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An Integrated Remote Sensing and Gis Approach in Monitoring Spatial Expansion of Federal University of Technology Akure Nigeria

By Dr. Michael Ajide Oyinloye & Olisa Babatope Sunday

Federal University of Technology, Nigeria

Abstract- In this study, a maximum likelihood supervised classification and post – classification change detection techniques were applied to Land Sat images acquired in 1986, 2002 and 2012 respectively to map Federal University of Technology (FUTA), Akure changes in Ondo state, Nigeria. The study employed surpervised digital image classification method using ILWIS 3.2, Arcview 3.1 GIS software and classified the Landuse into Built-up Area, Bareland, Dense forest, Exposed soils, Gallery Forest, Light Forest, Forest Reserve and Rock out crops. The results obtained shows that the Built-up area has been growing rapidly for the periods (1986-2012). The result also shows increase in the Bareland and Rock-outcrop between 2002 and 2012 while dense forest, forest reserves, Gallery forest and light forest decreased rapidly for the period (1986-2012). Adopting exponential growth formulae, the rate of change for projecting spatial expansion and landuse types and project the growth and landuse of Federal University of Technology (FUTA), Akure to year 2032. These results could help the city planners and policy makers to attain and sustain future urban and institutional development.

Keywords: *futa; landcover; change detection; exponential growth; remote sensing; gis.*

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An Integrated Remote Sensing and Gis Approach in Monitoring Spatial Expansion of Federal University of Technology Akure Nigeria

Dr. Michael Ajide Oyinloye [α] & Olisa Babatope Sunday [σ]

Abstract- In this study, a maximum likelihood supervised classification and post – classification change detection techniques were applied to Land Sat images acquired in 1986, 2002 and 2012 respectively to map Federal University of Technology (FUTA), Akure changes in Ondo state, Nigeria. The study employed surpervised digital image classification method using ILWIS 3.2, Arcview 3.1 GIS software and classified the Landuse into Built-up Area, Bareland, Dense forest, Exposed soils, Gallery Forest, Light Forest, Forest Reserve and Rock out crops. The results obtained shows that the Built-up area has been growing rapidly for the periods (1986-2012). The result also shows increase in the Bareland and Rock-outcrop between 2002 and 2012 while dense forest, forest reserves, Gallery forest and light forest decreased rapidly for the period (1986-2012). Adopting exponential growth formulae, the rate of change for projecting spatial expansion and landuse types and project the growth and landuse of Federal University of Technology (FUTA), Akure to year 2032. These results could help the city planners and policy makers to attain and sustain future urban and institutional development.

Keywords: futa; landcover; change detection; exponential growth; remote sensing; gis.

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I. Introduction

Land cover is the combination of vegetation, soil, rock, water and human-made structures, which make up the earth's landscape, influencing the exchange of energy and matter in the climatic system and biogeochemical cycles (Chen et al., 1998). Land cover change is significant to a range of themes and issues central to the study of global environmental change has an important influence on hydrology, climate, global biogeochemical cycles and human activities (Flamm et al, 1991; Flamm, 1992; Kirchhof, 1995). These diverse roles have been recognized in a large number of research publications and international conferences, symposia, and workshops devoted to the subject over the past few years (e.g America Institute of Biological Sciences, 1994; Thom, 1994; Meyer and Turner 1994) as well as the United Nations' Agenda 21 (UNCED, 1992).

Land cover pattern of an area is an outcome of natural and socio–economic factors and their utilization by man in time and space. Information on spatial expansion/land cover (natural landscapes) and possibilities for their optimal use is essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare. (Zubair, 2006). This information also assists in monitoring the dynamics of land use resulting out of changing demands of increasing population. It is actually a fact, that rapid urbanization brings opportunities for new urban (land use) developments (Oyinloye, 2010).

Several studies have been conducted with the integration of remote sensing and geographic information systems to analyze and monitor land cover changes. Musaoglu, et al, (2002) merged the remotely sensed data with geocoded information. This was achieved by first classifying the images, applying 5*5 neighbor hood functions, then transforming the results into vector layers. The layers were imported into GIS environment for area analysis.

Similarly, Zhi-Yong Yin, et al (2005) used image processing and analysis in a GIS environment to access spatial changes in urban land use pattern and population distribution. Here, unsupervised classification

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was used to classify the image into land use classes. With census data in a GIS, census polygon was constructed into various sets of units, and then comparison made with the classified image population in surface areas. In his studies carried out by 2004 in Shaoxing City in China using satellite imageries for the year 1984, 1997 and 2000, in which one of the goals of the study was to produce a landuse map of shaoxing city and its surroundings, the result shows that there are undoubtedly a lot of changes that occurred between 1984 and 1997 when compared with those of 2000, due to sufficient time gap. From the study, it was observed that residential area development was mainly at the expense of agriculture land use.

In the West African forest region, cities developed among the Yoruba, Fulani, and Hausa people as well as in the Ashanti and Benin kingdom. As well as being commercial and political centers they worked as spiritual centers. The Nigerian city of Lagos had 665000 inhabitants in 1963 (Rakodi, 1997) and 8.7 million in 2000 is expected to become the worlds' 11th biggest city by 2015 with 16 million inhabitants (UN, 2002). The urbanization of most of Africa countries is moving fast forward, especially south of the Sahara. As a country develops from primarily an agricultural to an industrial economy, large-scale migration of rural residents to towns and cities takes place.

In Federal University of Technology Akure, speedy urbanization took place in the last two decades due to population growth of students and staff which has been attributable to the increase in population of the host city of Akure and catchment areas and is still going on (Olisa, 2012). Spatial developments are no longer following a controlled and sustainable pattern due to lack of development plans. Meanwhile, the pressure of horizontal expansion that had started for years has continued to increase till this period in Federal University of technology Akure and its environs. This could sometimes be seen as socio-physical developments which consequently have effects on the natural landscapes. While these social issues affect the study area, their impact on vegetation distribution and composition are harder to estimate. The extent of this development is however deemed to be monitored in order to guide decision makers on the distribution of facilities/infrastructures and also to ensure that the growth is compatible with the concept that embraces Environmental Sustainability.

The aim of this paper therefore is to use the application of remote sensing and GIS approach to monitoring spatial expansion of Federal University of Technology, Akure with a view to determining the pattern of landuse/ landcover changes and its implications on the study area. The objectives are to;

i. identification of various landcover and landuse classes in remotely sensed data sources;
ii. determine the spatial extent and the impact urban growth on the rural surroundings.
iii. examine the major determinants of spatial expansion and land use types and the rate of urban growth in FUTA and its surrounding areas; and
iv. examine relationship between urban (population) growth and spatial expansion / landuse type.
v. adopt the exponential growth formulae;

Af = Ab(1+%/100) f-b, (where A is the future, b is the base year and % is the rate of change for projecting urban expansion and landuse type) to project the growth and landcover change of the study area to year 2032.

II. Study Area: Futa and Environs

Akure is the host town of the study area 'Federal University of Technology, Akure (FUTA)' a protected academic area. It is geographically geo-referenced on coordinate lines of 734393E, 808614N on the western flank and 737291E, 806714N on the Eastern flank of meridians. Down to the south is Aule Community; up in its north is Ipinsa Community Lands interpose by Akure-Ilesa Express way, on the west Ilara and Ibule settlements while to the east is southern part of Akure Metropolis in Akure South Local Government Area in Ondo State, Nigeria; all these areas are made up of FUTA environs (see Figures 1 and 2).

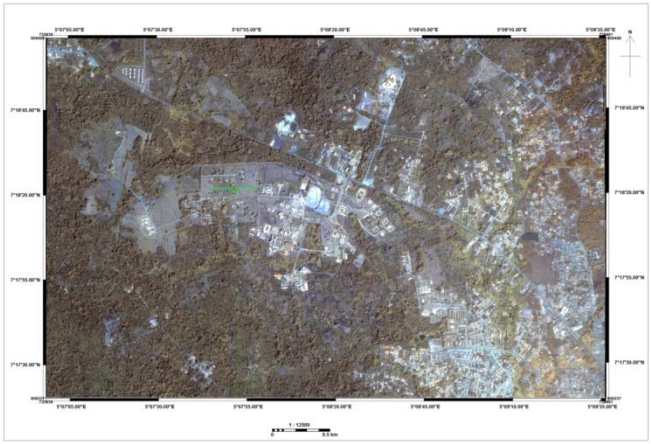


Figure 1 : High Resolution of FUTA showing Landuse/ cover of the Study Area

Source : http:www@googleearth.com

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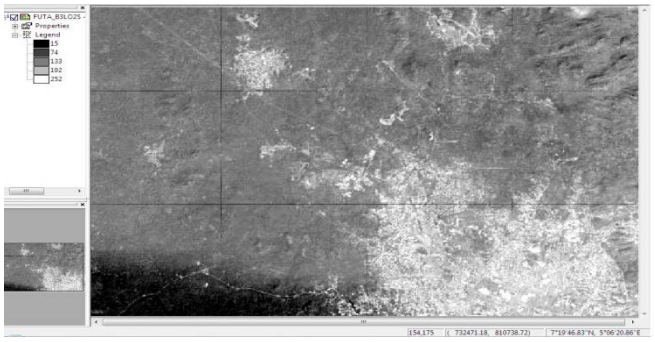


Figure 2 : Satellite Imagery of FUTA and Its Environment Source: *http:www@googleearth.com*

III. Data Acquisition and Method

As a pre-processing step for both 1986 Thematic Mapper, 2002 Landsat ETM+ and 2012 Quick bird on Time Series images were geometrically corrected and ground control points obtained through intensive ground surveys permitted the co-registration of all images to a Universal Transverse Mercator (UTM). The satellite images: the Thematic Mapper (TM) of 1986, the Enhanced Thematic Mapper of 2002 (ETM^{+}) and Quick Bird of 2012 were made to pass through process of image enhancement, geo referencing, resampling, image classification and digitizing.

Moreover, in order to produce landuse/land cover maps of 1986, 2002 and 2012, maximum likelihood supervised classification was performed on reflective bands (bands 4, 5 and 7) into the following 8 landuse/landcover classes; Urban (Built-up), Dense Forest, Bareland/Cultivation, Exposed Soil, Forest Reserve, Gallery Forest, Light Forest and Rock Outcrop. Information collected during the field surveys combined with the digital topographic map was used to assess the accuracy of the classification.

IV. Results and Discussions

Figures 3, 4 and 5 showed the results of the various processing itemized for the Landsat TM and Enhanced Thematic Mapping (ETM^{+}) data sets. Also, tables 1, 2 and 3 showed the statistical results of the classification of the data set.

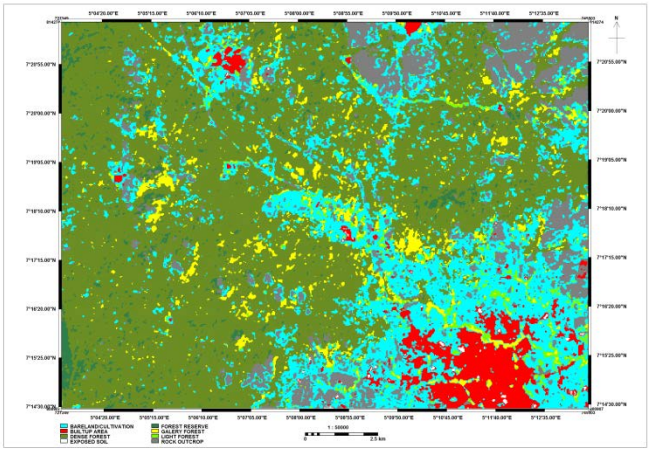
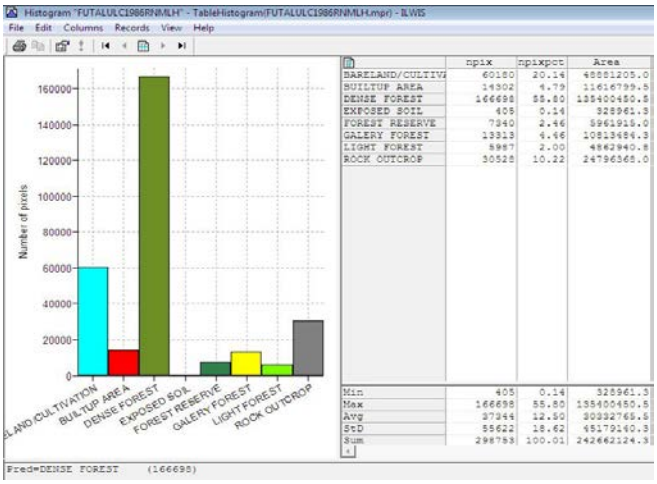


Figure 3 : Classified Landuse Landcover Change Map of FUTA and Its Environs in 1986

Table 1 : Statistical Result of Landuse Landcover Map of FUTA and Its Environs in 1986



