International Journal of Social Sciences & Educational Studies

---

Editorial Office:
International Journal of Social Sciences & Educational Studies
Ishik University
Erbil, Iraq
Email: www.ijssesjournal@gmail.com

International Journal of Social Sciences & Educational Studies gratefully acknowledges the support of Ishik University.

Composed by İrfan Publishing, Erbil, Iraq

Printed by Anıl Press, Gaziantep, Turkey

IJSSES (International Journal of Social Sciences & Educational Studies) is published quarterly (September, December, March, June) in both print and online versions by Ishik University.

ISSN 2409-1294 (Print)

International Journal of Social Sciences & Educational Studies is indexed by JIFACTOR

TABLE OF CONTENTS

The Conversion to Compressed Natural Gas-Fueled Vehicles – Social and Environmental Sustainability in India

Shlair Abdulkhaleq Al-Zanganee

Ishik University, Erbil, Iraq, Email: shlair.abdulkhaleq@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Concerned with the increased vehicular emissions in India's metropolitan cities, in 1998, the Indian Supreme Court mandated the conversion of the entire Delhi bus fleet of diesel-powered buses to Compressed Natural Gas (CNG) fuel by 31 March 2011. A similar initiative was introduced in Mumbai city in 2000. This policy measure has been the subject of an extensive debate. In addition to the controversy over the feasibility of the investments needed to cover the CNG technology and infrastructure, the ecological effectiveness of the policy is questioned as implementing the policy resulted in different outcomes in each of the two cities where the policy is implemented. This study attempts to examine the extent to which the policy was successful in addressing the environmental challenges in the entire Indian subcontinent. It also attempts to extend the analysis of the policy effectiveness beyond its ecological aspects to examine whether the policy succeed in promoting social sustainability and equitable development or not. The behavior of two environmental indicators is observed relatively to the increasing levels of economic growth observed in India during the last few decades. Other aspects of social and economic sustainability are also drawn into the analysis to provide an overview of the policy's contextual suitability. The study concludes that the policy's uncertain effectiveness in terms of environmental sustainability buttresses the controversy over its economic feasibility. In addition to the environmental aspects that the policy may fail to address, it may end up with undesirable social outcomes instead of promoting social sustainability and equitable development.

Key Words: Sustainability, Sustainable Development, Environmental Degradation, Conversion Policy.

Introduction

Research on sustainable means of development has grown in response to the challenges to sustainable growth imposed by the environmental damage. Environmental degradation generated by the increasing discharge of pollutants attributable to industrial activities and vehicular greenhouse gas emission poses a serious threat to environmental conservation. The United Nations' Koyto Protocol, first adopted in 1997 then put into force in 2005, required the world's industrialized countries to reduce greenhouse gas emission that is a major reason behind climate change and global warming. The Koyto Protocol's ratification acceptance was signed by India in August 2002 and put into force in February 2005 (United Nations Framework Convention on Climate Change, Status of Ratification of the Kyoto Protocol). Since

then, the Indian government has adopted a handful of policy measures in its attempt to conform to the international standards of sustainability.

Over the last few decades, India's economy witnessed accelerated growth rates. However, this economic progress has never been achieved without an associated degradation in environmental quality. As the byproduct of the expanding economic activities and the burgeoning automobile trade sector, the resulted high levels of ambient air pollution in India represent a major challenge to sustainable measures of environmental conservation. India's metropolitan cities such as Delhi, Mumbai, and Kolkata suffer from severe ambient air pollution problems caused in a major part by vehicular emissions, specifically, diesel exhausts generated by the excessive use of diesel-fueled public transportation means. Diesel exhaust produces 10 to 100 times more substances than gasoline. The Scientific Review Panel of the California Air Resource Board points out that those diesel substances proved to be more carcinogen than benzene which represents the main gasoline exhaust. It also estimates that the concentration of the suspended particulate matter (SPM) in major cities of India, which is caused mainly by power plants' emissions and the burning of fossil fuels, exceeds the annual average guidelines of the World Health Organization by an average of 275 days (Ravindra, Wauters, Tyagi, Mor, & Van Greiken, 2006).

