---

**Mayowa Adeyeye, (Ph.D)**

*Department of Human Kinetics and Health Education, Faculty of Education,  
University of Lagos.*

**Adeyemo Kehinde, (M.Sc)**

*Department of Human Kinetics and Health Education, Faculty of Education,  
University of Lagos.  
kelvinkenedy2007@hotmail.com*

## **Abstract**

The study investigated the conflicts of academics programme and funds on athletes' performance in Nigeria University Games (NUGA) with the aim of find if these two factors are responsible for athletes decline performance in Nigeria University Games. The sample used for this study was two hundred and ten (n-210) athletes and sport administrators who were selected from six federal and state universities in south-west geopolitical zone which included University of Lagos, University of Ibadan, Lagos State University, Olabisi Onabanjo University, Obafemi Awolowo University and Adekunle Ajasin University. The descriptive survey design was used for the study while Conflict of Academic Programme and Fund Questionnaire (CAPFQ) was used to elicit opinion from respondents. The test retest reliability value obtained for the instrument using Pearson Product Moment Correlation Co-efficient was 0.86. Data was analysed using frequency counts and percentage for demographic data while Chi-square was employed in determining the level of significance between the hypothesized and observed values at .05 alpha level. Based on the findings of the study, the result suggest that athletes are not well motivated due to lack of fund and also that most lecturers fixed some of their test to the same period they are out of school for competitions which they never reconducted.

**Key Words:** Fund; Motivation; Academic Programme; Athletes' Performance.

## **Introduction**

The ultimate goal of athletes preparing for competition is to attain peak performance for excellence. The Nigeria University Games is not an exception to this rule of athletes achieving peak performance. The Nigeria University Games is a forum for University athletes who have been identified as champions to represent their Universities in a fiesta that comprised all Nigeria University which is hosted every two years, thereby promoting friendship among University students in Nigeria. Thus, the Nigeria University Games become popular for University athletes to compete at optimal level since those that performed excellently at the end of the events will represent the country in the Olympics and other competitions e.g Chioma Ajuwon.

However, Privette (1982) defined peak performance as the level of optimal functioning where athletes found themselves in the zone and things are just working out fine. Williams (2006) also submitted that peak performance are those magic moment when an athlete put it all together both physically and mentally, the performance is exceptional, seemingly transcend ordinary levels of play. Privette, (1983) further defined peak performance as behaviour which exceeds one's average performance or an episode of superior functioning. Competitively, these performances often result in personal best, they are the ultimate high, the thrilling moment that athletes and coaches work for in their pursuit of excellence (Privette, 1983). There are some psychological factors which may serve as barriers, blocking athletes from getting to this zone of optimal functioning in Nigeria University Games which could be that the athletes are absent minded as a result of the continuous academic activities going on in their schools while they are out of school representing their universities. Adeyeye and Adeyemo (2013) further stated in their studies that lack of motivation and unavailability of facilities are some of the psychological factors influencing athletes performance in Nigeria University Games.

The provision of adequate fund in any sporting events is necessary if success is to be attained, Fasan (2006), stated that for effective organisation and management of sport there is need for proper funding either by the government, philanthropists or private organisations. Good organization and administration of sports as considered include the provision of adequate facilities and equipments, attractive incentives for the athletes and sound human relations. Umeasiegbu (2000) stated that "good sports programmes can function effectively only when they are supported with sufficient equipments in good condition". Oyilogwu, (2005) emphasize that it would be impossible to achieve satisfactory results from athletes whose training facilities are inadequate or of substandard but without adequate fund all these can not be visible.

In recent time, the researchers have noted that there has been decline in the performance of athletes representing their universities at Nigeria University Games, investigating into this phenomenon revealed that some psychological factors may be responsible for this decline, this study therefore investigated the conflict of academic programme and fund's influence on athletes' performance in Nigeria University Games.

## **Methodology**

The sample size comprised of two hundred and ten (n-210) athletes and sport administrators who were selected from six state and federal universities in south-west geopolitical zone of Nigeria. The selected universities included; University of Lagos Akoka, University of Ibadan, Lagos State University Ojo, Olabisi Onabanjo University Ago-Iwoye, Obafemi Awolowo University Ile-Ife and Adekunle Ajasin University. Athletes were selected based on the number of sports available in the institution after adequate consultation with the institutions sports units. A purposive sampling technique was used to select the participants for the study.

Conflict of Academic Programme and Fund Questionnaire (CAPFQ) consisting of two variables to which the participants were asked to tick the options of their choice in four-point Likert



rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) respectively, this was intended to rate the athletes' opinion the conflict of academic programme and fund's influence on their performance during the competition. The validity of the instrument was ascertained by some experts from cognate unit of this study who assisted in content and construct validity.

Test-retest method was used for reliability of the instrument, a correlation co-efficient value of 0.86 was obtained. 210 copies of questionnaire was administered by the researcher through the assistance of two research assistants after an approval from the institutions sport directors. It was distributed personally to the respondents in their various training sites and offices in their university sports complex. The duration for the distribution and collection of questionnaire lasted for two weeks. Out of the 210 copies of questionnaire distributed, only 175 were correctly filled, returned and coded for analysis. Descriptive statistics of frequency counts and percentage was used to analyse data while inferential statistics of Chi-square ( $\chi^2$ ) was used to test all hypotheses at .05 alpha level.

### Result

The demographic data revealed that by sex, 110 (62.8%) were male while 65 (37.2%) were female. Based on age, 92 (52.5%) of the respondents fell within 19-25 years, 41(23.4%) of the respondents fell within 26-30, 22 (12.5%) of the respondents fell within 31-40 while 20 (11.6%) fell within 41 and above. In marital status, the data revealed that 90 (51.4%) of the respondents were male single, 56 (32%) were female single, 20 (11.4%) were married male while 9 (5.2%) were married females. As regards the educational background, it revealed that 10 (5.7%) of the respondents have being to one tertiary institutions or the other while 165 (94.3%) were secondary school educated.

The data analysis of the responses of the participants is shown below.

**Table 1: Chi-square Result of the Conflict of Academic Programme**

Variable	N	Df	Calculated $\chi^2$	Critical $\chi^2$	Remark
Conflict of Academic Programme	175	15	11.66	21.02	*S* Significance

$\chi^2$  Cal. Value = 11.66 < Crit.  $\chi^2$  value = 21.02, df 9 p<0.05

Table 1 above showed that calculated value of 11.48 was lower than the critical value of 21.02 at 0.05 alpha level. This implies that there is no significant level of conflict of academic programme influence on athletes' performance in Nigeria University Games (NUGA).

**Table 2: Chi-square Result of Fund**

Variable	N	Df	Calculated $\chi^2$	Critical $\chi^2$	Remark
Fund	175	15	15.6	26.29	*S* Significance

$\chi^2$  Cal. Value = 15.6 < Crit.  $\chi^2$  value = 26.29, df 15 p<0.05

Table 1 above showed that calculated value of 15.6 was lower than the critical value of 22.29 at 0.05 alpha levels. This implies that there is no significant level of fund's influence on athletes' performance in Nigeria University Games (NUGA)

### **Discussion of findings**

The purpose of this study was to investigate the conflict of academic programme and fund's influence on athletes' performance in Nigeria University. Several studies have been conducted on various psychological factors influencing athletes performance in Nigeria University Games (Adeyeye & Adeyemo 2013. Oluwatunbi 2013., Mgbor 2013 e.t.c) but little light has been shed on conflict of academic programme and funding. Generally, the findings clearly disclosed that athletes were not well motivated when they go out to participate in competitions due to lack of fund, which implies that nothing is spurring the athletes to dipping into their reserve to perform optimally in competitions since motivation is the foundation of all athletic effort and accomplishment because without the desire and determination to improve performance, all other mental factors such as confidence, intensity, focus and emotions will be meaningless (Jim 2009). This corroborate the study of Cox (1998) which stated that motivation influences an individuals overall performances which come in form of money, award or trophies. In the same vein, the responses that athletes were not well motivated due to lack of fund was corroborated by Capald (1987) who opined that motivation inform of incentives can maximally enhance athletes when it is given immediately after the task has been completed.