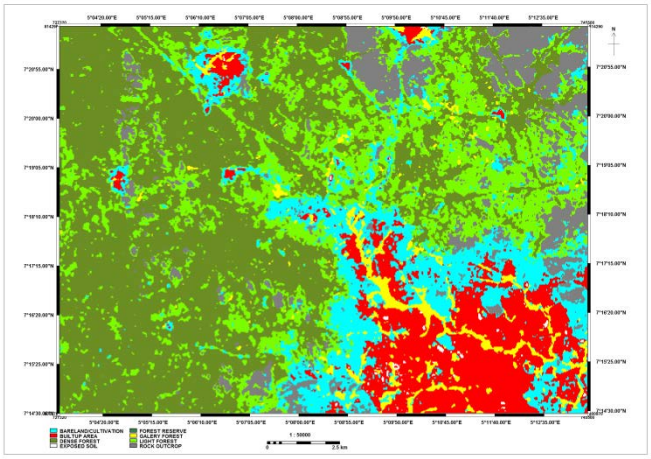
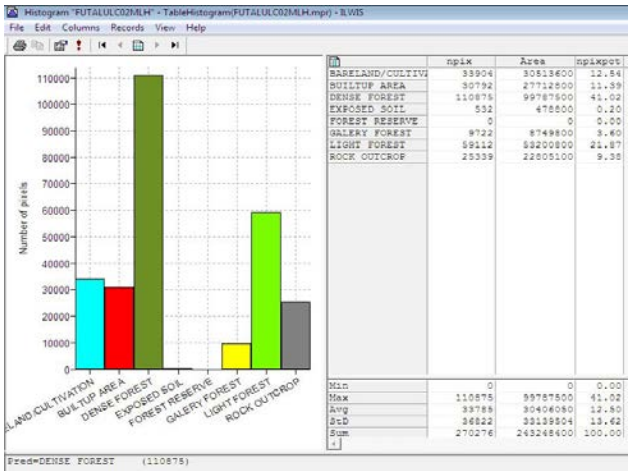


Figure 4 : Classified Landuse Landcover Change Map of FUTA and Its Environs in 2002

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Table 2 : Statistical Result of Classified Landuse Landcover change map of FUTA and Its Environs in 2002



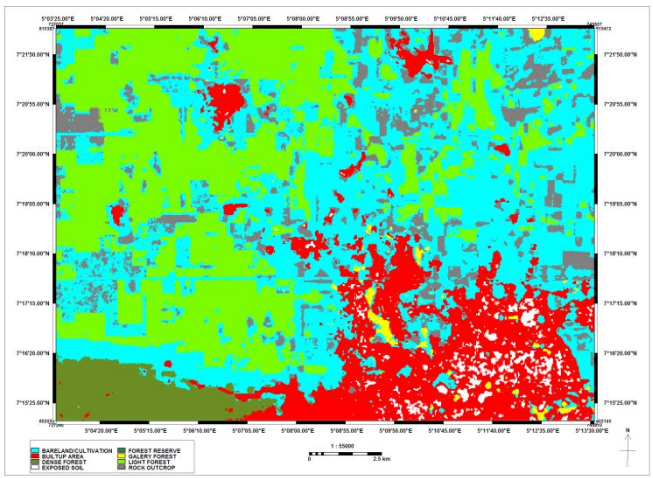
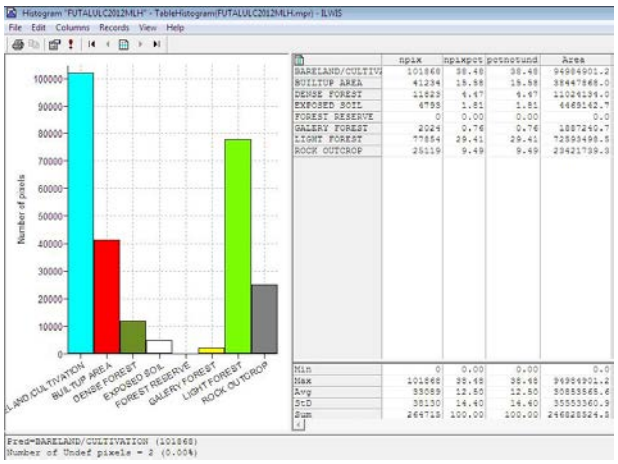


Figure 5 : Classified Landuse Landcover Change Map of FUTA and Its Environs in 2012

Table 3 : Statistical Result of Classified Landuse Landcover Change map of FUTA and Its Environs in 2012



A supervised classification was performed on reflective bands (bands 4, 5 and 7) into the following 8 landuse/landcover classes; Urban (Built-up), Dense Forest, Bareland/Cultivation, Exposed Soil, Forest Reserve, Gallery Forest, Light Forest and Rock Outcrop. The classification results of Figures 3, 4 and 5 however showed remarkable differences as evidenced on Tables 1, 2 and 3. On comparing the figure 3 and table 1 it was observed that densed forest covers the largest land area of 13,540 hectares (55%) of the total land area of study. Bare land/Cultivation covers 4888.125 hectares (20%), while, built-up area was 1161.67995 hectares (4.79%) of the total land area of study in 1986. This information reveals that people had not tampered with vegetative covers in terms of agricultural landscapes and natural vegetation. Construction/land use development was bare minimum.

Figure 4 and table 2 shows that almost all classes are changing to one another but more significantly to built-up, light forest and bareland/cultivation followed by exposed soil. Forest reserve disappeared in after 16 years, having lost to light forest which has landcover increase of 457.07 hectares to compare to 1986 land cover figures. Bare land/Cultivation class has a short fall of 1836.76 hectares, while, built-up area class increased in landuse size to 2771.28 hectares (11.39%). This result indicates that green covers are gradually disappearing thus posing threat to biodiversity in 2002.

In 2012 expansive Built-Up area is more pronounced than what it was in 2002. Though, forest reserve had disappeared but light forest keeps increasing as dense forest is rapidly losing to light forest. In figure 5 and table 3, dense forest had decreased to 1102.41 hectares (4.47%), light forest 7259.35 hectares (29.41%), Bare land/Cultivation had increased to 9498.49 hectares (38.48%). This has been attributed to government intervention on campaign for agricultural practices such as Fadama programmes, campaign for tree planting across the world and particularly in Nigeria. Between 2002 and 2012, dense forest lost 88.96% of its land cover to light forest.

a) Percentage Ratio of Landuse/Landcovers of the Study Area

In order to determine the percentage ratio of the land use land cover of the area of study, all the 8 classes are grouped into two class categories. Built-up area, Exposed soil and Rock Outcrops are categorized as Landuse, while Bareland/Cultivation, dense forest, Forest reserved, gallery forest and Light forest are categorized as land covers.

Comparing the landcover areas to the landuse area ratio in percentage for each year 1986, 2002 and 2012 as shown in figure 6, it appears that large percentage of the area of study is still covered with green vegetation. As can be expected, the percentage of the forest cover declines with drier conditions and differences are quite obvious.

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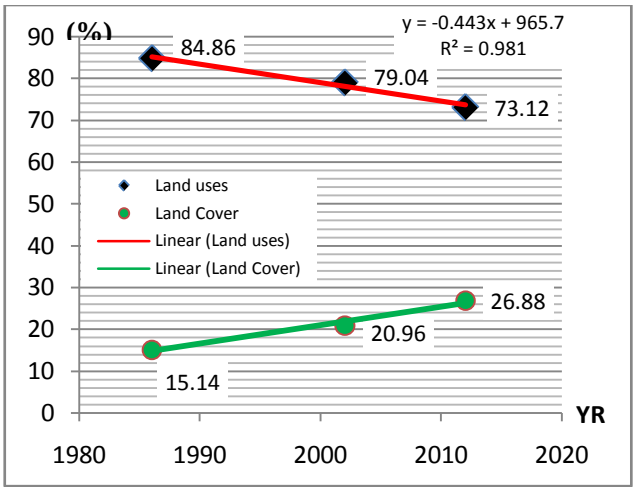


Figure 6 : Comparing the landcover areas to the landuse area ratio in percentage for 1986, 2002 and 2012

Hence, from figure 6, in 1986, 84.86 percent of the study area are forested in its tropical monsoon; in 2002, the vegetative area declines to 79.04 percent still in its tropical monsoon, while, in the year 2012, 73.12 percent is recorded for vegetation covers. In other word, the vegetation areas are becoming dry zones together as existed canopy and dense forests had gradually lost to Light and gallery forests. It is of note that light and gallery forest are also giving way for construction and other human activities while reclaiming land areas as substitutes from reserved and dense forest. The figure 6 indicates that as land cover decreases in percentage, landuse increases annually at 0.5% growth rate, implying an annual increase of 123.41 hectares of land gain to various urban landuse developments.

From the figure 7, the exponential function of Spatial (Built-Up) areas of the study area gives the following equation: Y=1E-16e0.0225x and R^2=0.9952

Within the 1986-2002, the increase in spatial expansion was 1425.45ha. (14254.5sqkm) that is 39% increase; the increase was 1534.2ha (15342.0sqkm) that is 30% landuse increase between 2002 and 2012. The percentage fall in this increase has been attributed to campaign on trees planting and promotion of agricultural production programmes such as FADAMA and landscape developmental crusade in Nigeria.

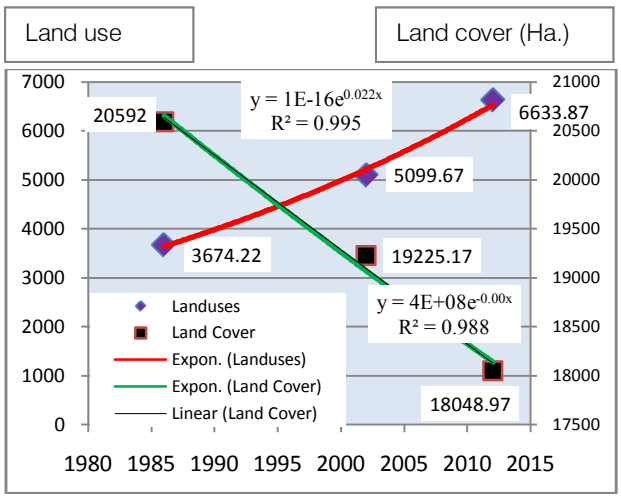


Figure 7: Exponential Function of Built-Up Areas of the study area from 1986 to 2012

b) Change Matrix

Change Matrix involves coding and assigning each landuse land cover type, overlay each other and subtract initial year landuse land cover data from land value of absolute year. Ko Ko Lwin, (1996).

i. *Change Matrix from 1986 to 2012*

An important aspect of change detection is to determine what is actually changing to what, that is, which landuse is changing to the other. Location of change can be accessed from the overlay map whereby both year of study's image were overlaid to see what has changed. Change matrix is a useful tool to vividly express the changes of a particular class and in what class the change absorption is taking place (Ko Ko Lwin, 1996).

As shown Figure 5 almost all classes are changing to one another but more significantly to built-up, followed by light forest and Bareland/Cultivation.

Table 4 : Coded Landuse Land cover type in two classification images

1986 classified Image	Code	2012 Classified Image	Code
Bareland/Cultivation	20	Bareland/Cultivation	39
Built-Up Area (Landuses)	5	Built-Up Area (Landuses)	16
Dense Forest	56	Dense Forest	5
Exposed Soil	0	Exposed Soil	2
Forest Reserve	3	Forest Reserve	0
Gallery Forest	5	Gallery Forest	1
Light Forest	2	Light Forest	29
Rock Outcrop	10	Rock Outcrop	10

The output values are between -55 to 56 according to their change categories are shown in table 4.

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Table 5 : Change Matrix from 1986 to 2012

YEAR	2012 LAND USE LAND COVER CHANGE MAP								
	CLASS	Bareland/ Cultivation	Built-Up Area (Landuses)	Dense Forest	Exposed Soil	Forest Reserve	Gallery Forest	Light Forest	Rock Outcrop
1986 LANDUSE LAND COVER CHANGE MAP	Bareland/ Cultivation	19	-4	-15	-18	20	-19	9	-10
	Built-Up Area (Landuses)	34	11	0	-3	5	-4	24	-5
	Dense Forest	-17	40	51	-54	56	-55	-27	-46
	Exposed Soil	39	16	5	2	0	-1	29	10
	Forest Reserve	36	13	2	-1	3	-2	26	-7
	Gallery Forest	34	11	0	-3	5	-4	24	-5
	Light Forest	-37	14	3	0	2	-1	27	8
	Rock Outcrop	29	6	-5	-8	10	-9	19	0

Note : the minus (-) signs indicate cell where class changes has taken place to another class type while positive sign indicates no change events.

The change categories are as follow,

1. Forest reserve reductions are: (Reserve forest to Light forest, Bareland/Cultivation, Built-up area)
2. forested Area (Dense forest to light Forest, Bareland/Cultivation to Forest)
3. Change to light forest (Every land cover type changed to light forest except gallery forest)
4. Change to Gallery forest (No land Cover type change to gallery forest but losing to built-up area)
5. Change to Bareland/cultivation (Every land cover type changed to Bareland/cultivation except densed forest)
6. Change to Built-up area (Urban) (Every land cover type changed to built-up area except Bareland/cultivation)
7. Change to Exposed soil (No land type changed to exposed soil except light forest)
8. Change to Rock Outcrop (No land type changed to exposed soil except light forest)

For each sample, a change matrix has been produced from the interdependent interpretation of two satellite images; the historical image acquired in year 1986 and the recent one acquired this year 2012.