Concerned with the increased vehicular emissions in India's metropolitan cities, in 1998, the Indian Supreme Court mandated the conversion of the entire Delhi bus fleet of diesel-powered buses to Compressed Natural Gas (CNG) fuel by 31 March 2011. A similar initiative was introduced in Mumbai city in 2000. This policy measure has been the subject of an extensive debate. In addition to the controversy over the feasibility of the investments needed to cover the CNG technology and infrastructure, the ecological effectiveness of the policy is questioned as implementing the policy resulted in different outcomes in each of the two cities where the policy is implemented. The studies conducted to assess the policy environmental effectiveness reported positive outcomes in Mumbai city, meanwhile, the outcomes of the implementing the policy in Delhi city turned to be uncertain. This uncertainty casts a shadow of doubt over the policy's effectiveness in addressing the environmental challenges and over its economic feasibility.

Studies undertaken to assess the policy effectiveness are mainly focused on its ecological outcomes without considering the social aspect of it. This paper attempts to examine the extent to which the policy was successful in addressing the environmental challenges in the entire Indian subcontinent. It also attempts to extend the analysis of the policy effectiveness beyond its ecological aspects to examine whether the policy succeed in promoting social sustainability and equitable development or not. The behavior of two environmental indicators is observed relatively to the increasing levels of economic growth observed in India during the last few decades. Other aspects of social and economic sustainability are also drawn into the analysis to provide an overview of the policy's contextual suitability. The following section provides a review of the socio-economic situation and a description of the policy measure. It is followed by a section that summarizes how the policy assessment is approached throughout the literature. Then, the other three sections are dedicated to show the materials and methods used to conduct the analysis, the empirical results, and the conclusions.

Though no improvement in the quality of ambient air of India is observed in this study, however, similar to other studies, it does not provide a model that links the change in the quality of ambient air with an indicator of social wellbeing. Another limitation of this study is that it does not provide assessment to the level of other air pollutants than the emissions of carbon dioxide and the concentration of particulate matters 10mm in the ambient air of India. Time constraints, lack of nation-wide data, and difficulties in developing appropriate measures that reflect the policy's impact on the social wellbeing, like indicators that measures the changes in health status of dwellers of major cities in India upon the implementation of the policy were behind these limitations.

Description of CNG Conversion Policy in India

During the last couple of decades, the rhetoric of sustainable development in India constituted a major part of the alternative development discourse in response to mainstream approaches to growth. The Planning Commission in India has been producing Five-Year plans since 1951 which set the strategic direction for the government of India for the following five years. The 12th Five-Year plan published in 2012 under the title of "Faster, More Inclusive and Sustainable Growth" calls for giving more attention to the twin problems of sustainability and more inclusive sustainable growth. However, policies intended to reconcile the two opposing dimensions: meeting the requirements of growth on the one hand, and promoting social and environmental sustainability on the other hand, cannot be perceived without challenges within the realm of the fast-growing developing economy of India. The advocated policy measures that are intended to achieve this balance between economic growth and environmental and social sustainability are still under controversy.

According to Banerjee and Sood's (2012) review of the policy agenda intended to address ecological and social challenges in the fields of water supply, land, forests, and river dams in India, they suggest that the neoliberal orientation of the current sustainable development approaches promotes economic growth and privatization, thus it aggravates existing social inequalities. The governmental macroeconomic reforms perpetuate extensive social vulnerability by imposing the developed world's agenda for green economy on the fast-growing developing economy of India. Banerjee and Sood attempt to examine the extent to which policy frameworks in India are consistent with the stated objective of growth and sustainability. They observe that within the current phase of neoliberalism, the government's reaction to the social and environmental challenges posed by the recent economic growth has been represented by enforcing legislative changes that legitimize the economic growth rather than restricting the propulsion of it (Banerjee & Sood , 2012).

The recent phase of economic growth in India is associated with adverse social and environmental consequences. The expansion in economic activities and the boost in the automobile trade sector brought by the adoption of the General Agreement on Tariff and Trade (GATT) led to millions of additional vehicles registered in India on annual basis. The number of vehicles registered in the capital city, Delhi, during 1996 increased from 2.5 million to 4.17 million in 2004 (Ravindra, Wauters, Tyagi, Mor, & Van Greiken, 2006). Consumption of diesel by buses and two-wheelers, the most common