Gambain (1991) alarmed that Nigeria Government has for a very long time been rewarding those athletes that bring laurel to the country in the field of sports. But the country started giving cash and materials award in 1980 when Nigerian Green Eagles won the 12<sup>th</sup> African Cup of Nation's Soccer. This confirmed kind gesture of the late General Sanni Abacha on the Nigerian contingent to 1998 Commwealth Games in Canada. Adewumi (1994) stressed that the Gold Medalist were given the sum of hundred thousand naira (100,000,00) each, Sliver Medalists, seventy five thousand (75,000,00), Bronze Medalist fifty thousand (50,000,00) each , While participants who did not win any laurel received twenty five thousand naira (25,000,00) each.

Moreso, result gathered on the conflict of academic programme revealed that most lecturers fixed their test during the period when students who are representing their universities in one sport or the other must have gone out to participate in Nigeria University Games which makes them lack adequate concentration. Cox (2002) stated that concentration is important for performing one's best and that the major component is the ability to focus one's attention on the task at hand and thereby not be disturbed or affected by irrelevant external stimuli. Some of the athletes responded that the taught that their academic pursuit is clashing with the sport makes them feel bad as examinations and test are not reconducted by the lecturers. This taught of missing test and examinations will trigger a cognitive and emotional shift in the athlete and a corresponding change in the response of the body i.e. a change in the athletes' taught and feelings changes what they attends to and how they attends (Strack, 2004).

### **Conclusion**

Based on the findings of this study, it was concluded that;

- i. Most lecturers fix their test during the time university athletes are out of school representing their universities
- ii. Test done during the period students are out of school representing their universities are not reconducted.
- iii. Damaged equipments can not be replaced or fixed due to lack of fund

iv. Athletes' match allowances that most of them used in taking care of themselves are not given due to lack of fund

**Recommendations**

- i. Adequate fund should be invested in sport by the government .
- ii. Funds should be made available for proper maintaining of equipments and facilities
- iii Lecturers should desist from fixing their test during the period which the school athletes are out of school for one competition or the other
- iv. Examinations or test should be reconducted for students who missed out due to their participation in one events or the other during Nigeria University Games
- v. The organising committee of Nigeria Universities Games should schedule the competition to the period when all students are on holiday.

## References

- Adeyeye, F.M. (1994); Psychological Variables as Determinant of Success in Highly Competitive sports. A paper presented at the 3rd (CHPER-SD) Conference at University of Education Winneba, Ghana.
- Adeyeye F.M., & Adeyemo, K.A (2013). The influence of motivation and facilities on athletes' performance in Nigeria University Games. *International Organization for Development and Sustainability*. (In Press)
- Awoyinka, J.O (2008). *Modern trends in sport administration and management*. Regeneration book publication, Lagos.
- Cox, R.H (2002). *Sport psychology: Concept and applications*. Dubuque, IA: Brown.
- Duda, J.L (1996). Motivation in sport settings: A goal perspective approach. In G.C. Roberts (Ed.) *Motivation in sport and exercise*, 57-92. Champaign, IL: Human Kinetics.
- Lumpkin, stroll and Bellar (1999). Motivation in sport. *Journal of Humanities*, 2, 66-68.
- Mgbor, M.O (2013). A survey of knowledge and use of ergogenic drugs among elite athletes in Nigeria Universities. *Journal of Educational Foundations and Management*. Vol 1, (1), 282-290.
- Oluwatunbi, B. (2013). Assessment of the predisposing factors to self-efficacy among university athletes in south-west Nigeria. University of Lagos Masters Thesis.
- Oyilogwu, D.B (2005). The psychological effect of facilities on athletes. *Journal of Sport*, 4, 23-26.
- Privette, G. (1982). Peak performance in sports: A factorial topology. *International Journal of Sport Psychology*, 13, 242-249.
- Privette, G. (1983). Peak experience, peak performance, and flow: A comparative analysis of positive human experiences. *Journal of Personality and Social Psychology*, 45, 1361-1368.
- Strack, B. (2004). Performance enhancement for athletes. Unpublished workshop at the 2004 Winter Brain Meeting, Palm Springs, CA.
- Umeasiegbu, D.B (2001). The place of motivation in sport performance. *Journal of Sport Psychology Association of Nigeria*, 4, 23-26
- Williams, J.M. (Ed) (2006). *Applied sport psychology: Personal growth to peak performance* (5th ed). Mountain view, CA: Mayfield.

# The Ethics of Nobility as World Society in a Global Perspective

---

**M. Hosnan**

*Lecturer of History Department FIS UNNES*

**Ufi Saraswati**

*Lecturer of Graduate School UNTIRTA*

**Kaharuddin**

*Faculty of Education,*

*Muhammadiyah University of Makassar, Sul-Sel, Indonesia*

[kaharuddin\\_unm@yahoo.co.id](mailto:kaharuddin_unm@yahoo.co.id)

**Zainuddin Bin Hassan**

*Faculty of Education,*

*UTM, Skudai, Johor Bahru, 81310, Malaysia*

[p-zainudin@utm.my](mailto:p-zainudin@utm.my)

## **Abstract**

Globalization” is extremely popular nowadays because it relates to the movement of Indonesian development especially for economy system and free trade. Globalization era is marked by sharp competition, intensive information, strong communication and opens therefore a high awareness and wide perception which are called global perception are required. The main point of global perception is to respect other people in order to have an ethics as society of the world. Globalization is a worldliness which means that all kinds of activities are for the world. Globalization process should be followed by an awareness and global perception in which humans in this era are aware about themselves are one of others in the world. They are mutual depending, mutual giving, mutual helping and they need one another. In a global perspective, we are not only people of Indonesia but also people of the world. Human should have an ethic of nobility as the society of the world in thinking and acting by anticipating for world’s need. It should be considered because globalization process will produce a global culture. It will possibly become a threat of national culture if it is not followed by providing an education which based on nationalism, norms, religions and the value of national culture.

**Keywords:** Ethics of Nobility, Society of the World, Global Perspective.

## 1. Introduction

Globalization is now attacking the world and making the world as *Global Village* in which geographical and territorial borders of a country are not a significant obstacle. The openness now on is stronger because of globalization which makes everything global, reaches all around the world. The openness and globalization are extremely ideal. They cannot be separated.

One of supported factors is a high progress in science, technology, communication and transportation. Development of technology was began by creating telephone. Alexander Graham Bell in 1876 was the creator of it. This communication and technology was strengthened by Atanasof and Clifford Berry who created computer in 1939. Both technologies synergize each other as a strong base for development of modern communication technology.

Globalization itself facilitates everything easily. Interaction of different people is easy as well. In a particular time, we cannot accept some differences which appear at the same time. However, the fast development of information technology and transportation unites people in one community and another community, even with the larger community. This is also one of things that causes problems. The roles of society should be strengthened not only national roles but also roles in the world. The strengthened point which should be owned by everybody is conviction that all human beings are civil society wherever they are because every human being is same as others.

Globalization possibly does not exist if the openness does not appear as well or on the contrary. All of entities which relate to the life of world society are influenced by globalization, products, technology, culture and information. They are influenced not only in national area but also in all around the world. Globalization is marked as well by some economical cooperations which exist in the world. Especially for southeast Asia, Indonesia is included. Economical cooperation is conducted regionally among all countries in southeast Asia called ASEAN. This cooperation produces an economical agreement AFTA. It is an agreement to open the areas of southeast Asian nations as areas which are free of admission charge for import goods. The import goods means the goods which are exported by a particular country in southeast Asia to the other country of southeast Asia.

In 2004, the import goods or commodities from southeast Asian nations were free of admission charge when they were carried to Indonesia. On the contrary, it happened as well for Indonesia to the other country in southeast Asia. In addition, the people of ASEAN who wanted to work in the other country of southeast Asia were allowed without charged. They were not considered as expatriates. In the further areas for instance Asia Pacific, there is also a cooperation. The aim of this cooperation is about economical cooperation among members whose focus is to open the market in each country.

In the world level, an organization is also formed. It is for managing the procedures of world trade with capitalist countries such as United States of America, England, Australia, etc as the main sponsors. This organization is known as World Trade Organization (WTO). The countries, as the members of WTO, have to obey the rules and procedures of trading which is designed by WTO. If there is a country, as a member of WTO, does not obey or follow the rules, they will be punished. The punishment is a kind of pressure to the country. In addition, the country which does not obey the rules will be expelled by giving the high excise tax for its exported products.