The table below shows spatial prediction of 20 years taking cognizance of the exponential functions. Recalling the formulae:

$$Af = Ab\ (1+\%/100)\ f\text{-}b).$$

Table 6 : Exponential prediction of land use land cover change for 20 years

CLASS	Area HaY0	Grow Perc	AreaHaY20 2032	Comments/Remarks
Bareland/ Cultivation	9498.49	21.13	49639.11	40140.62 hectares gain from dense forest, light forest and Gallery forest
Built-Up Area (Landuses)	3844.79	3.83	6789.90	2945.11hectares gain precisely from Bareland/ Cultivation class
Dense Forest	1102.41	-8.89	-3062.50	Dense forest has completely lost to light, then to Bareland/Cultivation with negative sign equivalent to nothing but zero.
Exposed Soil	446.91	83.34	7896.00	7449.09hectares of land has been exposed due to construction, quarry, mining and other physical developments
Forest Reserve	0	0	0	Zero forest reserved is experienced.
Gallery Forest	188.72	7.84	-484.63	There is tendency that the gallery forest would have totally given way for Cultivation /farming activities like FADAMA Projects.
Light Forest	7259.35	3.65	7260.35	Light forest almost disappearing.
Rock Outcrop	2342.17	0.27	2468.65	Rock Outcrop remains slightly unchanged due to low rate of industrial exploitation and mining.

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Where:

- Column AreaHaY0 contains the areas in hectares for each land use/land cover class in year 0.
- Column GrowPerc contains growth rates per year.
- Column AreaHaY20 contains the areas of the land use/land cover classes after 20 years

V. Implications of Spatial Expansion in Federal University of Technology (Futa), Akure

Indeed, between the period of 2002 and 2012, there has been rapid increment in the spatial expansion of the study area compared to the period between 1986 and 2002. There is a possibility of continual increment in this area over the next 20year. This may therefore suggest that land covers are continually disappearing in the study area. This would have impacts on a wide range of environmental and landscape attributes including the quality of water, land and air resources, ecosystem processes and function, and the climate system itself through greenhouse gas fluxes and surface albedo effects (Goodchild (2002). Continuous global warming and destruction of bio-diversities in the ecosystem will definitely become the order of the day.

There have been several house owners who have converted their residential units to student hostels without considering regular space standards. Open space and setbacks to road have been considered good areas to build more hostels and commercial shops. The result of this is upsurge of urban slum around a protected academic area.

There is likely going to be over crowdedness brought by compactness in and around FUTA come year 2032. This situation will have negative implications in the area because of the associated problems of complexity of urban land use such as crowdedness like crime, poor housing, poor socio-economy and easy spread of diseases. Surrounding areas of FUTA will contain the poorest segment of the urban population, notably first generation immigrants living in the lowest housing conditions.

VI. Conclusions

This paper employed the use of remote sensing, Geographic Information System and Spatial Statistics in monitoring spatial expansion of Federal University of Akure (FUTA). Attempt was made to capture as accurate as possible eight land use/ land cover classes as they change through time, the eight classes were distinctly produced for each study year but with more emphasis on built-up land as it is a combination of anthropogenic activities that make up this class; and indeed, it is one that affects the other classes. In achieving this, Land Consumption Rate, Land Absorption Coefficient and Change Matrix were introduced into the work.

However, the result of the work shows a rapid growth in built-up land between 1986 and 2002 while the periods between 2002 and 2012 also witnessed a reduction in this class. After the initial reduction in farm land between 1986 and 2002, the study area has witnessed a steady growth of land use development culminating to great decrease in farmlands, forest reserve and dense forest. In 2012, the result showed that there was great loss of agricultural lands, and it may continue in this trend in 2012 to 2032 all things being equal. Therefore in order to enhance the functionality of the institution and to reduce its social problems, the following recommendations should be given attention- there is need to encourage urban agriculture to create a sustainable environment, maintain quality of environment, create employment, and provide much food and aesthetics to serve as additional economic nutritional base. It becomes imperative for the institution and Federal government to make sure that farming and urban agriculture are encouraged since this will lead to food security and more importantly, it will be a source of revenue to the institution. Forest land has been steady in reduction between 1986 and 2002, thus signifying a desirable change and indeed; if this moderate change reduction in forest land observed in-between 1986 and 2002 is upheld to be for next 20 years, effects of global warming on our environment will be negligible. Securing plan approval will reduce uncoordinated building arrangement in our environment and reduce slums. Emerging development taking place around Federal University of Technology Akure 'a protected academic environment' can be checked with this measure. There is need to generate digital database for landuse/landcover spatial change. Geographic information on spatial change and other geographic data can be stored and accessed for policy decision making. This will serve as a brain box for policy makers not only in physical and urban planning but for other professions.

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The Performance Evaluation on the Electronic Medical Records Project of the Health-Care Systems: A Case Study from the National Audit Office of the Republic of China, Taiwan

By Lucia Sun
Tamkang University, Taiwan Province of China

Abstract- Social Welfare issues are a top concern of the public and one of the most important developments of a country. Many nations have shared their experiences in regards of Social Welfare, and for the first time I would like to share the Public Health Care system audit of the Republic of China, Taiwan, with emphasis on the importance of auditing.

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I. Introduction

a) *Development of the Public Health-Care System in Taiwan*

Taiwan's economic miracle is known to the world. One of the reasons for its success is a sound public health infrastructure, which made this economic miracle possible. The ROC's Department of Health (DOH) has a broad range of duties, including: responsibility for public health, health promotion, disease-prevention monitoring, food safety, drug administration, medical care, National Health Insurance, care for the disadvantaged, biotech research and development and international health affairs. The following is a brief introduction to the history of Taiwan's public health development.

b) *The Missionary Period (1865-1895)*

Several Western missionaries, including the earliest Dr. James Laidlaw Maxwell and the later Dr. George L. Mackay and Dr. David Landsborough came to Taiwan from foreign lands. With confidence and sincerity, they dedicated their lives to Taiwan and allowed let Western medicine to take root in this land, thereby winning the gratitude and respect of the local people. One after another they opened hospitals in Taiwan, such as the Gu Lau Hospital (now the Sin Lau Hospital) in Tainan, the Christian Hospital in Chunghwa and the Mackay Hospital in Taipei. These hospitals were the three major privately-run medical facilities in Taiwan during this period.

c) *Medical Development During the Japanese Rule (1895- 1945)*

The foundation for early medical development in Taiwan was laid mostly during the period when Japan colonized Taiwan from 1895-1945. At that time, epidemics were prevalent in Taiwan due to the damp climate and poor hygiene. The Japanese government realized that their lasting rule in Taiwan hinged on the effective control of epidemics, and therefore, attached special importance to this effort, laying a solid foundation for Taiwan's public health system, thereby improving the health of the Taiwanese people.

d) *Public Health After the Government's Relocation to Taiwan (1945-)*

Taiwan's medical facilities were seriously damaged during the Second World War and much needed to be done to fix them. As Taiwan is located in the sub-tropics, epidemics were frequent at that time, so health authorities decided to give precedence to the development of a national health system and put medical construction on the back burner. This policy served to lay a solid foundation for Taiwan's medical development in the years to follow. The major measures at that time included the wide establishment of health

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[1] Report on the 14th UN/INTOSAI Seminar, on Government Auditing the Audit of Public Health Care System by SAI, Vienna March 27- 31, 2000, p4.

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stations, elimination of malaria, plague and cholera, universal vaccinations, promotion of women's and children's health as well as Planned Parenthood[2] . It also promoted the construction of a health network and launched the National Health Insurance (NHI) program in 1995. Following the launch of NHI, it has gradually achieved the goal of reducing people's medical treatment burden, especially on fair medical treatment, universal health care coverage, and shortened wait times. Under this insurance system people would not be in poverty due to taking medical treatment and the nation enjoys the lowest administrative costs in the world. In 2009, for example, national health expenditures per capita each year were $ 2,186, (in the United States they were 3.6 times larger) and medical costs occupied only 6.9% of the GDP (Figure 1).

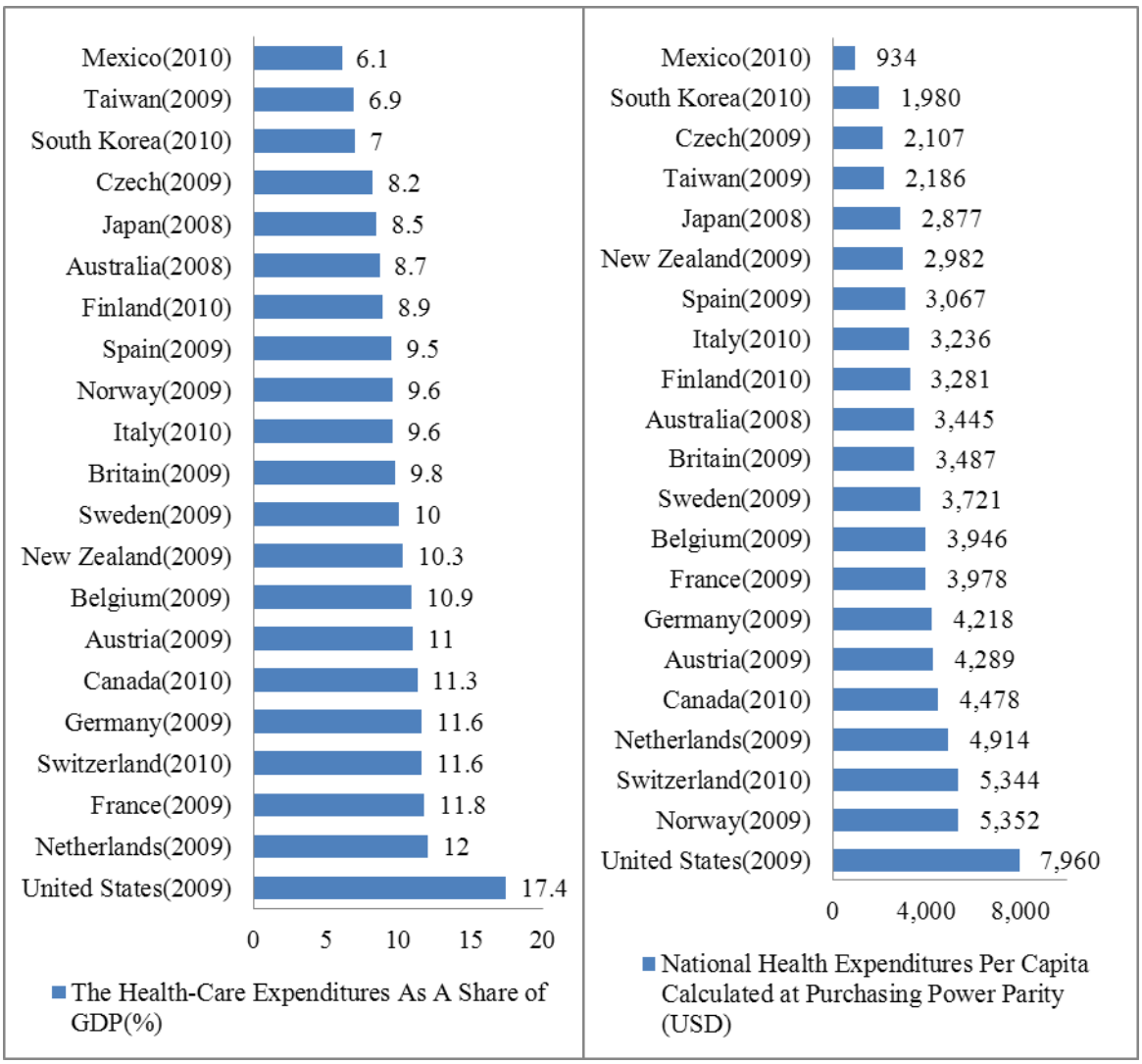


Figure 1 : Taiwan National Health Expenditures Comparing With the Major Countries, *Sources: The Bureau of National Health Insurance*

Average annual growth rate of National health expenditures was controlled at about 5.1%, which is lower than most of the major countries (Figure 2). Besides, among the 2009's top 20 brand drugs of NHI expenditure, their 2010 NHI paid drug prices are all lower than the drug prices of the major countries (Figure 3).

[2] http://www.nhi.gov.tw/English/webdata/webdata.aspx?menu=11&menu_id=290&WD_ID=290&webdata_id=1885, latest visit on May 1.