means of transportation in Delhi, is higher when compared to the average consumption of gasoline in anywhere in the developed countries. The resulted emissions of diesel exhausts in the ambient air of India cause dire consequences on people's wellbeing. Studies showed that chronic exposure to 1 $\mu g\ m^{-3}$ of diesel exhaust leads to 300 additional cases of lung cancer per million people, which means 4,200 extra cases of lung cancer just in the fourteen million population city of Delhi due to the excessive use of diesel-fueled means of public transportation. The government annual expenditure on the treatment of diseases that are caused by air ambient pollution is estimated between US$ 350 to 490 million in India. One out of every ten school children in Delhi is diagnosed with Asthma worsened by air pollution. Studies estimated the number of deaths caused by air pollution by approximately 40,000 Indians per year: 7500 in Delhi, 5700 in Mumbai, and 4,500 in Kolkata. It has been also estimated that this number of annual deaths in Delhi could be avoided by reducing the emissions of Particulate Matter 10 (PM_{10}) by 143 $\mu g\ m^{-3}$ (Ravindra, Wauters, Tyagi, Mor, & Van Greiken, 2006).

In its attempt to address the problem of vehicular emissions, in 1998, the Indian Supreme Court mandated the conversion of the entire Delhi bus fleet of diesel-powered buses to Compressed Natural Gas (CNG) fuel by 31 March 2011. Later, auto-rickshaws were submitted to the same rule. A similar attempt was initiated in 2000 by the Mumbai's High Court that mandated to scrap vehicles that were more than 15 years old and to substitute diesel and gasoline fuels with CNG (Bandela & Tare, 2008). The CNG conversion policy was subject to an extensive debate among politicians, different institutional entities, and in academia, where many studies were conducted to assess the environmental outcomes resulted by the implementation of the policy.

In other countries where similar policies are enforced, many studies attempted to assess the effectiveness of the CNG conversion as a policy measure took the form of cost/benefit analyses. In developing countries like China and Bangladesh, few studies attempted to measure the social and environmental benefits accrued to the society relatively to the costs incurred upon the implementation of CNG conversion policies (Wadud & Khan, 2011). Studies in the United States also took the form of cost/benefit analyses, but were focused only on the economic efficiency of similar policy measures enforced in few states like Ohio, Indiana, and Wisconsin production (Yang, Tyner, & Sarica, 2013). Assessing the policy's effectiveness is approached differently in the studies undertaken to measure air quality in India. These studies are mainly focused on measuring the policy's environmental outcomes, without considering any social or economic costs that may be incurred by implementing the policy.

Literature Review

Assessing the quality of ambient air upon mandating the CNG conversion policy in the two major cities of India, Delhi and Mumbai, reported different outcomes. Implementing the policy is assessed to be more environmentally effective in Mumbai than it is in Delhi. Those different outcomes could be attributed to the different contextual specificity of each city. They may also exist because of the different environmental indicators used to measure air quality. Studies accounted for different types of pollutants and assessed the concentration of different types of emissions in the ambient air.

Ravindra et. al (2006) conducted a study to assess the concentrations of various criteria air pollutants in the ambient air of Delhi within a timeframe of twenty months before and after the implementation of the CNG conversion policy. Their assessment includes a variety of criteria air pollutants such as suspended particulate matter (SPM), particulate matter 10mm (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen oxide (NO_x), and other organic pollutants such as benzene, toluene, xylene (BTX), and polycyclic aromatic hydrocarbons (PAHs).The implementation of the policy resulted in a significant reduction in the concentration of few criteria pollutant, such as CO, SO_2, and PAHs. However, no significant reductions in the concentration of BTX, SPM, and PM_{10} were realized, nor in the level of NO_x which on the contrary demonstrates a 10 to 20% increase in comparison to those levels before the implementation of the policy. Nevertheless, as the concentration of BTX demonstrated a correlation with the benzene content of gasoline, a reduction in the level of BTX was realized after the reduction of the benzene content in petrol from 3% to 1% in Delhi after November 2000. Ravindra et. al conclude that the vehicular emissions may not be the only source behind the high concentration of both of SPM and PM_{10} in Delhi's ambient air. These two pollutants relate to other anthropogenic and natural emissions sources like small scale industries, domestic coal burning, thermal power plants, and other natural source like the dust storms during the pre-monsoon period (Ravindra, Wauters, Tyagi, Mor, & Van Greiken, 2006).