Those regulations from an organization are one of an ethic in the global perspective among countries in the world. Especially in political vision, Indonesia includes as a country which follows independent and active foreign policy. Indonesia is involved in some political activities as one of mediations of conflicts in Kambodia, Phillipine, Bosnia, Palestine, Israel, etc. It becomes a base of cooperation in economical cooperation. In the political side, The reliance of other countries,

including the superpowered country both directly and indirectly will influence the economical cooperation. Nowadays, Indonesia is focusing on the economical side.

Globalization, relates to free trade and serious competition, demands each country to have or produce qualified people who are extremely competitive. In one point of view, this is the positive effect of globalization. On the other hand, it gives a negative effect because globalization demands the humans to be workers who keep working and they tend to be capitalist. They focus on earning money and fulfill the market demand. The traditional values such as togetherness and humanity tend to be ignored. This situation causes humans become robots which are programmed only for compete to reach the false prestige and prosperity. In this case, we need a high awareness and wide perception in the global perspective.

Globalization demands human to have a high awareness to understand global problems. The humans' wide perception will make them good in choosing and filtering the information. They can judge which information is important, is needed and is suitable for the local culture. Besides norms, religions and value of national culture, nationalism or national awareness is one of the important base to support the awareness and global perception.

Globalization is marked by the century with many changes. It is a competitive and informative era therefore globalization is the impact of the progress of science and technology. People should master the science and technology in order to keep under the globalization. In addition, increasing the education in Indonesia is one of the ways to master the science and technology.

## **2. The Nature and the Concept of Global Perspective**

Global perspective is a point of view which exists because of the awareness. That awareness relates to the statement that living and life are for global concern. The wider concern is not only based on local, regional, or national concern but also based on international concern that involves people in all around the world. Nowadays, people need to think globally and act locally. It can be stated that globalization is a process.

There are some explanations stated by some experts such as John Huckle. He stated that globalization is a process in which all incidents, decisions and activities in one of area in the world are significant consequences for individual and society in the other area.

The other expert namely Albrow explained that globalization as a process in which the people are incorporated into global society because this process is plural. This globalization is also considered as plurality. Both points of view shows that globalization contains process or activity which affects the world and involves the heterogeneous people to still have the same needs.

Hanvey in 1982 introduced his theory which divides five dimensions of global perspectives as follows:

1. Perspective consciousness
2. "State of the Planet" Awareness
3. Cross-Culture Awareness
4. Knowledge of Global Dynamics
5. Awareness of Human Choices

### **2.1 Perspective consciousness**

This dimension shows the needs of acknowledgment or awareness which realizes that most of individuals have different global perspective. The global perspective has been existed and shaped by some influences out of consciousness. Some of individuals have perspective that exceed other individuals' perspective. In the contrary, there are some people have the perspective under the

average perspective of common perspective. The acknowledgment of this various perspective is called as perspective consciousness. In this point of view, opinion and perspective should be distinguished.

Opinion is the beginning lining of the appearing of perspective consciousness while perspective is the deep and hidden lining in recognizing the behaviour. It can be found in Indonesian civilization especially in the era of independence struggle. Indonesians considered "We love a piece but we prefer to love an independence" They believe in it until now. This slogan is not only an opinion but also perspective consciousness. The other example can be seen in feminist. It causes a consciousness to women and the men respect the women's position. As a result, a deep and better behaviour arise. They respect the dignity and status of the women. This is the implication of women and men thinking about emancipation.

## **2.2 "State of the Planet" Awareness**

This dimension shows the needs of awareness which realizes the condition of the earth and development including the existing condition and tendency such as citizen growth, migration, economical condition, natural resource, physical environment, political growth, science and technology, laws, health, conflicts between nations and internal conflict in a country. Although majority of the world citizens cannot observe directly what is happening in the other places, they are still able to know because nowadays there are some communication medias which can convey news or information in one place to the other place on the earth. For instance, television, computer, internet, etc step on the awareness of earth condition.

## **2.3 Cross-Culture Awareness**

This dimension shows that there is an awareness of various ideas and their implementation in the society. The way of thinking and implementing in each country is observed in a beneficial point of view. Cross-culture awareness is a dimension which is difficult enough to implement because basically people have a right to create a unique culture. As a result, it is hard for particular community to accept the culture created by another community. For instance, until now white people are still hard to totally accept, including culture, the black people. They have different culture.

The existing different cultures is a main reason of the importance of global perspective. If there is a mutual accepting of characteristics between communities, the culture or the way of people doing something is not considered as a strange way. It might cause a mutual trusting and henceforth people from different countries will know and understand each other. It needs a hard effort to apply but there must be a method which can increase the possibility of the success.

## **2.4 Knowledge of Global Dynamics**

This dimension explains the simple understanding about characteristics and mechanism of earth system with emphasizing on some theories and concepts which can increase the accurate awareness about global change. There are three learning categories related to changes of global dynamics as follows:

- a. Principles of basic changes in social systems
- b. Development as a kind of changes
- c. Global planning

## **2.5 Awareness of Human Choices**

This dimension focuses on amount of awareness of the choices problems which is being faced by individuals, nations and social. This awareness needs a knowledge of global system in the future. World citizenry are in transition period which is marked by change from pre-global to global awareness (Hanvey, 1982). Global awareness is marked by new knowledge about interaction in a



system and planning in an action. Minimally, each human who will act need to think some choices based on global perspective for the future.

Merryfield, Elaine Jarchow and Sarah Pickert in 1997 stated some elements of global perspective as follows:

1. Beliefs and Value of Human
2. Global system
3. Global issues and problems
4. Global history
5. Cross-cultural understanding/interaction
6. Awareness of human choices
7. Developing evaluation and analysis ability
8. Strategy in participating and involving

### **3. Ethics of Nobility in Global Perspective**

Globalization has positive and negative impact. People can gain a benefit from the development of science and from the advancement of other countries. It will change into negative impact if people do not prepare themselves with knowledge, strong norm and ideology. Indonesia needs to anticipate this negative impact. It can be done by keeping the self identity of country as a filter of negative impact. National, religion, norms and national culture awareness are needed as well.

A strong national base can be a filter of bad impact of development technology. Nationalism is identical with feeling and spirit of togetherness which says that we as Indonesians have a same value to keep together. Nationalism refers to totality of culture, history, psychological language and other social grudge. They can unite people to fit together and same aspiration and social value.

Nationalism has to be able to avoid the different tribes, customs, races and religions. Entering reformation period, democratisation is sounded out everywhere. It is not only through the national election but also state structure systems. Both develop quickly in accordance with reformation. Hence the democratisation in this country should be controlled in order not to be free of value or authoritative.

A nation which knows a proper behaviour must have an ethic. In 2001 MPR RI issued TAP 6 about ethics and development of national democracy. This TAP was designed because of Indonesians low understanding of ethics, nobility and religion. TAP designed by MPR RI can be a warning for everyone especially whom has a position.

Ethic is a basic of nobility life. Life will run inharmoniously if life ignores an ethic for example life is controlled by materialism and positional concerns. Ethics had been a serious discussion in religious national congress III on June, 9<sup>th</sup> – 11<sup>th</sup> 2010 in Ancol, Jakarta. This congress, followed by 249 figures from 33 provinces, discussed about the importance of basic changes in ethic of nobility life. Ethics can run in respectful life of humanity and justice. It is a basic condition which is needed to be base in formulating democratic life with ethics and morality-based life.

Some experts always define ethics as the discipline which can act as the performance index or reference for our control system. Ethic is a limitation and standard which manage social relationship in social group. In a particular definition relates to social interaction, ethics is a form of written rule wrote systematically and made based on existing moral principles. It can be functioned as a tool to control an action which according to common senses is false. In addition, ethics is a reflection of self-control because everything is designed and implemented from and for community itself. For instance, ethic code of *DPR RI* (Council consent of the governed) which is on going process.

Moral refers to good or bad behaviour of people as human. It leads human how to live properly and control what should be done or not. All human beings in the social life have moral rules which allow and forbid a particular action. The rules should be obeyed by society and they will be punished if they disobey the rules. Moral should be based on value of culture which exist and develop in a social life or based on the religion.

Ethics and moral in Indonesian life can be investigated from *Pancasila* as national principle. It shows ethics and moral values that should be expanded and implemented by every individuals of Indonesia. Ethics and moral of nobility need to be considered as applied ethics because common normative rules are implemented in a particular way based on particularity and special characteristics of life. As a special ethic, ethics and moral of nobility are contextualization of common moral rules into concrete situation.