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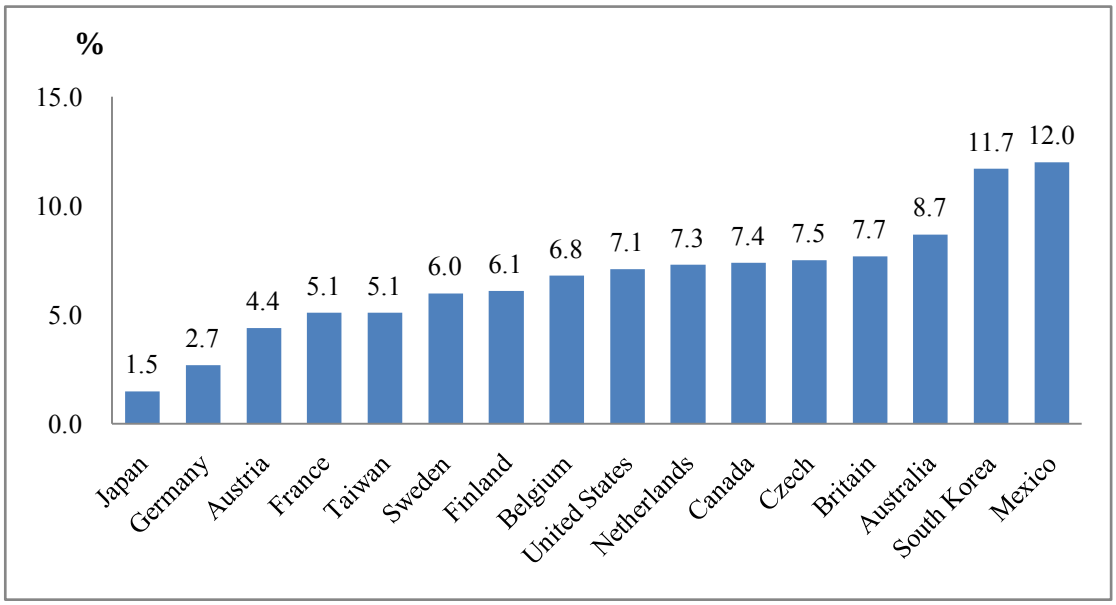


Figure 2 : National Health Expenditures Average Annual Growth Rate among the Major

Notes : Japan (1998-2007), Austria (1998-2007).

Sources : The Bureau of National Health Insurance.

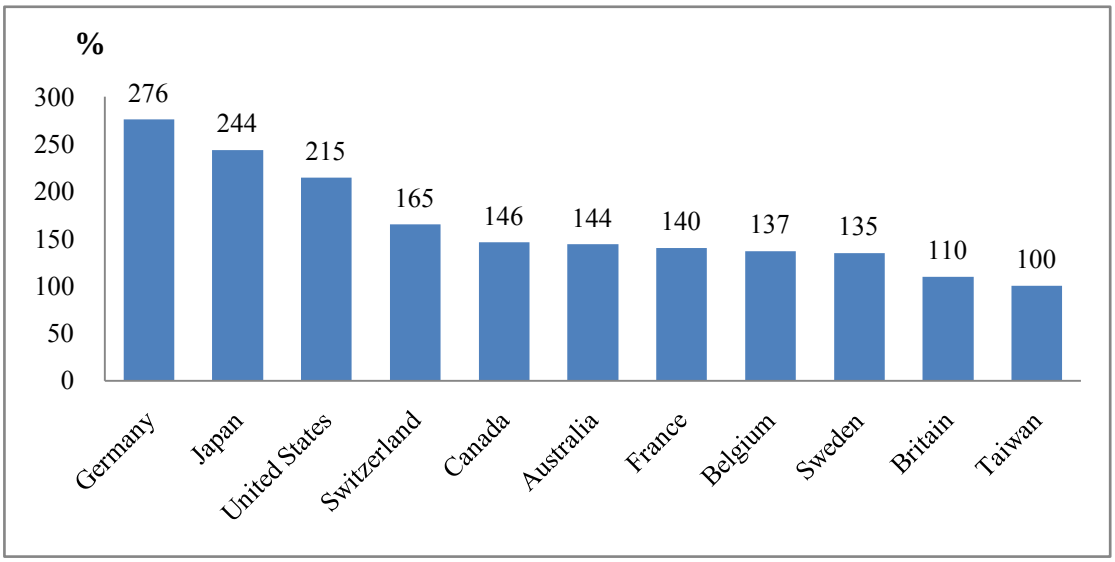


Figure 3 : NHI Brand Drugs Prices Are Lower Than the Major Countries

Notes : This data is based on the 2009's top 20 brand drugs of NHI expenditure to compare with their 2010 NHI pay drug prices and the drug prices of the major countries.

Sources : The Bureau of National Health Insurance.

II. Case Study : The Performance Evaluation by the National Audit Office of the Republic of China, Taiwan on the Electronic Medical Records Project

The Department of Health has promoted "National Health Informatics Project (NHIP)" since 2008 and "promoting the implementation of electronic medical records" is its primary objective. The main implementation strategies include: setting the common format for electronic medical records, promoting the health insurance professional review and hospital evaluation to relate electronic medical records while also providing medical institutions related personnel training and technical counseling for implementing electronic medical records. The Department of Health in 2010 added "Accelerated Medical Institutions Implementing Electronic Medical Records Systems Project (2010-

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2012) " branch project in the "Accelerating the execution of Intelligent Medical Care Project" (Appendix 1). To fully implement electronic medical records and medical records exchange system by 2014, the Department of Health speeds up the process of implementing electronic medical records in medical institutions from four dimensions: regulation, standard, safety and promotion, conducting strategy planning and supporting measures. To respond to what INTOSAI suggested that SAIs should pay attention to the new issues of public health-care systems, the National Audit Office planned to evaluate the performance of the electronic medical records projects.

The INTOSAI Working Group on Program Evaluation released "Program Evaluation for SAIs - A Primer" in 2010 to promote this new concept of performance audit. According to this paper, program evaluation is defined as:

A program evaluation is a systematic investigation of an organization or institution, program or project, or process or policy that is intended to benefit society. A program evaluation's purpose may be to help improve, help decide an action, or learn reasons for successes and failures or strengths and weaknesses in meeting objectives. It can document for accountability or increase knowledge. Program evaluations commonly determine criteria that distinguish between high and low quality, measure performance against those criteria, and draw valid and reliable evaluative conclusions.

A program evaluation may be independent while being conducted with participation from community members, consumers, managers, and others to give it multiple perspectives. The evaluation process may involve identifying objectives and key questions, defining assessment criteria, obtaining and analyzing relevant data, reporting results, and promoting the effective use of the findings. Evaluations are conducted by persons well-grounded in research design and methodology, content knowledge and skills in particular specializations, and competencies in evaluation theory, evaluation methodology, and practical knowledge.

The method of this evaluation was adopting the concept of process evaluation in program evaluation, to evaluate the input, process, output, outcome and efficiency of electronic medical records related projects so as to answer the following questions:

1. How many target groups was the electronic medical records services being provided?
2. Did target groups receive appropriate services?
3. Were the projects properly implemented?
4. Were the resources enough?
5. How was the gap between actual and expected outcomes?

We evaluated these related projects based on Cost-Effectiveness, Regulations, Information Security as well as Resources Allocation and Utilization.

The development and the use of Electronic medical records involved professionals from different fields, such as medicine, public health, legal and information technology. The audit process was from September to November in 2011, and auditors made a systematic check by analyzing key documents such as relevant media opinion reports, professional website bulletins, health statistics, related information system database, internal sheets, minutes of meetings, related operational rules and standards, relevant documents, files, and information from other countries promoting similar projects; in order to obtain the objective testimony and instructions, the auditors interviewed the Department of Health officers, major systems suppliers, nine hospitals which use the systems and got descriptive statistics for the data obtained. We found some key findings about the related electronic medical records projects from the 4 areas of Cost-Effectiveness, Regulations, Information Security, Resources Allocation and Utilization[3].

The electronic medical records related projects have completed the model of 117 electronic medical records forms and announced 4 types of electronic medical records exchange standards, 93 medical institutes completed ISO27001: 2005 international information security system verification, 211 medical institutions completed the electronic medical record checks, 152 medical institutions completed electronic medical records inspection, and constructed electronic medical records exchange center (142 medical institutions involved in detection). There's considerable success in promoting the medical institutes' medical records electronization, however, there are still many defects that need to be improved, not being able to fulfill certain duties and performing too low on cost-effectiveness, regulations, information security, resources allocation and utilization dimensions.

a) Cost-Effectiveness

The projects content significantly adjusted and reduced the challenges of the projects objectives and didn't set project goals on a results-oriented basis and actual performance did not meet the plan original intention.

The NHIP set results-oriented or effectiveness-oriented indicators such as "the number of people owned electronic medical records", "the number of information exchange", and "the number of people who use personal health management demonstration system" (Appendix 2) but in 2009 the project was amended. In addition to deleting three branch projects and the indicators above, it let the challenge of project

[3] TanjimaPervin, Ulf-G Gerdtham1 and Carl HampusLyttkens, Societal costs of air pollution-related health hazards: A review of methods and results, Pervin et al; licensee BioMed Central Ltd. 2008, 6:19,p3.

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goals fall sharply and lacked results-oriented or effectiveness-oriented indicators, so that it is difficult to assess outcomes of the project. It resulted in achieving the outcome of "the rate of hospitals implementing electronic medical records" performance indicators【the number of hospitals implementing electronic medical record/ the number of national hospitals (500) × 100%】 reached up to 222% [target value was 23%, actual value was 51.2% (accumulated more than 256 hospitals across the country reported the implementation of electronic medical records; 256/500 × 100%)], but observing from the substantive outcomes (EHR campus-wide access to download situation) there were 142 hospitals involved in the electronic medical records exchange and from May 2010 to April 2012, the actual number of retrieving medical records was only about 14,000 times.

The planned value, amended value, and actual value of performance indicators of electronic medical records related projects

Performance Indicator	Planned Value	Amended Value	Actual Value
Encouraging and counseling medical institutions to develop the informatization of medical operations, the electronizationand exchange of electronic medical records	Until the end of 2012： • The hospitals proportion of implementing electronic medical records all around the country:80% • The hospitals proportion of implementing electronic medical records all the Department of Health's hospitals: 100% • The clinics proportion of implementing electronic medical records all around the country: 70%	Until the end of 2012： • The hospitals proportion of implementing electronic medical records all around the country: 26% • The hospitals proportion of implementing electronic medical records all the Department of Health's hospitals: 23% • The clinics proportion of implementing electronic medical records all around the country:10%	Until the end of 2012： • The hospitals proportion of implementing electronic medical records all around the country: 41% • The hospitals proportion of implementing electronic medical records all the Department of Health's hospitals: 100% • The clinics proportion of implementing electronic medical records all around the country: 10%
Promoting the exchange of electronic medical records across hospitals	Until the end of 2012： The cumulative number of hospitals providing retrieving electronic medical records across hospitals: 300 Shortening the patients' waiting time for medical images output time: 1-2 days	Until the end of 2012： The cumulative number of hospitals providing retrieving electronic medical records across hospitals: 75 Shortening the patients' waiting time for medical images output time: 1-2 days	Until the end of 2011： The cumulative number of hospitals providing retrieving electronic medical records across hospitals: 142 Shortening the patients' waiting time for medical images output time: 1-2 days
The number of people who own electronic medical records	1 million people until the end of 2011	N/A	N/A
The annual number of information exchange of electronic medical records, referral, or the Bureau of NHI's professional review	40,000 until the end of 2011	N/A	N/A
Total visitors of people using personal health management demonstration system	50,000 visitors until the end of 2011	N/A	N/A
Total issued number of second generation medical certificate IC card	N/A	90,000 until the end of 2011	160,000 until the end of 2011
The implementation ratio of public health information integration services	N/A	90% until the end of 2011	94.7% until the end of 2011
The completion rate of health indicators	N/A	100% based on the standards of WHO and OECD until the end of 2011	N/A

Sources : The Department of Health of the Republic of China, Taiwan.

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b) Regulations

The relevant laws and regulations for promoting electronic medical records have not been sound yet.

To promote electronic medical records, the Department of Health amended "Medical Care Act" article 69 in 2004:" Medical care institutions which document and store medical records by means of electronic records shall be exempt from producing another written copy…". It made electronic medical records legal, and "Regulations Governing and Development and Management of Electronic Medical Records" was decreed. However, in order to ensure the privacy of patient and the confidentiality of electronic medical records, and to analyze how the release of the "Personal Information Protection Act "impacts Medical Care Act and all kinds of medical personnel regulations related to electronic medical records, the Department of Health in 2010 contracted with Integrating the Healthcare Enterprise Taiwan Association for "the research of 2010 completing electronic medical records legal system". According to research in the final report, it recommended to set related regulations about the transmission of exchanging electronic medical records, the paper and electronic medical records, how the electronic medical records responds to the impact of the Personal Information Protection Act, the public sectors collecting of health information, problems related to the classification of medical records, as well as the outsourcing of electronic medical records processing. Until the auditing date (April 30 2012), the Department of Health has not yet acted on these recommendations so the related administrative process is far from effective. It highlights that the electronic medical records project invested huge funds without conducting the appropriate evaluation of the legal system.

The implementation of electronic medical records regulations are unsound and lack the proper supervision and evaluation mechanisms.