Rather than confining the assessment to few months upon the policy implementation, Kumari et. al (2011) extend the assessment of Delhi's ambient air to seven years after the policy was mandated. They present estimates of polycyclic aromatic hydrocarbon (PAH) automobile emissions in Delhi during the period 1999-2006. Their model estimates twenty three species of PAHs and five congeners of polychlorinated dibenzo-p-dioxin (PCDDs) and dibenzo-furans (PCDFs) emissions from the gasoline, diesel and CNG fueled automobiles. The results of their analysis show that the annual emissions of PAHs from road transportation means have increased four times during the period between 1999 and 2006. Emissions of other pollutants also demonstrated an increasing trends; in addition to the three-time increase in total PCDDs and PCDFs emissions that contributed the most in worsening the air quality in Delhi, Naphthalene (Nap) emissions have increased eight times, as well did the emissions of both carcinogen benzo(a)pyrene (BaP) and benzo(a)pyrene equivalent (BaPeq) that witnessed a two-fold increase.

Kumari et. al conclude that although CNG fueled vehicles produce less emission of PAHs than gasoline and diesel fueled vehicles, the overall increase in the share of private vehicles outweighs any reduction in the level of PAHs that is realized upon the policy implementation. They observed a sharp increase in private vehicles population and usage during the study timeframe. Thus, they state that the implementation of the CNG conversion policy may contribute to the reduction in the emissions of some hazardous air pollutants like PAHs. However, this contribution is nullified by the immense increase in emissions of private gasoline vehicles. Moreover, they call for further investigations on the implementation of the CNG conversion policy as they have never observed any reduction in the levels of PCDDs emissions due to this conversion (Kumari, Attri, & Gurjar, 2011).

So, both of the studies that assessed the quality of Delhi's ambient air assert the uncertain environmental outcomes that the policy is intended to address. The reduction in the level of BTX observed by Ravindra et. al (2006) resulted from the reduction of benzene content in gasoline, thus it is totally irrelevant to implementing the CNG conversion policy. Moreover, the policy did not succeed in realizing the intended 143 $\mu g\ m^{-3}$reduction in the concentration of (PM_{10}) in Delhi's ambient air that is required to avoid the number of annual deaths due to air pollution in Delhi city. Thus, policies intended to reduce the level of (PM_{10}) concentration as a crucial pollutant responsible of large number of deaths caused by air pollution should target other sources of (PM_{10}) than vehicular emissions.

The results of Kumari et. al (2011) analysis confirm Ravidnra et. al (2006) conclusions regarding the uncertain outcomes of the policy implementation in Delhi. Ravidnra et. al realized a reduction in the levels of PAHs during the few months that followed the implementation of the policy. But, Kumari et al. analysis that extended the study's timeframe for few years after the implementation of the policy realized that the levels of PAHs increased due to the sharp increase in the number of private vehicles, and this increase counteracted any reduction in the level of PAHs that could be realized due to the implementation of the policy. However, Kumari et. al (2011) referred to the sharp increase in the use of privately owned vehicles, but they never mentioned any reasons behind this increase. This extensive use of private cars could be attributed to the reaction of the users of public transportation means towards any changes induced by implementing the policy. Takeuchi et. al (2007) anticipate that users of public transportation means may shift to other alternatives as a reaction to the increase in bus fare, or the fare of any other public mean like two-wheelers, that is required to cover the costs of the investment in CNG technology and infrastructure.

On the contrary to the uncertain environmental outcomes of implementing CNG conversion policy that are reported in Delhi, studies conducted in Mumbai city reported positive outcomes. Takeuchi et. al (2007) analysis compares the environmental effects of implementing different policy measures on the quality of the ambient air in Mumbai. Their analysis suggests that relatively to other policy measures, such as raising gasoline prices and imposing a tax on private vehicle ownership, CNG conversion policy realizes ultimate outcomes in terms of both environmental and economic efficiency. The policy may result in a significant reduction in the concentration of PM_{10} that may constitute 14% of the total emissions from transportation. Takeuchi et. al conclude that the policy succeeds to address the environmental challenges posed by the rapid growth in private vehicles fleets and the hiking emissions of diesel truck, taxis and auto-rickshaws. However, the thy stress the peculiarities of Mumbai compared to other Indian cities as having a sophisticated rail and bus system, and a much smaller vehicle fleet than other major cities like Delhi (Takeuchi, Crooper, & Bento, 2007).