Ethics and moral consist of three types. **First type is individual ethic and moral.** It focuses on responsibility and behaviour of people to themselves. One of principles which is relevant with this ethic is personal integration principle. It refers to the individual behaviour and action in keeping and maintaining their reputes as a person who has a good morality.

**The second one is social ethics.** It refers to right and responsibility, behaviour and attitude of human as social creature in interaction. The nature of human is individual and social. He/she has to have individual and social ethics which related one another and sometimes is hard to separate.

**The third type of ethics is environmental ethics.** It relates to the relationship between human, both as individual and social, and environment. In addition, it relates as well to the relationship between humans connection with other humans and the impact of it to the environment.

The existence of TAP which talks about the ethics of nobility. It is influenced by the poor understanding of nobility ethics and religion ethics. The background of this is obvious. Originally, it was began by the anxious of government in MPR. This anxious appeared since the multidimensional crisis caused a serious threat of national unity and the decrease of nobility life ethics. It could be seen in long social conflicts, lost trust, the ignorance of rules and laws and people handed without mittens in a social life. All of them are caused by some factors both from internal country and abroad.

There are five things that should be noticed in applying ethics. Internalizing and socializing the ethics of nobility with cultural and religious approach actively, communicatively and participatively which involve all people and non government organization. All ethics refers to the ethics of nobility. In terms of national ethics and moral, there are some strengthened point should be emphasized namely: (a) the importance of understanding ethics and moral of nobility, social, cultural and moral crisis still exist especially can be found in some disoriented attitudes in the society. For instance, disintegration of social and politics based on freedom euphoria, (b) the losing of social patience in encountering the harder reality. A harder reality makes people easy to do criminality and anarchy and (c) the decreasing of respect and pursuance of social laws, ethics, morality and manner.

Referring to four pillars in nobility life, as socialized by MPR, basically related to ethics and moral of nobility. The four pillars are *Pancasila*, *UUD 1945*, *NKRI* and *Bhinneka Tunggal Ika*. On the top of affirmation four pillars, religion is a guide of them. It is an umbrella in life of nobility. Norms and religions are the main pillars to avoid negative impacts of globalization.

The most prominent globalization phase is the phase of high science and technology development, economical power, environmental problems and politics. The progress of science and technology make communication easily both between one individual to another individual and between one country to another country. Globalization is considered as well as a spectrum of social change which is hard to anticipate. The global change directly relates to human aspiration dimension at the end of 20 century which was marked by advanced information. In this case, people need an awareness to accept the fact that the earth where they live on is more small because of the

advancement of the science and technology. the incident occurred in another country in seconds can be known in Indonesia. It is because of the development of science and technology. as a result of this globalization, Indonesians should keep and maintain their self identity by nationalism, religion and the value of national culture.

#### **4. Education in Global Perspective**

Education has a relevance with globalization. Indonesia has to conduct reformation in educational process in order to come to globalization era. The reformation means the emphasis of designing comprehensive and flexible educational system in order that the alumnus can play role effectively in democratic global society. Hence the education should be designed in order to develop the potencies naturally and creatively in a good atmosphere which is full of freedom, togetherness and responsibility. In addition, education should produce graduates who understand their society with all supported factors both to reach success and crucial to success in the social life.

One of alternative solution can be done is the global perspective management of education. Global perspective is a point of view which appears from the awareness that realizes everything in the world related to the global issues. People cannot isolate themselves from global influences because they are a part of world movement. It is demanded that people should pay attention to the concern of world citizenry.

The general objective of understanding global perspective is to increase the perception and to avoid ourselves to be petty minded, to be limited by subjectivity, to be primordial such as thinking about skin, race and limited understanding of nationalism, etc. Understanding global perspective in arranging the strategic aspects is an effort to increase national quality. The global perspective owned by the society can avoid them to be petty minded. It makes people to be open minded. We as Indonesians can observe some aspects in other developed and developing countries. It is expected to be able to compare Indonesian education system and education system of other countries which can be or cannot be applied in Indonesia.

Education system of Indonesia can follow the education system of other countries as long as not in contradiction to the self identity of Indonesia. In managing the education with global perspective, information and knowledge of other places or other countries are required. It can develop our awareness that we will understand better our situation if we can understand the relationship of other society. In addition, understanding global issues is required as well.

The increasing of educational quality for a nation should have priority over others because quality of education is very important and urgent. Besides that, the only people who can survive are those whom are qualified. The way to increase the quality is managing the education with global perception.

Education with global perception can be distinguished into two perspectives namely reformation perspective and curricular perspective. Reformation perspective refers to global perception education which means an educational process designed for preparing learners with intellectual and responsibility in entering a competitive life and high mutual benefit of countries. Education should always relate educational process which is running to the values of global society which always change. School should be value oriented in which society is always investigated as world society.

The implication of global perspective education according to reformation perspective is not only transforming the curriculum but also system, structure and educational process. The education with a basic policy as a social policy is not suitable to the global perspective based-education. Global perspective based-education is a combination of policies which based on market mechanism. As a result, the system and structure of this education should be open like an activity which has an economic function.

The educational policy which is between social policy and market mechanism means that education is not only designed and managed with the regulation – one kind, detailed and instructive – but also designed and managed like a mall. The owner has a freedom to determine which stuff or goods will be sold, how they are sold and how much their cost are. The government does not need to manage everything detally.

In addition, education with gobal perception is systematic-organic, flexible-adaptive and creative-democratic. Systematic-organic means that a sechool is a interactive group of process. It cannot be understood as white and black but every interaction is considered as a part of the whole existing interaction. Flexible-adaptive means that education is emphasized as a learning process instead of teaching process. Learners are stimulated to have motivation in learning something and it must be a continues learning. The learners will not be forced to learn while the material is integrated. One material and the other material are integrated. Those materials are in open-system environment. In this education, individual characteristics have an appropriate place. The last is creative-democratic. It refers to education whose emphasis on mental behaviour in order to keep creating something new and original. Pedagogically, creativity and democracy are two unseparated sides. Creative process will not exist without democracy and in contrary, without creative process, democracy doe not mean anything.

In enterring globalization era, education shoud move from education with curricular perspective to education with global perception. Education with global perception means providing an interdiscipliner, multidiscipliner and transdiscipliner curriculum. Based on reformation perspective, education with global perception demands educational policy is not only as a social policy but also a policy which exist between social policy and market mechanism policy. It can be stated that education should have a democratic, flexible and adaptive freedom.

The second perspective is curricular perspective. It defines an education with global perception is an educational process whose aim is to provide high school teachers and professional teachers by increasing individual ability in understanding the society in terms of world society life. The characteristics of this perspective are (1) learning culture, social, politics, economy of other countries that focus on interdependence, (2) learning various discipline of study to be used based on environment needs and (3) developing some possibilities, abilities and skills in coorporating to apply better world life.

In terms of education, global perspective aims to socialize a group of people in order that elements in global perspective can be conceived by that group of people. In this definition, global perspective is a variable which owned by the people with a particular characteristic according to capacity, tendency, behaviour of group members. The other fact can be found is although the global perspective variable has existed in a group does not mean that each member will have a same global perspective.

Educational institution has a strategic position in conveying global perspective to particular group members and to the citizen in a country. Teachers in the school play role as wel. They need to prepare themselves to have knowledge and skills to teach: (1) apreciateing the differences and similarities oc cultures including the way of teaching about diversity and awareness of perspective, (2) world is an interdependent system and concept, (3) how the existence of students influences and is influenced by relationship of people and global organization in all around the world (Merryfield, 1990).

An interesting article under the title “Becoming citizens of the world” written by Vivien Stewart, vice president of “Education at Asia Society” was published in educational leadership journal April 2007 edition. It explains the importance of preparing American young generation in order to be world citizens which cannot be refused because the impact of the world is global. The

strengthened point stated by Stewart is about the school should reform missions, visions and curricula in order to meet the world's need, not the country or regional needs. Hence American learners, according to statistical data are the most learners who do not learn foreign languages, should learn foreign languages and learn the culture both the weaknesses and the strengths of it.

All countries realize the importance of preparing to encounter the globalization. This is a kind of struggle called as "all out" to come to a field of competition in competing or making friends widely. Japan realized since 1990s, international education such as cultural exchange was conducted from kinder garten level to university level. Eventhough, until now some teachers sometimes are difficult to translate international materials in their classes. This material refers to *Manbukagakusho*. It is continued to the classes of integrated course such as extra class out of school lesson. Some elementary schools and igh schools are involved intensively in social activity to help friends who are in a disaster in all around the world.