According to the article 69 of the Medical Care Act, electronic medical records can replace paper medical records. Because there is no review threshold or mechanism in Regulations Governing and Development and Management of Electronic Medical Records and the lack of afterward supervision and evaluation mechanisms, if the hospitals in which information security management mechanisms are relatively unsound implement electronic medical records first, when information security events such as medical records tampering or leakage occur, it will cause disputes between doctors and patients and damage patient's rights. According to the NHIP implementation performance evaluation report, by the end of 2011, 274 hospitals have already declared the implementation of electronic medical records, including 211 hospitals (77.01%) passed through the electronic medical records checks, showing that about 20% of hospitals have not yet applied for checks. According to the result of "2011 hospitals electronic medical records checks", about 10 hospitals signed for follow-up examinations but had not applied for re-checks within the check project. Furthermore, the Department of Health has not planned a follow-up monitoring mechanism for those hospitals which passed checks, nor set a deadline for certification, that is, the certification is permanent; unless the hospital applies for another category of electronic medical records check, it is difficult to ensure that the hospital passed checks of which follow-up development of electronic medical records is in line with the relevant provisions.

c) Information Security

The sensitive personal information such as domestic violence, sexual abuse, mental illness, statutory infectious diseases, or acquired immune deficiency syndrome (AIDS) will cause serious damage to the patients' rights and interests if this information is leaked. In medical records management, such medical records are sensitive medical records; relevant regulatory requirements for the management of retrieving sensitive medical records should be stricter than other general medical records. The current system of EEC exchange mechanism does not set further mandatory encryption and permissions control for sensitive electronic medical records according to the degree of sensitivity; it only depends on the self-manage of hospital side. If one hospital's management is loose, the sensitive electronic medical records exchanged from the well managed hospital will be in danger of leakage. It seriously affects the interest of patients whose electronic medical records are leaked, and it's contrary to the relevant laws and regulations. It also highlights the department of health's incomplete planning of electronic health record exchange management.

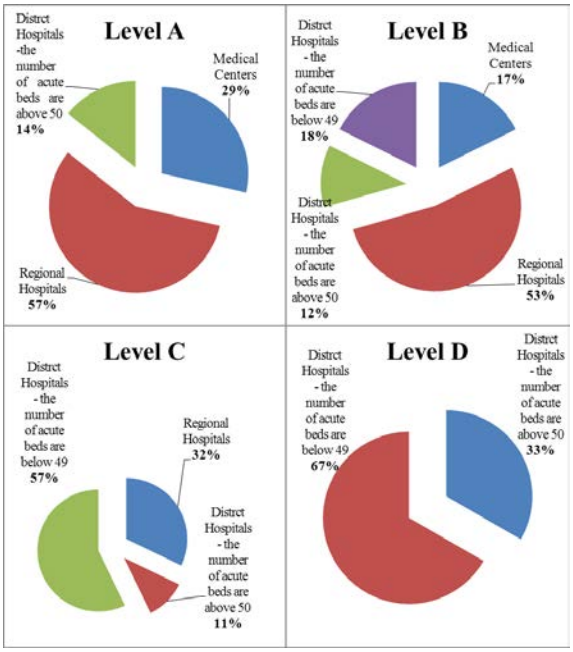
Small hospitals rely heavily on contractors, and some hospitals, without obtaining any information security certification, still join the exchange system of electronic medical records and it results in the information security vulnerabilities of overall exchange system.

To ensure the security of electronic medical records, the category of information security checks on medical institutions' electronic records can be summarized by the three major aspects of the management of electronic medical records mainframe (computer room), the production of electronic medical records, and the training of personnel and management. The Department of Health has been training hospital security seed personnel, conducting hospital information security workshops, contracting with providers to counsel 93 hospitals to achieve ISO 27001:2005 - Information Security Management Systems Certification, and conducting electronic medical records checks on 211 medical institutions, to make sure that the electronic medical records made by institutions comply with the "Regulations Governing and

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Development and Management of Electronic Medical Records".

According to the NHIP implementation performance evaluation report, by the end of 2011, 274 hospitals have declared the implementation of electronic medical records, including 142 hospitals participated in the electronic health record exchange, however, 24 hospitals dose not passed ISO 27001:2005 or the Department of Health's information safety checks, but they are still permitted to participate in the exchange of electronic medical records, and it results in the information security vulnerabilities of overall exchange system. On the other hand, in 2011 hospital evaluation, there were 56 hospitals from 122 evaluated hospitals taking in the assessment of electronic medical records management system, and the evaluation results shows that there is about half of level A and B belonging to medium-sized regional hospitals, and small hospitals are in the majority of level C and D, it shows the electronic medical records management system of most small hospitals are not performing as well as they could. Electronic medical records through EEC are exchanged among small and large hospitals; even if large hospitals could effectively implement information security management and control, small hospitals, due to the lack of IT manpower, technology and funding, have to rely on contractors to build and maintain electronic medical records system. However, the Department of Health has not yet established the related supervision and management mechanism of hospital electronic medical records management outsourcing, so the electronic medical records made by either small or large hospitals may leak from small hospitals if contractors make mistakes which results information security vulnerabilities to the overall exchange system. Besides, when personal electronic data leaks, it's usually in a large number of batches, unlike paper leakage which results in a comparatively small number of files being leaked, so it will cause more damage compared to traditional paper records.



III. Resources Allocation and Utilization

The electronic medical records projects lacked long-term and integer planning, budgeted separately in the general budget and special budget in addition to having insufficient long-term financial resources.

The promotion of electronic medical records is an important policy of the Department of Health, but it did not take into account the international experience from nations such as the United States, Canada and the United Kingdom to establish a comprehensive plan and failed to properly seek out long-term and stable resources. The implementation funds over the years were separated in the general budget and special budget, so it was hard to get the whole picture of the process of related projects and to evaluate the overall performance[4]. The Department of Health explained that the Minister of Health was changed three times in 2008, which intern caused the policy direction to change. It was revealed that the electronic medical records related projects lacked long-term, comprehensive planning and due to the policy direction changing repeatedly, there was a decrease of general funds in the planned budget, another budget in the special budget, all of which influenced the performance evaluation.

The executive way of subsidized projects was improper and it made the allocation of resources unequal.

The objective of subsidizing hospitals to implement electronic medical records was expanding the hospital's participation, and the principle of

[4] Kenneth J. Arrow, Economic Welfare and the Allocation of Resources for Invention, National Bureau of Economic Research, Universities-National Bureau,1962, p3.

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subsidizing objects was mainly covering fund-shortages in district hospitals, regional hospitals and medical centers were secondary objectives. However, the actual situation of subsidization in 2010 and 2011, there were 78 district hospitals (counted 20.86% of all local hospitals around the country), 45 regional hospitals (counted 54.22% of all regional hospitals around the country), and 20 medical centers (counted 90.91% of all medical centers around the country) getting the subsidization. On average, each medical center got subsidy of NT$560 million, each regional hospital got subsidy of NT$495 million, and each district hospital got subsidy of NT$2.34 million. The actual situation of subsidization was obviously contrary to the Department of Health's subsidizing principle.

The subsidization focused on the establishment of an electronic information platform and exchange system, and adopted the direct review of results instead of reviewing, planning then reviewing result later to ensure that it achieved its performance goals. Besides, announcing the usage and balance of subsidies on the Department of Health's electronic medical records website help to facilitate the competition. However, compared with small hospitals, large hospitals are more competitive because of relative abundance of human power and material resources, and the Department of Health adopted the direct review of results and the first-come, first-serve review way, so it made the actual subsidies of small hospitals relatively low. This situation not only violated the original projects intention but also caused small hospitals difficulty in enhancing the efficiency of medical services, and it intensified "the big get bigger" uneven competition of the development of domestic medical environment.

IV. Conclusion

These points have become the new auditing issue for SAIs. With limited resources available for providing health care, it is important that providers maximize the economy, efficiency and effectiveness of the services they provide. The auditor has an important role to play in helping to ensure that value for money increases, as well as that the expenditure was lawful and accounted for properly. At the same time, patients were rightly becoming more aware of the quality of the service they receive. This had led to calls for more transparency, more comparisons of health outcomes between providers and assurance that best practice is being adopted as part of their treatment. This growing demand for transparency is another reason why the auditing of health systems is increasing in importance.

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Modeling, Simulation and Experimental Study of Soot Combustion Process

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Abstract- The formation of soot particles is one of the most complex problems in combustion science, still by for not well understood. However, intense experimental and theoretical researches within the last two decades improved the fundamental understanding and led to detailed picture of the soot particles formation process. This paper discusses soot combustion fundamental processes in term of the in-cylinder combustion and emission. The new research requested both simulation and experimental researches to study fundamental process involved in diesel engines in order to define possible strategic scenario toward zero emission level.

Our investigations can be divided into groups, which are however closely linked with each other:

1. The application of chemical kinetics to problems relating to the theory of combustion and explosion processes.
2. Mathematical formulation of the concentration of reactants.
3. Experimental and simulation results of soot in-cylinder concentration.
4. The influence of antismoking additives on thermal and combustion efficiencies.

This paper presents data from tests conducted by internal combustion diesel engines, a testing laboratory and results of numerical simulation. The results of calculation are compared to experimental data showing good agreement for soot particles concentration in diesel cylinder.

Keywords: *harm emission reduction and soot combustion process.*

GJSFR-E Classification : *FOR Code: 090201*



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Modeling, Simulation and Experimental Study of Soot Combustion Process

Raed Al-Hasanat [α] & Moh'd Qawasmi [σ]

Abstract- The formation of soot particles is one of the most complex problems in combustion science, still by for not well understood. However, intense experimental and theoretical researches within the last two decades improved the fundamental understanding and led to detailed picture of the soot particles formation process. This paper discusses soot combustion fundamental processes in term of the in-cylinder combustion and emission. The new research requested both simulation and experimental researches to study fundamental process involved in diesel engines in order to define possible strategic scenario toward zero emission level.

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This paper presents data from tests conducted by internal combustion diesel engines, a testing laboratory and results of numerical simulation. The results of calculation are compared to experimental data showing good agreement for soot particles concentration in diesel cylinder.

Keywords: harm emission reduction and soot combustion process.

I. Introduction

The heterogeneous air-fuel mixture and heterogeneous diffusion of flame stream in diesel cylinder always be accompanied with appearance of solid carbon in the form of soot particles, which estimate smog with diesel exhaust gases, the importance of studying soot particles formation not only in decreasing harm emission with exhaust gases but in increasing engine efficiency too.

Researchers on diesel particulate matters (PM) has probed and provided unprecedented details about the atomic microstructure of (PM), researchers used scattering spectroscopy with a highly sensitive optical analysis technique that can study atomic microstructures in carbonaceous material (fig.1), they have thus far concluded that higher combustion temperatures and pressure conditions within the engine are the factors contributing most to the production of diesel exhaust emission with (PM) characterized by small, agglomerated, oxidized/graphitic (sootier) particles. [U.S. Department of Energy- Drexel University- August26, 2004]

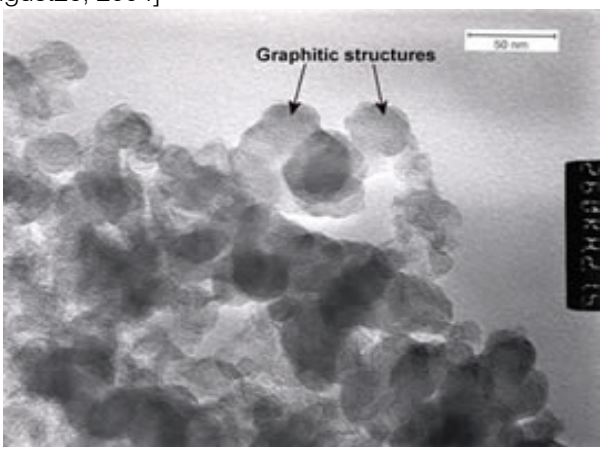


Figure 1 : The transmission electron microscope can reveal the presence of graphitic structures in PM sampled under high engine loads.

Soot particles are commonly believed to be formed by coagulation of polycyclic aromatic hydrocarbons PAH species, the resulting small particles essentially grow by heterogeneous surface reactions with acetylene being the most important growth species. The combustion of soot particles occurs mainly by heterogeneous reactions with OH radicals and molecular oxygen, the formation and oxidation steps have to be described in fig(2).

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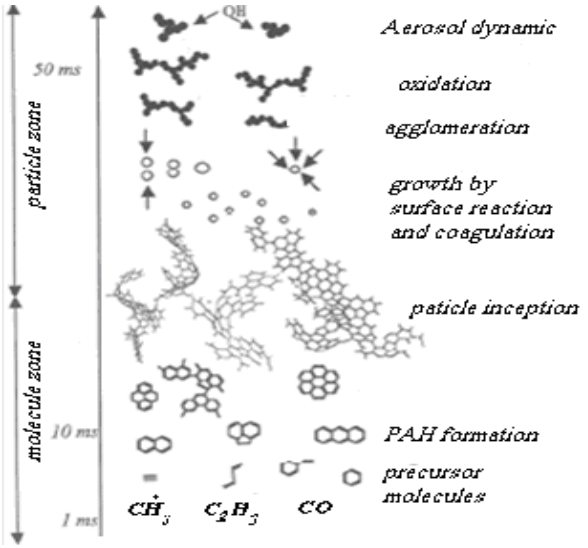


Figure 2 : soot formation steps

In diesel engines, soot particles formation occurs essentially under complex heterogeneous conditions, predictions of soot particles in numerical simulations become even more difficult because of unresolved question in the treatment of physical chemistry interactions, even though some progress has been made recently, applying for reaction rate and physical state in a chemical reaction.