Bandela and Tare (2008) study confirms Takeuchi et. al conclusions. Their empirical analysis examines the reduction in the levels of pollution in the ambient air of Mumbai city upon the implementation of CNG conversion policy. The study measures the levels of three pollutants: SO_2, NO_x, and respirable suspended particulate matter (RSPM) from 2000 through 2003. They conclude that although some pollutants' levels exceed the limits set by India's Central Pollution Control Board, they demonstrated a substantial decrease upon the implementation of the CNG conversion policy (Bandela & Tare, 2008).

So, Takeuchi et. al (2007) assert that when targeting public fleets, the policy induces an increase in bus fare that inclines a shift in transportation modes. However, this increase to cover the cost of the conversion turned to be insignificant. In the case of Mumbai, the resulted shift to other alternatives, if any, will be likely to other environmental-friendly means of transportation, particularly either to walking, cycling, or to using the rail system, but not to privately owned vehicles. So the supremacy of the CNG conversion to other policy measures is due to the fact that it targets public modes of transport. As the users of such public means likely belong to low or middle income classes, they will shift to more cost-effective means rather than to privately owned vehicles. However, these alternatives may differ according to each city's contextual specificity. The shift to other modes in Delhi may induce an increase in the use of privately owned vehicles, thus may aggravate vehicular emissions rather than controlling them. Different social context may induce different ecological outcomes. Therefore, the psychological and social causes for these differences in the attitude of user of public transportation should be incorporated in the ex-ante assessment of such a policy measure.

Upon reviewing the above evaluation to the ecological effects of implementing the CNG conversion policy, it is obvious that the social ramifications of this policy measure are not included in the analysis. Benarjee and Sood (2012) suggest that appropriate policies cannot be formulated unless the question of environmental sustainability is considered and treated simultaneously as integral and fundamental to the institutional contexts behind people's social, economic, and material circumstances.

The priority in the policy making process in India should be given to identifying and supporting social, cultural, and political mechanisms. Though it may look irrelevant to the main topic of this paper as their study explores other environmental indicators than air pollution; Benarjee and Sood's (2012) findings are interesting due to their different approach to issues of ecology.

Banerjee and Sood (2012) paper shows how the effectiveness of the contemporary green or sustainable development approaches are compromised as they tend to lean toward neoliberal principles. They offer an analytical overview of the Indian state's alternative or sustainable development trajectories and of the mainstream policy decisions for high-growth objectives in the global economy. They analyze how emerging economies like India have responded to the opposing demands of inclusive growth and more equitable development aimed at closing social divides. They explore the politics of green growth with a case study of two seemingly contradictory development trajectories, namely the "Green Mission" which is a strategy undertaken to preserve and promote environmental health and biodiversity in the Indian State of Sikkim, and the hydroelectric power (HEP) dams that exist in the same state on the river of Teesta in India's northeastern Himalaya regions. Their data analysis reveals that due to aggressive strategies targeted to achieve a 10% growth rate, the region's dwellers suffer from a massive displacement from forests, lands, and natural habitats, loss of livelihood, social conflict, and rapidly depleting natural resources. Their findings highlight the fact that instead of promoting social sustainability, the current trajectory of development has created social distress represented in social divide, social exclusion, and dire need for job and livelihood.

Though both of Takeuchi et. al (2007) and Bandela and Tare (2008) studies acknowledge the policy's success in improving the quality of ambient air in Mumbai, they do not acknowledge any ramifications of this improvement on the wellbeing of Mumbai's dwellers. The studies did not highlight any benefits accrued to the society due to the positive outcomes of implementing the policy. Meanwhile, Wadud and Khan (2011) study of similar initiatives taken in Dhaka, the capital of Bangladesh, provides quantitative evaluation of the social benefits of implementing some policy measures that promote the use of CNG, it also links the observed improvements in the air quality of Dhaka to an indicator that measures the avoided number of deaths among premature infants.

Air quality degradation attributable to automobile emissions in Dhaka urged for some governmental initiatives addressed to alleviate the levels of air pollution (Wadud & Khan, 2011). In their analysis, Wadud and Khan (2011) quantify the ex-post social benefits of a government policy which resulted in a widespread conversion of petroleum based vehicles to CNG vehicles. Started by banning the leaded fuel in the country in 1999, the series of policy initiatives that followed included the tightening of emissions standards for motor vehicles in 2002, the banning of three wheeler auto-rickshaws and vehicles older than 20 years from the city, and mandating the retrofitting of all governmental vehicle fleet with CNG conversion kits in 2003. These initiatives were associated with other policy measures attempted to invoke the use of CNG in transportation like exempting import duty on CNG conversion kits and CNG storage cylinders, and raising the price of petroleum fuel that was subsidized before. These initiatives led other privately owned vehicles to gradually switch to CNG. Although this may result in reduced black carbon emissions, Wadud and Khan anticipated an increase in methane (CH_4) emissions, thus they conducted an ex-post analysis to the quality of air in Dhaka.