Japanesse way of thinking is different with Indonesian and American. Japanesse prefer to the detail things. It gives the other impact of applied educational approach in school for preparing their students to be the citizens of the world. America does not face difficulties in introducing diversity to the students because originally Americans are not American. They were from different countries in the world. Indonesia does not either. Indonesia consists of different tribes and cultures but japan is a homogenous country which originally from *Ainu*.

Becoming the citizens of the world means not only people are able to speak English but also minimally be able to speak languages of other countries which are not a mother tongue. There are three languages which are considered to focus on because those countries are predicted to control the economy in the future. They are Arabic, Chinesse and Latin America. The other interesting thing is learning other countries will train the learners to solve the problems occur in other countries. Local act from the process of global thinking as the slogan "*think globally and act locally*" is a result of education. It needs to develop as an awareness which realizes that Indonesian are same as people from other countries. Slowly, indonesians can be aware of their functions and roles of being citizens of the world.

## 5. Conclusion

"Global" refers to something which relates to the whole world. Global issue relates to the problems, events/incidents, activities and attitudes which influence the world or international. Globalization is a process in which the incident or event, decision and activity in a part of the world become a concequence for individual and society in the other part of the world. Globalization is marked by serous competition, many information, openness and supported by an advance scince and technology. an existing opened society is te globalization characteristic. In economical aspect, it is marked by the free trade which demands people to be creative in producing products with high quality.in political aspect, it is marked by the development of democracy in a democratic society, respect of human right and becoming a *madani* society who respects right and responsibility. In encountering this, awareness and global perception are required. Global perspective is a point of view which appear as a result of awareness. This awareness is talking about the people should be aware that this life is for global concern. In the global perspective, we are not only citizens of Indonesia but also citizens of the world. Indonesia, as a citizen of the world, should avoid itself to be petty minded which focuses on different religions, races, skins, cultures and nations. Hence it is required a strong base relating to ethics and moral as a citizen of the world. Nationalism, norms, religions and value of cultures can be the base.

Athics and moral are a universal point of view which keep the aspiration of life nobility to reach the natural objectives namely life is running with the value of national culture. Every attitude and behaviour in the public spaces should reflect those values. The basic conception of ethics and

moral of a country should base on the concensus of existing values or values which are developing in the society especially for the values in majority, this values in majority means a nature value that control human behaviour. It can be implemented if the politics run based on democracy and place the people as a sovereignty. Ethics and moral come from values of society in order to keep togetherness, unity and reach a peaceful, harmonious and prosperous life. Value is a base of acting in all aspects of life. Moral and ethics in the attitude of society including national politics are two unseparable things.

Stability and security will not be able to be implemented without supported by prosperity of economy and even distribution. In contrast, economical development and prosperity will not be reached without supported by condusive situation of security and stability.the cooperation of economy, politics, security, culture and social will create a stabil peaceful. However, the development of society cannot be applied without a extended socialization, long term process and continously. The efforts to increase the quality of the country can be done by conducting innovation and change. It is the responsibility of education. That education means the education which focus on the humanity value, science and technology as priorities in order that peope can keep and maintain their dignity and status. They shoud tend to the truth to reach the progress according to the values of religions and cultures in the citizens of the world. Global education offers a meaning that Indonesia lives in the society of the world as a global village in which one human is related to the other human without any obstacle because of science, technology, communication and transportation. Hence, global education is is a systematic effort to shape the comprehencive perception and perspective related to the global problems. Global education should provide as well skills to the learners in order to play roles locally and internationally in the society of the world without leaving the identity of national culture.

## References

- Astrid S. Susanto Sunario, (1993). *Globalization and Communication*. Jakarta: Pustaka Sinar Harapan
- Firor, John (1990). *Atmospheric Change (A Global Challenge)*. Jakarta: Penerbit Rosda Jayaputra
- Foley, G. (1993). *Global Warming*. Jakarta: Yayasan Obor Indonesia. Konphalindo. Panos
- Gross, R.E Dynneson.(editor).(1991). *Social Science Perspectives on Citizenship Education*. New York: Teachers College. Columbia University.
- Lubis, T.M (editor). (1993). *Human Rights in the World Community*. Jakarta. Yayasan Obor Indonesia.
- Merryfield M.M, Jarchow E, Pichert S.(1997). *Preparing Teacher to Teach Global Perspective*. A handbook For Teacher Educator. California: Corwin Press Inc
- Muessig, RH, Gilliom (editor). (1981). *Perspective of Global Education*. Columbus : Ohio, Sollege of Education, The Ohio State University
- Susanto, A.B. (1997). *Vision Global Leaders of Civilization syncretism*. Jakarta: PT Elex Media Komputindo Kelompok Gramedia.
- Tilaar, H.A.R. (1998). *Some National Education Reform Agenda, In the 21st Century Perspective*. Jakarta: Penerbit Tera Indonesia
- Yaya, M. (editor). (1998). *Global Vision: Anticipation Indonesia enters the 21st Century*. Yogyakarta: Pustaka Pelajar

# Meeting the Challenges of Numerical Representations in Science and Technology: A Case for the Review of Numeral Derivational Morphology of Nigerian Languages

---

**Reuben O. Ikọtun**

*Department of Linguistics and Nigerian Languages*

*Ekiti State University*

*Ado-Ekiti*

*e-mail address: roikotun53@gmail.com*

## **Abstract**

In this paper, we examine the numeral derivational morphology of Nigerian languages namely, Hausa, Igbo and Yorùbá- the three major languages that are accorded official status in Nigeria. The data used included responses from some students, teachers/lecturers of the Nigerian languages, previous studies conducted on the numeral derivational morphology of the three languages as well as the syllabus designed for the teaching of the counting systems of the languages. It is revealed, from the data collected, that the morphology of the three languages has only positive integers and that it does not have negative integer, positive and negative non-integer numbers. We therefore posit that it is important to borrow the idea of negative integer and positive and negative non-integer numbers into the morphology of the three Nigerian languages so as to make them more relevant to the modern-day scientific and technological needs especially scientific discussions and discoveries that deal with numerical forms or representations. It is also observed that the inclusion of the mathematical terms into the morphology of the Nigerian languages will make the languages very relevant nationally and internationally.

**Keywords:** numerals, derivation, teaching, borrowing, syllabus, morphology.



## Introduction

Numeral derivational morphology as it is called in linguistics or mathematics as it is called in sciences has been defined as the “Queen and Servant of the Sciences” or “the study of numbers, quantities, shapes, and relationships” (see Awake 1993:68). The study and use of numbers, quantities, shapes and relationships are common to every ethnic group or race. But, what is not common is the representation of quantities, shapes and relationships with real or rational and irrational numbers. It is also important to observe that before the discovery and development of modern scientific calculations every ethnic group had what the group needed for use in the area of calculation. However, with the discovery and development of modern science, what was believed to be sufficient with every ethnic group eventually became insufficient. This explains the difference between the indigenous education and western education especially in countries where indigenous and colonial masters’ languages exist side by side. There are sociolinguistic studies which show that any indigenous language that is not in tune with modern scientific development may either become extinct or grossly unpopular even among its users (see Ahukanna 1990, Oyetade 2001). This position also reminds one of what happened to Roman numerals when the modern scientific calculations began. For example, it is recalled that:

*The Roman numerals could not be used for mathematical or scientific calculations, they became unpopular and the teaching in schools was unnecessary when the ninth century Arab Mathematician an astronomer Alkharizmi wrote about the Hindu – Arabic numerals. The Arab Mathematician had derived the numerals from the Hindu mathematicians of India, who had worked it out in the third century B.C.E. Mathematician Leonardo Fibonacci introduced it in Europe in 1202. The nine Indian figures are 9 8 7 6 5 4 3 2 1. With these nine figures and with the symbol 0, any number may be written and its simplicity did not only encourage scientific progress it had made several scientific discoveries possible (Awake 1993: 18-21).*

Mathematically, the nine Indian figures with the symbol 0 which is called zero in English are called rational numbers and a rational number is a number that can be written as a ratio of two integers otherwise it is irrational (see Olorunṣola and Adeleke, 2005:44). These numbers which are called Hindu/Arabic numerals are not only used in Europe but also in nearly every part of the world today as the representatives of the numeral derivational morphology.