In the present study of soot particles formation in diesel cylinder are presented the chemical kinetics used to describe physical chemistry interactions, the formation and combustion of soot particles described kinetically, different assumptions for soot particles concentration are applied and the results are discussed in a comparison with experimental data provided.

II. Soot Particles Formation

Chemical kinetics take a part in process of flame stream diffusion in diesel cylinder, when reactants (mixture) are in different phases, one is liquid and the other is gas, contact can only occurs at the interface, in other words at the surface of the liquid, so this means that the more final divided a solid or liquid particles, process of solid particles formation is going with growing particles (carbon radicals) surface.

Radicals are atomic or molecular species unpaired electrons, these unpaired electrons are usually highly reactive, so radicals are likely to take part in chemical reactions, and a radical plays an important role in combustion. The formation of radicals requires covalent bonds to be broken homiletically, a process requires by thermal cracking where complex carbonyl group (fuel) converted simpler molecules (acetylene) as shown in following reactions shown in equations(1-5).

$$C_xH_y \rightarrow V_{11}C_3H_6 + V_{12}C_2H_6 + V_{13}C_2H_4 + V_{14}CH_4 + V_{15}H_2 \quad (1)$$
$$C_3H_6 \rightarrow V_{21}C_2H_4 + V_{22}CH_4 + V_{23}H_2 \quad (2)$$
$$C_2H_6 \rightarrow V_{31}CH_4 + V_{32}H_2 \quad (3)$$
$$CH_4 \rightarrow V_{41}C_2H_4 + V_{42}H_2 \quad (4)$$
$$C_2H_4 \rightarrow V_{51}C_2H_2 + V_{52}H_2 \quad (5)$$

In this type of processes, the corresponding reactive intermediates (radicals, ions) are permanently regenerated, and thus they proceed by a self-propagation chain mechanism, the chain of reactions is eventually terminated by radicals or ions recombination, the main reactions that take place include:

Initiation reactions are those which result in a net increase in the number of free radicals, the formation occurs at low-temperature mechanism, with appearance carbon radical $C^{\bullet}_6H_5$-phynel, therefore, from acetylene formed the following reactions shown in equations (6-9):

$$C_2H_2 \rightarrow \dot{C}_4H_3 + \dot{H} \quad (6)$$
$$C_2H_2 \rightarrow \dot{C}_2H + H_2 \quad (7)$$
$$C_2H_2 \rightarrow \dot{C}_4H_3 \quad (8)$$
$$C_2H_2 \rightarrow \dot{C}_6H_3 \quad (9)$$

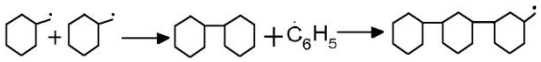
Isolation Metal in the case of application metallo-organic compound antismoking fuel additives, where carbon radical removes the metal from cyclopentane compound, turning the second molecule into a free radical as shown in equation (10).

$$(C_5H_5)_2Me + \dot{C} \rightarrow Me + \dot{C}_6H_5 \quad (10)$$

Hydrogen decomposition, where a free radical breaks a part into two molecules, one is cyclopentane the other is a free radical as shown in equation (11).

$$\dot{C}_6H_5 \rightarrow C_5H_5 + \dot{H} \quad (11)$$

Radical addition, the reverse of radical decomposition at T<700C° in which a radical reacts with a phenyl radical $\dot{C}_6H_3$ to form a single or larger free radicals, these processes are involved in forming the polycyclic aromatic hydrocarbons (PAH) and other products, which a result of low-temperature processes at temperature below 1500K°, as shown in the following reaction considered by equation (12):



(12)

Termination reactions, which happen when two free radicals react with each other to produce products that are not free radicals, high-temperature (T>1500°K) process growth aromatic hydrocarbons structure with the formation of soot particles. General scheme for reaction mechanism of soot particles formation shown in fig.(3).

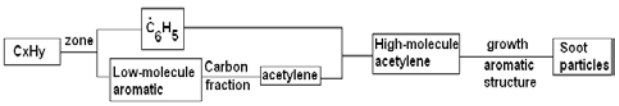


Figure 3 : scheme of soot particles formation process in diesel cylinder

Analyzing the influence of different reaction conditions gives information about the chain reaction and the transition state of matters in a chemical

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reaction. Thus, expressed reaction equation(13) for carbon's concentration rate.

$$j_c = \frac{12P\ 10^3}{8{,}314T_m}[r_{O2}(K_{10}+K_{11}) + r_{CO2}K_{12} + r_{H2O}K_{13}] \qquad (13)$$

Where: r_{O2}, r_{CO2}, r_{H2O}- volumetric concentration of O_2, CO_2 and H_2O

Kinetic deals with experimental determination of reaction rates from which constants are derived for soot particles combustion as shown in equation (14):

$$Ki = K^* \exp[\frac{Ei}{RT_m}(1-T_m)],\ m/s \qquad (14)$$

Products of chemical reactions considered by reaction rate, the rate equations are differential equations named mathematical model, and it can be integrated in order to obtain the in-cylinder concentration of soot particles. The main differential equation describes the change of soot particles concentration in diesel cylinder as shown in equation (15):

$$\frac{dMi}{dt} = (\frac{dMi}{dt})_\sigma + (\frac{dMi}{dt})_k - (\frac{dMi}{dt})_x \qquad (15)$$

Where:

$(\frac{dMi}{dt})_\sigma$, $(\frac{dMi}{dt})_k$, $(\frac{dMi}{dt})_x$:-The change in soot particles concentration by instantaneous evaporation of the mixture, by transition state of the mixture, and based on combustion.

The rates of soot particles concentration in diesel cylinder calculated as the sum of two components are characterized soot particles formation and soot particles combustion shown in equation (16):

$$(\frac{dN}{dt})_{\Sigma} = (\frac{dN}{dt})_{form.} - (\frac{dN}{dt})_{comb.} \qquad (16)$$

Mathematical model (Index 1) considers the change of soot particles concentration with crank angle position in degrees (φ^o) and so when exhaust valve opens estimated the quantity of soot particles with exhaust gases.

III. Results

In fig (4) presented experimental results of soot concentration (rational amount of soot) in diesel cylinder as a function of φ^o. An 8-cylinder diesel engine study of water-in-diesel emulsion was conducted to investigate the effect of water emulsification on soot emission with exhaust gases. Emulsified diesel fuel 17% water/diesel ratio by volume, were used direct injection diesel engine, operating at 1700 r.p.m. and molti-loads (Pe=1,21…4,85). Graphics indicate that the addition of water in the form of emulsion decreases soot emission with exhaust gases to 20%.

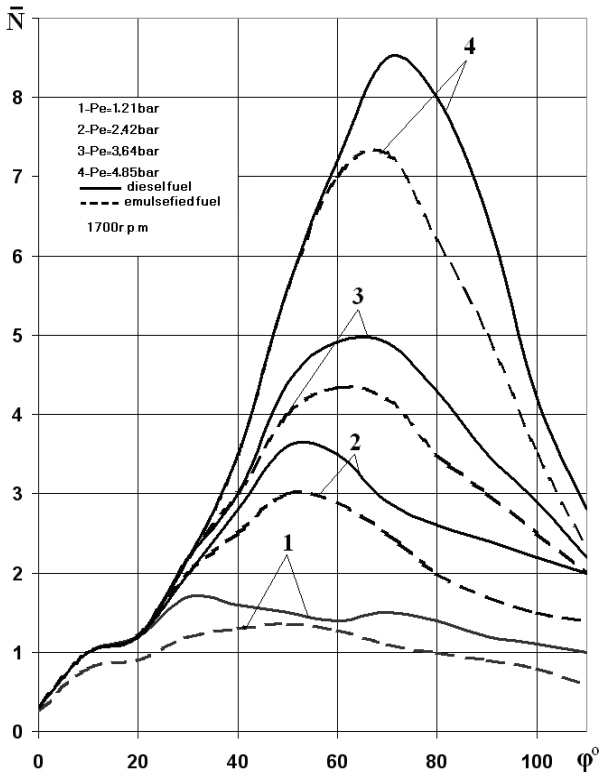


Figure 4 : The effect of water emulsification on soot emission with exhaust gases(rational amount of soot).

In the result of dripping emulsified fuel increases mixture quality. Decreasing temperature on account of water Dissociation and sharply decelerate chemical reactions of soot formation. The system saturates with hydrogen's radicals which assist to suppress formation of chains at the stage of sootier radical formation so the burning speed of soot particles increases on account of increasing of carbon gasification.

The high-quality of computing results indicated in comparison with experimental data. In fig.(5) presented experimental and computing rational amount of soot formation in diesel cylinder as a function of crank angle position in degrees (φ^o). Graphics show good agreement for soot particles concentration in diesel cylinder, so it confirm our assumption of chemical kinetics.

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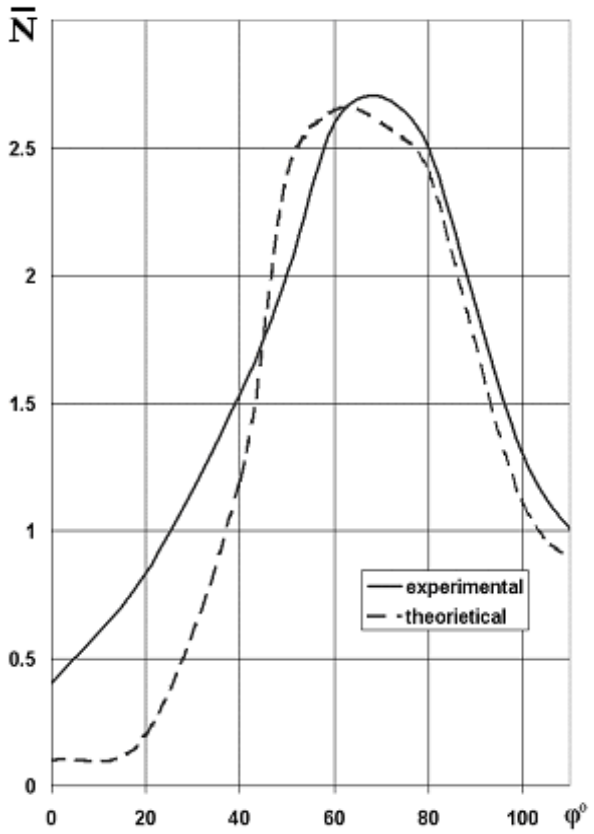


Figure 5 : Soot emission with exhaust gases(rational amount of soot). Pe=3bar.

The results of numerical simulation show soot particles concentration (rational amount of soot) in diesel cylinder as a function of crank angle positioning in degrees (φ^{o}). In fig (6) presented computing results of soot formation in diesel cylinder. A single cylinder diesel engine study of metallo-organic compound fuel additives for diesel was conducted to investigate the effect of antismoking additives on soot emission with exhaust gases. Modified diesel fuel 0,5% additive/diesel ratio by mass, were used direct injection diesel engine, operating at multi-loads (Pe=2bar, Pe=5bar, and Pe=7bar) and 1300 r.p.m. Graphics indicate that the addition of antismoking additives (SLD) decreases soot emission with exhaust gases to 40%.

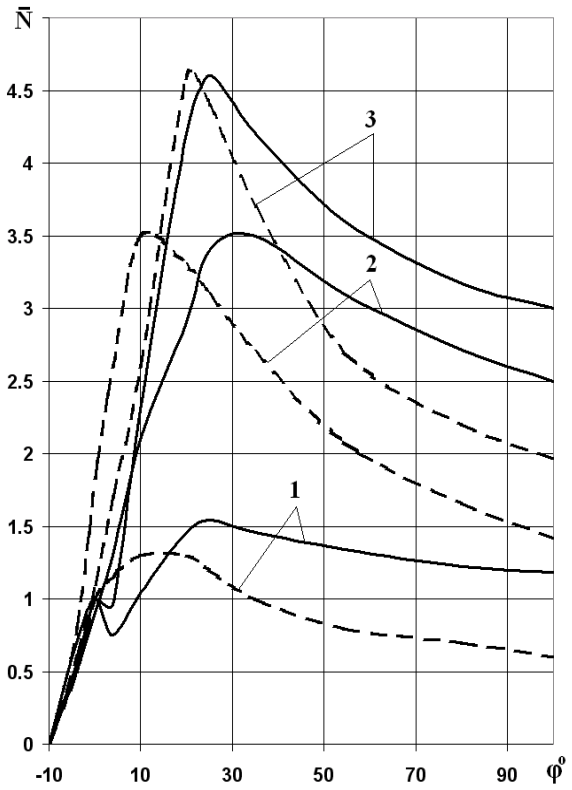


Figure 6 : The effect of antismoking additives on soot emission with exhaust gases(rational amount of soot). 1-Pe=2bar 2-Pe=5 bar 3-Pe=7 bar, diesel fuel, ---- modified diesel fuel, 1300r.p.m.