To determine benefits accrued to the society by the conversion to CNG vehicles, they developed a model that links the change in gas emissions to the changes in the quality of ambient air and to the number of avoided premature deaths. Their results show that conversion to CNG led to an increase in CH_4 emissions, they are set to increase because there was no leakage of CH_4 emissions from the vehicles before the use of CNG. These emissions contribute to air warming effect. However, the policy initiatives resulted in a net cooling effect due to the reduction CO_2 and SO_2 emissions. The resulted improvements in air quality attributable to the use of CNG were coupled with population distribution and functions of health impacts. Wadud and Khan strongly recommend the policy initiatives. They conclude that the CNG conversion initiatives resulted in around 6,000 avoided premature deaths in 2009, in an amount of saving of US$ 1.15 billion that makes around 1.3% of the country's GDP, and in around US$ 0.6 million benefits of pollution reduction.

Upon identifying the gaps in the reviewed literature, in addition to examining the behavior of two air pollutants during the last few decades, this study attempts to extend the analysis of the CNG conversion policy in India to include the social and economic ramifications of implementing it. However, it shares with the other studies the same limitation of not linking the change in the quality of ambient air attributable to the implementation of the policy to any indicator of social wellbeing. In addition to the lack of data and the difficulty of linking the resulted environmental change to some indicator of

wellbeing, no reduction in the emissions of the two pollutants in the ambient air of India is observed upon implementing the policy.

Material and Method

Throughout the literature, the emissions of greenhouse gases and the concentration of particulate matters in the ambient air of a particular area are used to measure the environmental outcomes of policy measures that target air pollution within a particular period of time. The environmental indicators that are used in this study to assess the environmental outcomes of the CNG conversion policy in India throughout the last few decades are: the levels of carbon dioxide (CO_2) emissions created by the consumption and flaring of fossil fuels measured in thousands of tons during the last three decades, and the concentration of particulate matters 10mm (PM_{10}) in the ambient air of India during the last two decades measured in microgram per cubic meter. The time series data are published by Euromonitor International (2013) and are withdrawn from the World Bank environmental database.

Figure 1 illustrates the increase in CO_2 emissions created by the consumption and flaring of fossil fuels during the last three decades. Figure 2 illustrates the growth rate of those emissions during the same period.

Figure 1. CO2 Emissions from the Consumption and Flaring of Fossil Fuels ('000 tons)