## Statement of the Problem

At present, studies have shown that over four hundred different languages exist in Nigeria (see Bamgboṣe 1971, Babajide 2001, Oyetade 2001). Out of this number, three languages namely Hausa, Igbo and Yorùbá have been accorded official status by the Federal Government of Nigeria and the languages are learnt not only in Federal but also in state schools (see National Policy on Education (NPE) 1978, Babajide 2001). Each of the languages has its numeral derivational morphology (see Bowen, 1858: 47-50, Ward, 1952: 157-158, Bamgboṣe, 1967: 14-17, Èkundayo, 1977: 436-453, Dikko, 1981: 24-25, Emenanjo, 1987: 54-60, Oḍètunde, 2000: 53-58, Olubòde-Sawẹ 2010). However, information from sociolinguistic studies shows that Nigerian scholars are worried over Nigerians’ preference of English to Nigerian languages and infrequent use of Nigerian languages in social interactions (see Ahukanna 1990, Awonusi 1993, Babajide 2001, Oyetade 2001, Adegbite 2004, Owolabi 2007). For example, Nwafor (1971) cited in Ahukanna 1990: 178-179 says that the rate at which Igbo speakers code - mix English with Igbo is very alarming and that the reason for code-mixing is that Igbo language cannot meet the challenges of modern technology or express sufficiently modern concepts in arts, science and technology. In a similar vein, citing Bokamba and Tlou (1977), Oyetade (2001:16) remarks that “in the realm of science and technology which is germane to the progress of any nation, the role of English is incontrovertible. It is nationally

recognized as the veritable vehicle for the transmission of scientific and technological concepts. This constitutes one of the rationales for challenging the adequacy of indigenous languages vis-à-vis European languages in the educational system of African countries”.

However, Owolabi (2007:13) suggests that more loan-words could be borrowed into the morphology of the Nigerian languages so as to make them viable and more relevant to the modern-day needs. To buttress Owolabi’s (ibid) position, we can observe that some of the languages that are used internationally now had had restricted roles in the past. In fact, English, which is highly valued and treasured in many countries of the world today, has had its lexical items expanded with loan-words from Latin, Greek, Arabic and French to mention a few (see Fromkin and Rodman (1988: 308&309). As already shown in the introductory section of this paper, numeral derivational morphology is very important to the study of modern science and technology and that the numeral derivational morphology is made up of positive and negative integer and positive and negative non-integer numbers. The question that arises is this: does the numeral derivational morphology of each of the three languages include positive and negative integer and positive and negative non-integer numbers? This question will be addressed in this study. However, our discussion will cover Hausa, Igbo, and Yorùbá. This is because the three languages are the only languages that are regarded as national languages and taught in Federal government secondary schools, some state Colleges of Education and Universities across the nation.

### Some Related Works

Mathematics is defined as “the science of numbers and their operations, interrelations, combinations, generalizations and abstractions...” (see Summers et al 1995:878). Şoyemi (2003:11) is also of the opinion that mathematics is a way of life and that it is an all-embracing body of knowledge that opens up the mind to logical reasoning, analytical thinking and the ability to make abstract object look real or concrete. Some of its branches include arithmetic, algebra, geometry, trigonometry, number system, complex numbers and real analysis. The number system, which is the focus of this paper, can be divided into six different classes. They are natural numbers, integers, rational numbers, irrational numbers, real numbers and complex numbers. In this paper, we are interested in integers. Integers are numbers that contain the positive and negative counting numbers.

Furthermore, it has been argued that whole numbers that are greater than zero are called positive integers and they are to the right of zero on the number line while whole numbers that are less than zero are called negative integers and they are to the left of zero on the number line.

For example:



*Figure 1: Number line of positive and negative integers*

The integer zero is neutral and, therefore, is neither positive nor negative ( $\pm$ ).

**Example:**  $m + x = n \quad \forall m, n \in N$

where  $m > n$

The variable  $x$  can be found and the equation satisfied with a set of numbers from the integers.

$$\text{Take } m = 3, n = 2$$

$$3 + x = 2$$

$$x = 2 - 3$$

$$x = -1$$

$$\text{where } -1 \in \mathbb{Z}$$

There are also positive non-integer and negative non-integer numbers (fractions) (see Bunday and Mulholland 1983:1-4). According to Ilçri and Akinye (1986:57-59), positive non-integer numbers are 2.36, 0.79, 0.333 while negative non-integer numbers are -0.5, -0.003251, -0.5495. Some workings are  $1/99=0.0101010$  (positive non-integer number) and  $^{-3251}/1,000,000=-0.003251$  (negative non-integer number). Other examples of positive non-integer numbers are +0.2,+1.11,+11.222, while those of negative non-integer numbers are -1.11, -1.22 and -0.12. The integers, whether positive or negative, are brought out or designed as a result of deficiency in the counting numbers. In this paper, we argue that one of the ways by which Hausa, Igbo and Yorùbá languages can meet the challenges of modern technology especially in the area of numerical forms is that the numeral derivational morphology of the three languages must include integer and non-integer numbers.

### Data Collection

The data that were used in this paper were collected from three different sources. First, we interviewed some Hausa, Igbo and Yorùbá teachers/lecturers. A random sample of students of College of Education, Ikẹrẹ Ekiti was equally collected on whether the numeral derivational morphology of Hausa, Igbo and Yorùbá includes both integer and non-integer numbers. The number of the interviewees was thirty-eight which included five Yorùbá lecturers, two Igbo lecturers and one Hausa lecturer. The students were ten from each of the languages. We collected our data from the College of Education, Ikẹrẹ-Ekiti because at the College, Hausa, Igbo, and Yorùbá languages are taught both at the NCE and B.A. degree levels. The interviewees were asked to change the following positive, negative integer and non-integer numbers to their languages. The numbers are:

1. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (positive integers)
2. -0, -1, -2, -3, -4, -5, -6, -7, -8, -9 (negative integers)
3. +0.212, +0.111, +1.11345, +11.0011, +1.2221 (positive non-integers)
4. -0.212, -0.111, -1.11345, -11.0011, -1.2221 (negative non-integers)

The second data that were used included studies that were conducted on Hausa, Igbo and Yorùbá numeral derivational morphology. The researchers were Crowther (1852), Bowen (1858), Ward (1952), Bamgboşe (1967), Èkundayọ (1977), Dikko (1981), Emananjo (1989), Ođetunde

(2000). We also considered the Hausa, Igbo and Yorùbá syllabuses and schemes of work on the counting systems meant for study in schools.

### Findings

Studies conducted on Hausa, Igbo and Yorùbá numeral derivational morphology show that numerals 9, 8, 7, 6, 5, 4, 3, 2, 1 and 0 are as follows in Hausa, Igbo and Yorùbá especially when they occur before the decimal point otherwise called or known as integer numbers.

	<b>Hausa</b>	<b>Igbo</b>	<b>Yorùbá</b>	<b>English</b>
0	sufuli	efù	òfo	zero
1	daya	ọtu (òfu)	oókan, ọkan, ìkan	one
2	biyu	àbụā (àbùà; ibùà)	eéjì, èjì	two
3	hukwu	àtọ (ìtọ, ẹtọ)	ẹẹta, ẹta	three
4	hudu	ànọ (ìnọ, ẹnọ)	ẹẹrin, ẹrin	four
5	biyar	ìse (iso)	aárùn-ún, àrún	five
6	shida	ìsì	ẹẹfà, ẹfà	six
7	bakkwai	àsaà (ìsaà, ẹsaà)	eéje, èje	seven
8	takwas	àsátō (ìsatō, ẹsatō)	ẹẹjọ, ẹjọ	eight
9	tara	ìteghete (itènaāni, itoolū, toolu)	ẹẹsàn-án, ẹsán	nine

Still on the integer numbers, like the numerals in many languages of the world, any integer numbers can be formed or derived from the ten basic numbers (see also Ẹkundayọ, 1977: 436-453, Dikko, 1981: 24-25, Emananjo, 1987: 54-60, Ọdętunde, 2000: 53-58). Let us consider some examples in the three languages.