The soot particles reducing effects of many additives are well-known, but little is understood about the details of soot particles suppression mechanism, A laminar diffusion flame burning was seeded with a metallo-organic additive, by evaporating the additive from a crucible placed in the heated fuel gas flow, found that additives suppress the formation of PAH and accelerate the burning process.

The results indicate that antismoking additives improve combustion efficiency (X) and brake thermal efficiency ($\eta_{th.}$) as shown in fig.(7). The average increase in the brake thermal efficiency is approximately 4% over the use of diesel for the engine range studied. The proper brake specific fuel consumption and gases exhaust temperature decreased.

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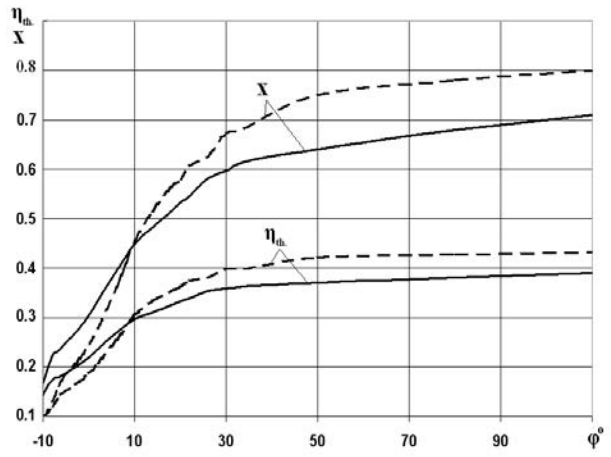


Figure 7 : The effect of antismoking additives on thermal efficiency and combustion efficiency, ----modified fuel, ___ standard fuel.

IV. Conclusion

The results presented in this paper are those that have been carried out by sources from Altai State Technical University. The new detailed kinetic model of soot particles formation in the diesel cylinder and aromatic hydrocarbons is proposed, the model based on comprehensive of PAH formation and growth.

The new pathways were introduced into the kinetic mechanism of the soot particles formation and the new concepts of soot particles nucleation and soot particles surface growth implemented in the new model made it possible to improve considerably the agreement between the results of calculations and experimental measurements. A mechanism for the catalysis is proposed. We hope that this paper stimulates interest in pursuing further solutions of environmental problems.

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During the planning and preparation of this, the authors had advice and assistance of many people researchers, educators, and specialists. The authors offer their sincere thanks. Special thanks are owed to the following organizations for information: Ministry of Education and Higher Education, and Palestinian Polytechnic University.

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Index 1 : List of Symbols

φ°	Crank angle position
$\overline{N}$	Rational amount of soot particles
1H13/14	One Cylinder KAMAZ Engine, Cylinder Diameter 13cm, Length of Stroke 14 cm.
F	Specific surface of soot particles, M^2/kg
G_{air}	Cyclic entered air for 1kg fuel, m^3
G_D	Soot particles concentration with exhaust gases kg/m^3
K^*	8m/sec
n	Engine angular speed, min^{-1}
$N_{comb.}$	Soot particles combustion
$N_{form.}$	Soot particles formation
N_n	Initial value of soot particles concentration in diesel cylinder at firing instant
P	Pressure of gases in diesel cylinder
Me	metal
r.p.m.	Revolution per minute
R_5	Reaction speed of soot particles growth
r_5	Acetylene volumetric concentration
SLD	Antismoking Additive, which contains Barium.
T^*	2500 K
TDC	Top Dead Center
T_m	Average temperature in the center of flame.
X	Specific heat generation (Combustion efficiency)
α	Theoretical air fuel ratio
α_{comb}	Actual air fuel ratio
σ	Equivalence ratio

Index 2 : mathematical model of soot formation

1- $$\frac{d\Gamma}{d\varphi}C_{14}H_{30} = \left(-K_{+1}\Gamma_{C14H30} + K_{-1}C_{\Sigma}^{6,5}\cdot\Gamma_{C_3H_6}^{2}\cdot\Gamma_{CH_4}\cdot\Gamma_{C_2H_4}^{3,5}\right)/6n,$$

2- $$\frac{d\Gamma}{d\varphi}C_3H_6 = \left(\left(-K_{+2}\Gamma_{C_3H_6} + K_{-2}C_{\Sigma}\cdot\Gamma_{C_3H_6}\cdot\Gamma^{0,5}_{C_2H_2}\cdot\Gamma^{0,5}_{H_2}\right) - 2\frac{d\Gamma}{d\varphi}C_{14}H_{30}\right)/6n,$$

3- $$\frac{d\Gamma}{d\varphi}C\,H_4 = \left(\left(-K_{+3}\Gamma_{CH_4} + K_{-3}C_{\Sigma}^{0,5}\cdot\Gamma_{C_2H_4}\cdot\Gamma_{H_2}\right) - \frac{d\Gamma}{d\varphi}C_{14}H_{30}\right)/6n,$$

4- $$\frac{d\Gamma}{d\varphi}C_1H_4 = \left(\left(-K_{+4}\Gamma_{C_2H_4} + K_{-4}C_{\Sigma}\cdot\Gamma_{C_2H_2}\cdot\Gamma_{H_2}\right) - 6\frac{d\Gamma}{d\varphi}C_{14}H_{30} - \frac{d\Gamma}{d\varphi}C_1H_1 - 0,5\frac{d\Gamma}{d\varphi}CH_4\right)/6n,$$

5- $$\frac{d\Gamma}{d\varphi}H = \left(\begin{array}{l}\left(K_{+5}C_{\Sigma}\Gamma_{H_2}\Gamma_M - K_{-5}C_{\Sigma}^2\Gamma_H^{-2}\Gamma_M^{-2}\right) + 7\frac{d\Gamma}{d\varphi}C_{14}H_{30} + \\ +1,5\frac{d\Gamma}{d\varphi}C_3H_6 + 0,5\frac{d\Gamma}{d\varphi}CH_4 + \frac{d\Gamma}{d\varphi}C_2H_4 + \frac{o\Gamma}{d\varphi}C_2H_2\end{array}\right)/6n,$$

6- $$\frac{d\Gamma}{d\varphi}C_2H_2 = \left(\begin{array}{l}\left(-K_{+6}C_{\Sigma}\Gamma_{H_2}\Gamma_{C_2H_2} + K_{-6}C_{\Sigma}\Gamma_{H_2}\Gamma_{C_2H}\right) - 7\frac{d\Gamma}{d\varphi}C_{14}H_{30} - \\ -1,5\frac{d\Gamma}{d\varphi}C_3H_6 + 0,5\frac{d\Gamma}{d\varphi}CH_4 + \frac{d\Gamma}{d\varphi}C_2H_4\end{array}\right)/6n,$$

7- $$\frac{d\Gamma}{d\varphi}H_2 = D'\left(K_{+7}\Gamma_{C_2H_2} + 0,5K_{+8}\Gamma_{C_2H}\right)/6n,$$

8- $$D' = \frac{\left(10^{-3}P_{\Sigma}\Sigma_{\mu_i}\Gamma_i\cdot N\cdot \mathrm{F}\cdot 10^4\right)}{\left(12\cdot 1,003\cdot G\cdot(\sigma - x)(\alpha_{com.}+1)\right)},$$

$$\Gamma_{C_2H} = \left(1 - \sum_{i=1}^{8}\Gamma_i\right),$$

9- $$\frac{dN}{d\varphi} = \frac{10^4 P_{\Sigma}\cdot N''\cdot \mathrm{F}}{1,033\cdot 6n}\cdot\left(K_{+7}\Gamma_{C_2H_2} + 0,5K_{+8}\Gamma_{C_2H}\right)$$

10- $$\frac{dN}{d\varphi} = \frac{10^4 P_{\Sigma}\alpha_{\Sigma}\cdot N''\cdot S_{wh.}}{6nRT(1+N_3)(1+N_1+N_2)}\left(\begin{array}{l}\Gamma_{O_2}(N''(1+2N_3)+2N_2(1+N_3))+ \\ +\Gamma_{CO_2}N_3(1+N''+N_2)+\Gamma_{H_2O}N_4\cdot \\ \cdot(1+0,5N_1+N_3)\end{array}\right),$$

11- $$\frac{dN}{d\varphi} = \frac{d\Gamma_i}{d\varphi}\cdot\frac{i}{x} + \Gamma_i\frac{1}{\sigma + x}\cdot\frac{d\sigma}{d\varphi} - \Gamma_i\frac{1}{\sigma - x}\cdot\frac{dx}{d\varphi},$$

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Improvement of Systematic Process in Pharmaceutical Industry Applying Green Productivity on

By Mansournejad, Mona, Khezri, Seyed Mostafa & Nouri Jafar
Islamic Azad University Tehran, Iran

Abstract- By one year filed and librarian studies about awareness of green profit system's management it's been settled to notice about analysis of producing processes (producing pills, capsule, syrup), mount of loss and the position of them and amount of energy consume through producing.

According to achieved information amount of usage in sources such as (water, electricity and gas) has been measured and compared with indices of ministry of mines and industry. Results show that electricity consumption 75/3 percent, gas consumption was 12/6 percent and medicine and lass 5 percent more than defined indices.

Of course there has been found reduction in energy and consumed sources has as brilliant in fluency over production expenses studies has proved green profit system will be really important for the system of production, implementing green profit system in order to lessen loss and using different recycling and reusing will be really effective.

Keywords: green profit, medical industry, hakim pharmaceutics.

GJSFR-E Classification : FOR Code: 111599, 140209



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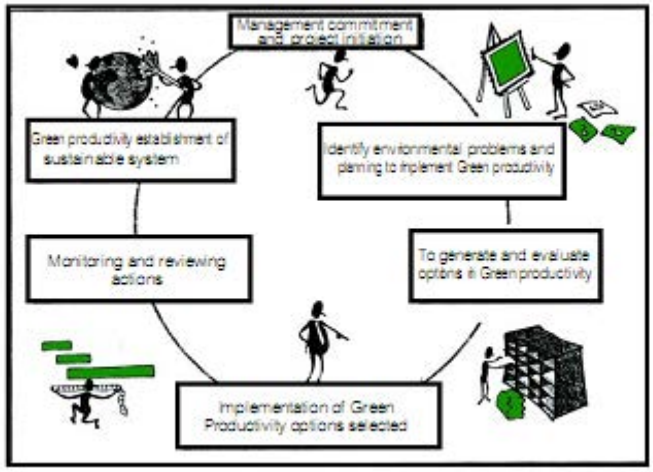
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I. Introduction

Industrializing in developing countries has led loss production and pollution which have un compensable harms to environment of the world(1). One of the solutions in order to reduce or omit this loss is in their resource of production (10). according to statistics in our country 98 percent of industrial units of country have influency over pollution and due to shortage of having purification we are in need of billions rails for investment(5). This explanation was the first step of defining a national strategy toward warring prevention methods in producing pollutants and wished to find its stand in in stand development plan.

Green profit is a solution to exact determination of current situation, estimation of its distance to desired situation and presenting suggestions (6).

In this trend the base of activity is recognition of situation and problems about water, materials and energy consumption and stopping loss in quality and quantity. Then the industrial unit will benefit the maximum amount of its energy and material by minimizing pollution and loss making (1). This action will help the industries to improve their environmental activity and in the same time decrease their profit. Using this tool by neglecting production process is impossible, green profit is administrable in any industry but it's applying strategy is fixed for all cases.



Pic 1: the main steps in methodology of Green productivity

Green profit will get special means with production. green production by minimum sources and the lowest amount of environmental pollution can produce high qualifical with reasonable price and long lasting life, of course all attempts are toward producing goods which are recyclable(6).

Green profit has prevention view which is a reaction to high financial expenses of pollution control methods. There is strong band between environment improvement and economical thrift due to green profit. It's why in industrial scientific communities this trend is seeking a change in technology (picture1) (2).

In order to improve green profit's movement in Asia and Oceania and all over the world. Asian profitability organization with co–operation of Philippine academy have help Apo universal conference in Manila, Philippine, 4-6 December 1996.

Acceptation of principals in Earth meeting based on stability of all aspects on total social

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economical advancement of the whole world was the basic rule.

Being a ware of this fast about Asia and Oceania is the settlement of half of world's population(4), and economical improvement in recent years has caused progress in life situation of several people in those zones and also has made natural destroy of environment and loss in renewable resources(3).

So far medicine industry is one of competitor industries, so most plants and factories have no desire to several details about production process.

Reduction in loss of resources and recycle those losses will cause productivity increase, decrease in need of materials and energy and reduction in expenses of hazardous material management (9). There is hope the results of this research about green profit in medicinal industry become noticeable and been applied by managers and experts of this industry.