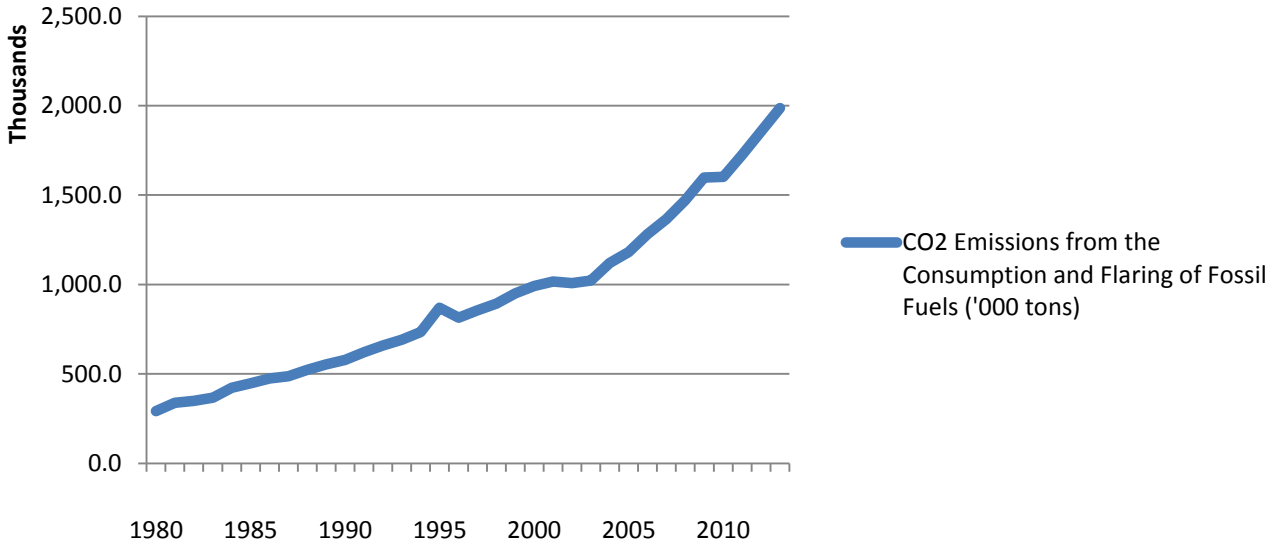


Figure 2. Growth Rate of CO2 Emissions from the Consumption and Flaring of Fossil Fuels (%)

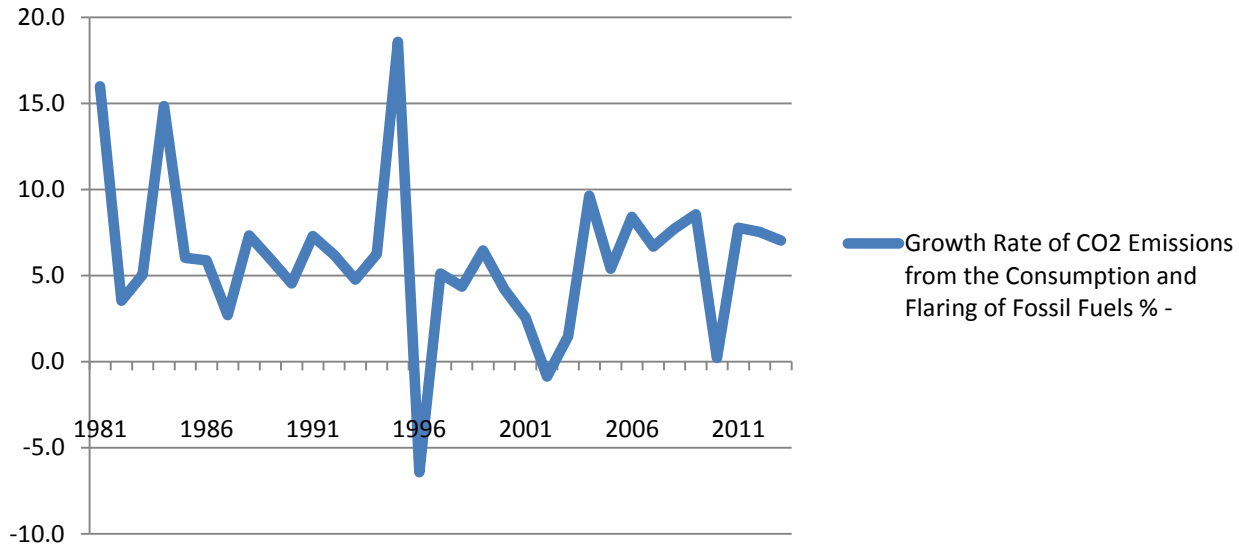


Figure 3 illustrates the reduction in the concentration of PM_{10} in the ambient air of India during the last two decades. Figure 4 illustrates the growth rate of the concentration of PM_{10} during the same period.

Figure 3. Concentration of PM10 in the Ambient Air (Microgram per cubic meter)