### Derived

#### Numbers

#### Hausa

115	dari daya da sha biyar <i>five minus twenty in six places</i> one hundred and fifteen
180	dari da tamalin <i>twenty in nine places</i> one hundred and eighty
1400	dubu daya da dari hudu <i>two hundred in seven places</i> one thousand four hundred
20000	dubu ashirin <i>five hundred in forty places</i> twenty thousand
20222	dubu ashirin da dari biyu da ashirin da biyu <i>seven hundred and seventy eight minus one thousand in twenty one places</i>

30578	<p>twenty thousand two hundred and twenty-two          dubu talatin da dari biyar da saba'in da takwas  <i>twenty two minus four hundred and twenty two minus one thousand in thirty one places</i>          thirty thousand five hundred and seventy-eight</p>
1000000	<p>miliyan daya / dubu dari daya sau goma  <i>two hundred thousand in five places</i>          one million</p>
<b>Derived</b>	
<b>Numbers</b>	<b>Igbo</b>
115	<p>nnàrì nà ìrì nà ìse  <i>hundred and fifteen</i>          one hundred and fifteen</p>
180	<p>nnàrì nà ìrì āsatō  <i>hundred and eighty</i>          one hundred and eighty</p>
1400	<p>(otù) pukù nà nàrì ànọ  <i>thousand and four hundred</i>          one thousand four hundred</p>
20000	<p>pukù ìrì ābụọ  <i>thousand in twenty</i>          twenty thousand</p>
20222	<p>pukù ìrì ābụọ, nàrì ābụọ nà ìrì ābụọ nà ābụọ  <i>thousand twenty, two hundred and twenty two</i>          twenty thousand two hundred and twenty-two</p>
30578	<p>pukù ìrì ātọ, nàrì ìse nà ìrì āsàà nà àsatō  <i>thousand thirty, five hundred and seventy eight</i>          thirty thousand five hundred and seventy-eight</p>
1000000	<p>(otù) n□dè  <i>million</i>          one million</p>

<b>Derived Numbers</b>	<b>Yorùbá</b>
115	márùn-ún-dín-lógófà <i>five minus twenty in six places</i> one hundred and fifteen
180	ọ̀gósàn-án <i>twenty in nine places</i> one hundred and eighty
1400	egbèje <i>two hundred in seven places</i> one thousand four hundred
20000	ẹ̀gbàáwàá/ọ̀kẹ́ kan <i>twenty in one thousand place</i> twenty thousand
20222	ẹ̀gbàáwàá-ó-lé-igba-àti-méjì-lé-lókòó <i>twenty in one thousand place over two hundred and two over twenty</i> twenty thousand two hundred and twenty-two
30578	ẹ̀gbàá-lònà mẹ̀èdógún-ó-lé ẹ̀èdẹ̀gbẹ̀ta- àti-méjì-dín-lógórin <i>twenty in one thousand in five minus twenty places over one hundred minus two hundred in three places plus two minus twenty in four places</i> thirty thousand five hundred and seventy eight
1000000	àádọ́ta-ọ̀kẹ́ <i>sixty minus ten in twenty thousand places</i> one million

However, information from the textbooks as well as the syllabuses used as guides for teaching numerals in the three languages showed that negative integer, positive and negative non-integer numbers are not part of the numeral derivational morphology discussed in the three languages. The students and teachers/lecturers that were interviewed also claimed that the numerals in the three languages did not include the negative integer, positive and negative non-integer numbers. Therefore, none of them could change -0, -1, -2, -3, -4, -5, -6, -7, -8, -9 (negative integers), +0.212, +0.111, 1.11345, +11.0011, +1.2221 (positive non-integers), -0.212, -0.111, -1.11345, -11.0011, -1.2221 (negative non-integers) to any of the languages. Similarly, although the University of Ifẹ̀ experimented the use of Yorùbá at a designated primary school for all primary school subjects sometimes in the 70s, there was no evidence that negative integer, positive and negative non-integer numbers were taught in Yorùbá. This is because these numbers are not taught in primary arithmetic, nature and social studies.

### **Recommendations/Suggestions**

Since negative integer, positive and negative non-integers are important in scientific discussions and discoveries; our suggestion is that the numeral derivational morphology of Hausa, Igbo and Yorùbá should include negative integers and positive and negative non-integer numbers. In

other words, the idea of negative integers, positive and negative non-integers should be borrowed into the morphology of the three Nigerian languages just as Mathematician Leonardo Fibonacci introduced the ten basic numbers in Europe in 1202 (see Awake, 1993: 18-21). The introduction of the mathematical terms into the three languages will make the languages compete favourably with other foreign languages in the areas of science and technology at least numerically. The lexical borrowing or the introduction of irrational numbers into the morphology of the three Nigerian languages will also reduce to nullity the argument among the Nigerian literate people that Nigerian languages cannot meet the challenges of numerical representations of modern technology or express sufficiently modern concepts in arts, science and technology (see also Ahukanna, 1990, Oyetade 2001).

Furthermore, it must be observed that there is a fundamental difference between positive integer numbers and positive and negative non-integer and negative integer numbers. While it is possible to derive several and bigger numbers from positive integer numbers, derivations of several and bigger numbers from positive and negative non-integers and negative integers are not possible. This is because any number that occurs after the decimal point is not up to one. While derivations of numbers from positive integer numbers have been shown in this paper, we shall show below how some examples of positive and negative non-integer and negative integer numbers should be handled in Hausa, Igbo and Yorùbá with the help of words like *ragi*, *hada* and *alarƙar tsayawa* in Hausa, *mgbakọ*, *nwepụ* and *kpom* in Igbo and *àròpò*, *àyòkùrò* and *ẹ̀sún* in Yorùbá:

Negative Integers	Hausa	Igbo	Yorùbá	English
-1	ragi daya	nwepụ ọtu or òfu	àyòkùrò oókan or ọ̀kan or ìkan	minus one
-2	ragi biyu	nwepụ àbụā or àbùà or ìbùà	àyòkùrò eéjì or èjì	minus two
-3	ragi ukwu	nwepụ àtọ or ìtọ or ẹ̀tọ	àyòkùrò ẹ́ẹ̀ta or ẹ̀ta	minus three
-4	ragi hudu	nwepụ ànọ (ìnọ or ẹ̀nọ)	àyòkùrò ẹ́ẹ̀rin or ẹ̀rin	minus four
-5	ragi biyar	nwepụ ìse or ìso	àyòkùrò aárùn-ún or àrún	minus five
-6	ragi shida	nwepụ ìsìì	àyòkùrò ẹ́ẹ̀fà or ẹ̀fà	minus six
-7	ragi bakkwai	nwepụ àsaà or ìsaà or ẹ̀saà	àyòkùrò eéje or èje	minus seven
-8	ragi takwas	nwepụ àsatō or ìsatō or ẹ̀satō	àyòkùrò ẹ́ẹ̀jọ or ẹ̀jọ	minus eight
-9	ragi tara	nwepụ iteghete or ìtènaānị or itoolū or toolu	àyòkùrò ẹ́ẹ̀sàn-án or ẹ̀sán	minus nine

**Positive Non-**

**Integers**

	Hausa	English
+0.212	hada sufuli alamar tsayawa biyu, daya, biyu	plus zero point two, one, two
+0.111	hada sufuli alamar tsayawa daya, daya, daya	plus zero point one, one, one
+1.11345	hada, daya alamar tsayawa	plus one point one, one, three, four, five

daya,daya, uku, hudu, biyar

+11.0011	hada daya, daya alamar tsayawa sufuli, sufuli, daya, daya	plus one, one point zero, zero, one, one
+1.2221	hada daya alamar tsayawa biyu, biyu,biyu, daya	plus one point two, two, two, one

Positive  
Non-Integers

	Igbo	English
+0.212	mgbakọ éfù kpọm abua, ọtu, àbụā	plus zero point two, one, two
+0.111	mgbakọ éfù kpọm, ọtu, ọtu, ọtu,	plus zero point one, one, one
+1.11345	mgbakọ ọtu kpọm, ọtu, ọtu, àtọ, ànọ, ìse	plus one point one, one, three, four, five
+11.0011	mgbakọ ọtu, ọtu, kpọm éfù, éfù, ọtu, ọtu	plus one, one point zero, zero, one, one
+1.2221	mgbakọ ọtu kpọm àbụā, àbụā, àbụā, ọtu	plus one point two, two, two, one