Green profit's indices are as follow:

- Reduction of pollutants
- Reduction of using resources.
- Reduction of energy consumption.
- Improving product process.

Decreasing high expenses of pollution control management among other researches clone in this filed we can call on:

- Thesis of MA called integration of green profit management in planning and management organization of Isfahan in 2005-2006 by Ms. Maryam Kermaniwhich its results show: one of the best ways to achieve 2.5 percent of economical growth in profit in implementing green management system of organizations and industries (2012, Author).
- M. A thesis named as analyzing the condition of green profit management in non – lucrative part (Aseman airlines) by Ms. Sahar AzarKamand that results show: applying green profit management will decrease energy consumption and there have been found several methods about environmental conditions:
- MA thesis named as committing loss in medicial industry in 2011 by Ms. Bahare Ghanbari which based on the results: reduction in departure of an industry can be achieved by changing products, vaw materials and organizational activities and its result has profits for medicinal companies, the basic aim of this article is measuring the possibility of fixing green profit management in Hakim pharmaceutics in Tehran. The companies activities:
- Through obeying environmental hints and keeping the right of other neighbor's the company has signed an agreement with one of known laboratories which their dauty is measuring gas, steam, dust and sound and sewage amount.
- Equipping the factory to noise management system and sewage purification system.
- Substitution diesel boiler Boiler with Gas boiler in agreement with energy consuming optimization.

The construction cost of sewage purification system for every 25 sq.m in 24 Hours was 1,000,000,000 IR Rls, and there is an annual cost of 100,000,000 Rls to maintain it safely .(Author,2012)

Apparently the concentration of gases and elements measured in chimney wail, was not more than permitted limit and has desired number in comparison with Job and social affair ministry standard.

The annual cost	Unit cost (Rial)	Environmental effectiveness	Measurable parameters	row
13842400	133100	Air	CO2	1
13842400	133100		SO2	2
13842400	133100		NOx	3
20763600	133100		Dust	4
1277760	53240	Water	BOD	5
191664	79860		COD	6
191664	79860		PH	7
255552	10648		TSS	8
191664	7986		TDS	9
1597200	66550		Oil	10
638880	26620		Heavy metal	11
12584000	-	Environmental Hearing	Sound level 50 m	12
12584000	121000		Sound level 100 m	13
93528160		Total		

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II. Materials and Methods

This study has taken one year (Oct.2010-Sep.2011) in filed and librarian study style. Elements of green profit management considered in this study are as follow:

1. Total recognition of production processes.
2. Recognition and classification of medicinal or Non – medicinal loss made in each unit
3. Some methods for determining product loss medicinal or non – medicinal.
4. Measuring the amount of energy and resources usage.
5. Comparing usage amount with index of industry and mines ministry.
6. Defining and selecting green profit methods and preventing loss in production.
7. Presenting suggestions and solutions about reduction in water, electricity, energy usage and loss.

Then for implementing a comprehend practical plan in pharmaceutics company, recognition of producing process and pollution tracking was began in each unit.

III. Results

a) Hakim Pharmaceutics Company has concluded

i. *Outgoing chimney elements*

Results of sampling and measuring the total volume of outgoing elements and gases of different units of factory was considered in spring in Apr.2011 1390 which shows the amount in gas concentration and element wasn't more than authorized volume and has a desired position in comparison with other indices of environment conservation organization.

Considerations	The sampling and testing		Sampling	Name of the Industry	Row
	Unit of measure	Total particle concentration			
Lower limit	(mg/m^3)	16.5	The rate of ISOkinetic Sampling	Output dust stuck dragee (F182)	1
Lower limit	(mg/m^3)	19	The rate of ISOkinetic Sampling	Juice of 2 Unit Output (F145)	2
Lower limit	(mg/m^3)	21.7	The rate of ISOkinetic Sampling	Out of the mist visor cap (F042)	3
Lower limit	(mg/m^3)	17.5	The rate of ISOkinetic Sampling	Output wash room dragee (Fi48)	4
Lower limit	(mg/m^3)	18.6	The rate of ISOkinetic Sampling	Output wash room dragee (F185)	5
Lower limit	(mg/m^3)	15.3	The rate of ISOkinetic Sampling	Sai pill dust output 2 (F175)	6
Lower limit	(mg/m^3)	34	The rate of ISOkinetic Sampling	The output of the solid packaging UPS300(F068)	7
Lower limit	(mg/m^3)	19.5	The rate of ISOkinetic Sampling	Dust exhaust unit granules (F113)	8
Lower limit	(mg/m^3)	84	The rate of ISOkinetic Sampling	Mill dust output (F114)	9

IV. Voice

Based on gathered data of sampling in Day time it can be concluded that the mean of voice level wasn't higher than 65.2 Db and it is close to the permitted number defined by environment conservation organization. In night measurement also the same as what is shown in table 3, it is mentioned that at night the amount of voice in out door areas wasn't satis factory because the achieved mean was 56.8 Db which is higher them determined number of conservation organization (55 Db).

It's worth mentioning that those distributed voice were accompanied by street noise. So it can be assured that the real number will be lessen than it is measured in different indoor units of factory.

The amount of water usage in medicinal industry was different regarding their producing and it's mostly used in production, cleaning and washing, conditioning, hygienic and servicing usage. All in use water of factory added by drinking and producing is from Tehran in volume of 3 to 4 Tankers of 12000 liter.

Some of it will be purified by water makers (Anion – Kati on Filter) and the purified water is used in product – line for cleaning and constructing.

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a) Used amount of water in factory

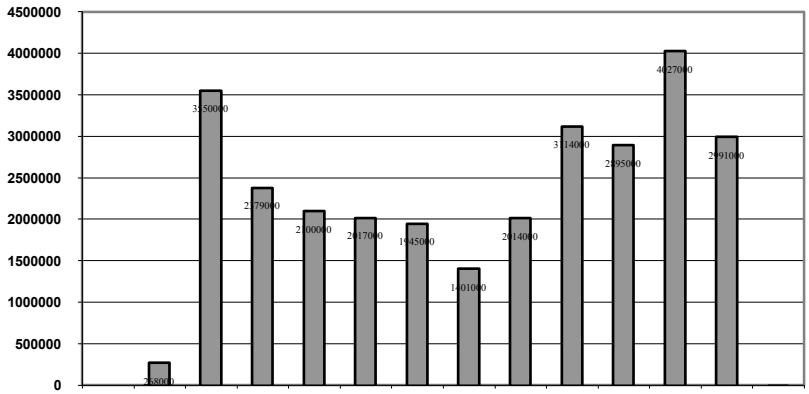
- Deionized water in production: 20000 to 30000 liter daily.
- Distilled water in production: ward 500 to1200 liter daily.
- Personal hygienic, bathing of personnel usage. 30000 liter daily.
- Water to be used for washing the floor. 2000 liter daily.
- Plant watering: 20 to 50 m^3 (Defends on the season and amount of rainfall in a year)
- Restaurant water usage: 5m^3

Most of usage is in syrup manufacturing of the factory which is about 35 to 40.

Percent of daily use.

- Washing syrup bottles and vials (30000 to 35000 bottles)
- Machine washing
- Syrup filling

Also public usage (bathing, hygen) about 20% of water.



V. Energy

Factory's energy is used as lightening machines official equipment's, heating and cooling and, there hinds of daily applicationsuch as fuel of transport.

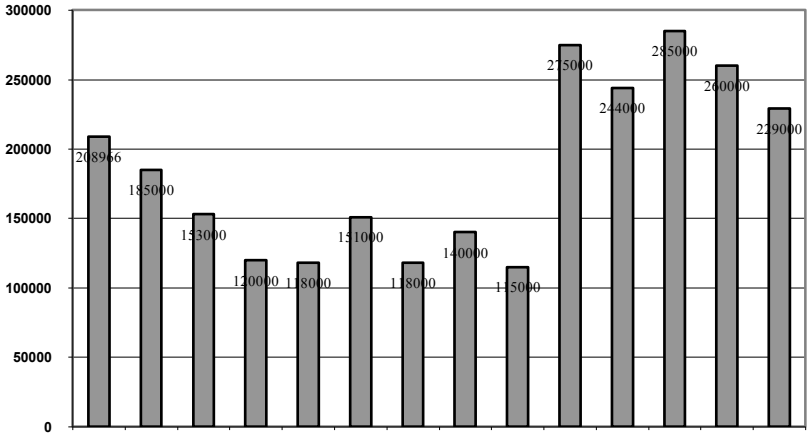
Machines and equipments of power usage, and information about the heating and cooling are drown in table 5.

Number	Power (kW)	System	Name System
4	340	Condensation	Chiller
3	35	Boiler	Radiator
$^{7}/_{10}$	$^{30}/_{80}$	Water/gas	Cooler
10	40	Aerator	Other

Regarding to substitution of gasoil boiler with gas boiler to optimizing energy usage and having dean fuel instead of fossil fuel, the gas of factory is optimized.

Regarding this substitution pollutant gases in chimney of boiler which are mostly CO, SO_2 will be purified respectively and are in standard line of environment organization.

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a) Most gas of factory is used in two parts

- Boiler, due to using warm water in various parts such as bathing and personal usage which is about to percent of total amount.
- Restaurant for cooking and dishwashing which is about 30 percent of total.

Totally results conclude that green profit management in Hakim pharmaceutics has made total reduction of 5% in drug eruption,75.3% for Elect Power, 12.6% for Gas and 35.2% for water.

VI. Discussion and Conclusion

Regarding harmful environmental disadvantages of high energy consumption and medicinal loss.

Green profit programs according to materials, energy and improvement of production process has made loss manufacturing and in the other hand rule making and administration of principals has stepped toward economical and social profitability, according to various processes of medicinal plants large amount of energy and water is wasted, energy is consumed by power generators, transports, and much water usage in washing units and solid, semi – solid and liquid manufacturing lines. Also series of loss and damages such as expired medicine, medicinal packs, blisters, tubes, glass and ext are mode.

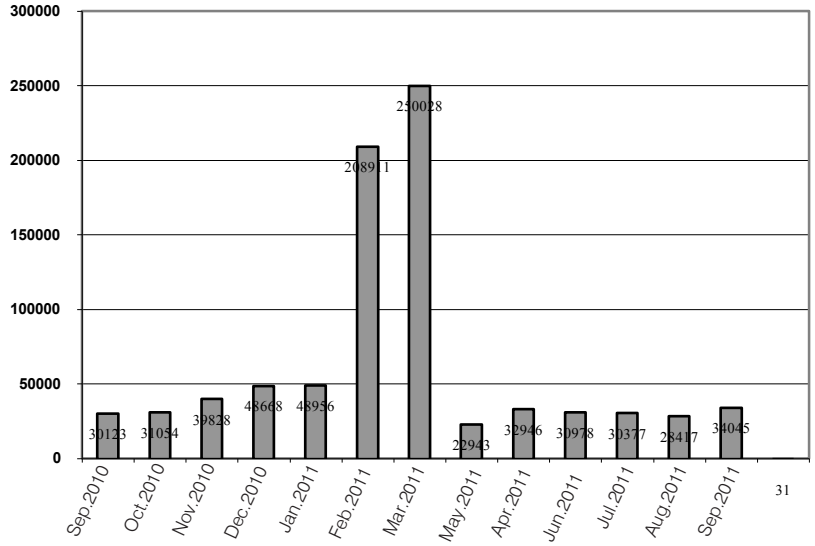
In past, medicinal wastes were buried with home mode and urban wastes but nowadays by noticeable attention toward hygen and environment, there has been managerial plans and laws determined, nationally and internationally to consider these cases.

According to indices of industry and mines ministry, the amount of water consumption is 48046 m^3, while the factory usage is 31113 annually which is 16933 m^3 less than the index.

Based on the current consumption of factory, 2598966 kw/h is 1116266 kw/h (75/3%) more than the index of ministry. (1482700).

According to the factory indices about gas consuming it is using 7413521 m^3, while Hakim pharmaceutics factory uses 837274 annually which is 12/6% or 93753m^3 more than determined index.

The company has applied following solutions to be balanced with real amount of authorized consumption.



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a) Water reduction solutions

- Using waste water of abashing glasses and salon
- Using the last washing step as the prewash step of next cycle.
- Reusing waste water of air conditioning systems or boilers in the case of being non – pollutant to wash saloon floor or returning to process.

b) Power reduction solutions

- Perfect canals insulation.
- On time servicing and monitoring.
- Washing the steam pot in order to lessen. The sediments and lessen gas consumption.
- Adding heating pump in order to turning law head to high heat.

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3. Submission of Manuscripts,

4. Manuscript's Category,

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A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

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General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

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· Use standard writing style including articles ("a", "the," etc.)

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· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

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· Shun use of extra pictures - include only those figures essential to presenting results

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An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
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- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
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Approach:

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- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

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- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
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- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
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What to keep away from

- Resources and methods are not a set of information.
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- Leave out information that is immaterial to a third party.

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The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.



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Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

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- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
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- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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