POSITIVE  
NON-INTEGERS

YORÙBÁ

ENGLISH

+0.212	àròpọ òfó ẹ̀sún, ẹ̀jì, ìkan, ẹ̀jì	plus zero point two, one, two
+0.111	àròpọ òfó ẹ̀sún, ìkan, ìkan, ìkan	plus zero point one, one, one
+1.11345	àròpọ ìkan ẹ̀sún, ìkan, ìkan, ẹ̀ta, ẹ̀rin, àrún	plus one, point one, one, three, four, five
+11.0011	àròpọ ìkan ìkan ẹ̀sún òfó, òfó, ìkan, ìkan	plus one, one point zero, zero, one, one
+1.2221	àròpọ ìkan ẹ̀sún ẹ̀jì, ẹ̀jì, ẹ̀jì, ìkan	plus one point two, two, two, one

**Negative**

**Non-Integers Hausa**

**English**

-0.212	ragi sufuli alamar tsayawa biyu, daya, biyu	minus zero point two, one, two
-0.111	ragi sufuli alamar tsayawa daya, daya, daya	minus zero point one, one, one
-1.11345	ragi daya alamar tsayawa daya,daya, uku, hudu, biyar	minus one point one, one, three four, five
-11.0011	ragi daya, daya alamar tsayawa sufuli, sufuli, daya, daya	minus one, one point zero, zero, one, one
-1.2221	ragi daya alamar tsayawa biyu, one	minus one point two, two, two, one



	biyu,biyu, daya	
Negative Non-Integers	Igbo	English
-0.212	mweṗụ éfù kpọm abua, ọtu, àbụā	minus zero point two, one, two
-0.111	mweṗụ éfù kpọm, ọtu, ọtu, ọtu,	minus zero point one, one, one
-1.11345	mweṗụ ọtu kpọm, ọtu, ọtu, àtọ, ànọ, ìse	minus one point one, one, three, four, five
-11.0011	mweṗụ ọtu, ọtu, kpọm éfù, éfù, ọtu, ọtu	minus one, one point zero, zero, one, one
-1.2221	mweṗụ ọtu kpọm àbụā, àbụā, àbụā, ọtu	minus one point two, two, two,one
Negative Non-Integers	Yorùbá	English
-0.212	àyọkùrò òfo ẹ̀sún, ẹ̀jì, ìkan, ẹ̀jì	minus zero point two, one, two
-0.111	àyọkùrò òfo ẹ̀sún, ìkan, ìkan, ìkan	minus zero point one, one, one
-1.11345	àyọkùrò ìkan ẹ̀sún, ìkan, ìkan, ẹ̀ta, ẹ̀rin, àrún	minus one point one, one, three, four, five
-11.0011	àyọkùrò ìkan ìkan ẹ̀sún òfo, òfo, ìkan, ìkan	minus one, one point zero, zero, one, one
-1.2221	àyọkùrò ìkan ẹ̀sún ẹ̀jì, ẹ̀jì, ẹ̀jì, ìkan	minus one point two, two, two, one

However, it must be observed that while Hausa does not have alternatives of numerals 0 – 9, Igbo and Yorùbá have. Therefore, the numerals that are used under positive and negative non-integers for Igbo and Yorùbá should be adopted and used when mathematical issues that deal with these numbers come up. The numbers that are used are:

	<b>Igbo</b>	<b>Yorùbá</b>	<b>English</b>
0	éfu	Òfo	zero
1	ọtu	ìkan	one
2	àbụā	ẹ̀jì	two
3	àtọ	ẹ̀ta	three
4	àno	ẹ̀rin	four
5	ìse	Árún	five
6	ìsiì	ẹ̀fà	six
7	àsaà	ẹ̀je	seven
8	àsatọ	ẹ̀jọ	eight
9	ìteghete	ẹ̀sán	nine

## Conclusion

In this paper, we have examined the numeral derivational morphology of Hausa, Igbo and Yorùbá. Our discussions covered these three languages out of over four hundred languages that exist in the country. The choice of these three languages is informed by the fact that they are the only languages that are accorded official status and taught in some schools across the country. We have shown that the numeral derivational morphology of the three languages does not include negative integer and positive and negative non-integer numbers. We have also shown that it is important to

modernize the three Nigerian languages in the areas of mathematics because of the relevance of mathematics to the modern-day scientific and technological needs and that the inclusion of the mathematical terms into the morphology of the three languages will make the languages more relevant nationally and internationally. We have therefore suggested and demonstrated how the idea of negative integer and positive and negative non-integer numbers can be borrowed into the morphology of the three languages so as to address the deficiency observed in the failure of the three languages to take part in scientific discussions and discoveries.

## References

- Adegbitẹ, A. (2004) "Enlightenment and Attitudes of the Nigerian Elite on the Roles of Languages in Nigeria". *Language, Culture and Curriculum*, Clevedon, UK: Multilingual Matters. Vol. 16 No 2 pp 185 - 196
- Ahukanna, J.G.O (1990) "Bilingualism and Code-mixing in language use: The Case of Igbo-English Bilinguals" In E.N. Emenanjo (ed) *Multilingualism, Minority Languages and Language Policy in Nigeria*. Agbor: Central Books Ltd. Pp175-185.
- Awake (1993) "Religion and Science a poor mix" *Victorious in the face of death*. pp 18-21.
- Awonusi, V.O. (1993) "The English Language, National Development and Unity in Nigeria: A Sociolinguistic Perspective" *Education Today*, 6(2) 5-8.
- Babajide, A. O. (2001) "Language Attitude Patterns of Nigerians", *Language Attitude and Language Conflict in West Africa*. Ibadan: Enicrownfit Publishers, Pp. 1 – 13.
- Bamgboṣe, A. (1967) *A Short Yorùbá Grammar* Ibadan: Heinemann.
- Bunday, B.D. & Mulholland, H. (1983) *Pure Mathematics for Advanced Level*. Oxford: Heinemann Educational Books.
- Bowen, T.J. (1858) *Grammar and Dictionary of the Yorùbá Language*, Washington D.C.; Smithsonian Institute.
- Crowther, S.A. (1852) *A Grammar and Vocabulary of the Yorùbá Language*, London, Seelay's.
- Dikko, I. (1981) *Hausa* by T.V. Zaria: The Northern Nigerian Publishing Co.
- Èkundayo, S. A. (1977) 'Vigesimal Numeral Derivational Morphology: Yorùbá Grammatical Competence Epitomized' *Anthropological Linguistics*, 19 (9) 436 – 453.
- Emenanjo, N. (1987) *Elements of Modern Igbo Grammar*. Ibadan: University Press Ltd.
- Fafunwa, A.B et al (1989) *Education in Mother Tongue: The Ifẹ Primary Education Research Project*. Ibadan: University Press Ltd.
- Fromkin, V. and Rodman, R (1988) *An Introduction to Language*. New York: Holt, Rinehart and Wiston INC.
- Ilṛi, S.A. and Akinyẹle, O. (1986) *Elementary Abstract and Linear Algebra*. Ibadan: Ibadan University Press.
- Olubṛde-Sawẹ, Funmilayo, O. (2010) Yorùbá Numerals : A Review and a New View. New Findings in the Study of Nigerian Languages and Literatures. *A Festschrift in honour of Oladele Awobuluyi*. Pp41-59.
- Owolabi, K. (2007) *Ó Tó Gẹ́, Omọ Odùduwà: Ogun Ìsàmùlò Èdè Yorùbá ní Ibíkíbi, ní Ipòkípò àti ní Àyèkayè di Jìjà Wàyì*. Universal Akada Books (Nig.) Ltd.
- Ọḍẹtunde, J.O. (2000) *Teach Yourself Yorùbá, Hausa & Igbo in English Language*. Lagos: Bravo Publishers Limited.
- Ọlṛunṣọla, S.A. and Adeleke, R.A. (2005) *Algebra, Trigonometry, and Complex Numbers (An Introduction)*. Lagos : YPPS Publishers.
- Oyetade, S.O. (2001) "Attitude to Foreign Languages and Indigenous Language use in Nigeria" *Language Attitude and Language Conflict in West Africa*. Ibadan: Enicrownfit Publishers, pp. 14 – 29

Şoyemi, B.O. (2003) Student Dictionary of Mathematics. Lagos : Text & Leisure Publisher Co.

Summers, D. et al (1995) Longman Dictionary of Contemporary of English. England: Longman Group Ltd.

The National Policy on Education (1978) Lagos: Federal Ministry of Education.

Ward, I.C. (1952) *An Introduction to the Yorùbá Language*. Cambridge: W. Heffer and Sons Ltd.