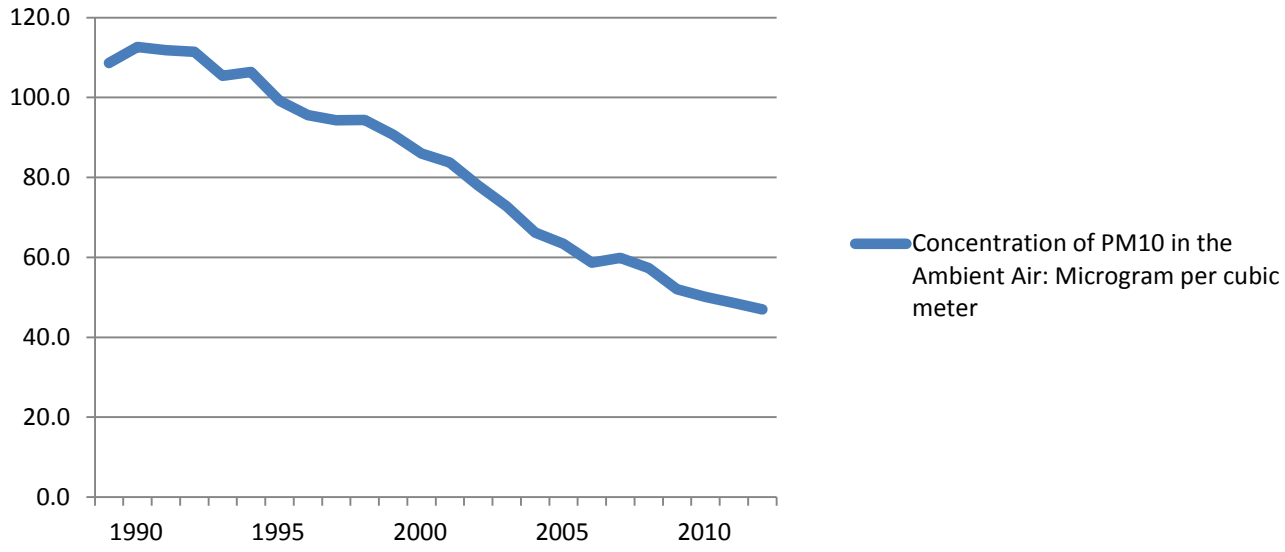
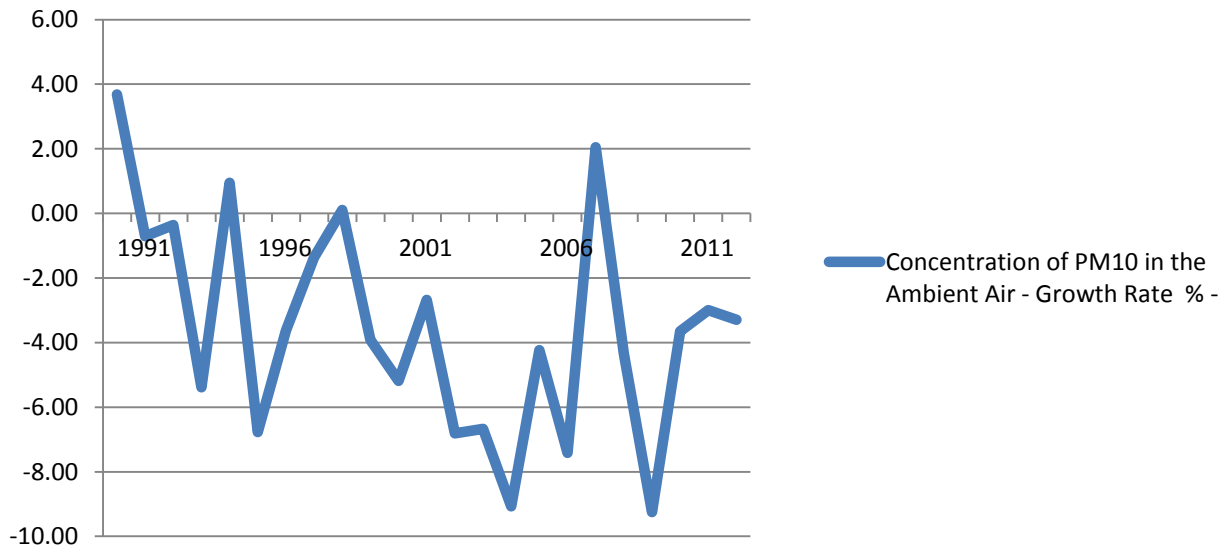


Figure 4. Growth Rate of Concentration of PM10 in the Ambient Air (%)



The behavior of both pollutants CO_2 emissions and the concentration of PM_{10} in the ambient air is observed in accordance with India's economic performance during the last few decades. In this study, economic growth is represented by three economic indicators of Gross Domestic Product (GDP): GDP measured at purchasing power parity (PPP), per capita GDP at current prices measured in US dollar, and real GDP growth rate.

GDP measured at PPP has been almost steadily increasing during the last three decades. Figure 5 illustrates that the associated CO_2 emissions took a similar increasing trend with GDP measured at PPP. Meanwhile, Figure 6 shows that the decreasing concentration of PM_{10} in the ambient air of India during the last two decades has been inversely related to the increase of GDP measured at PPP.

Figure 5. CO_2 Emissions ('000 tones) & GDP Measured at PPP

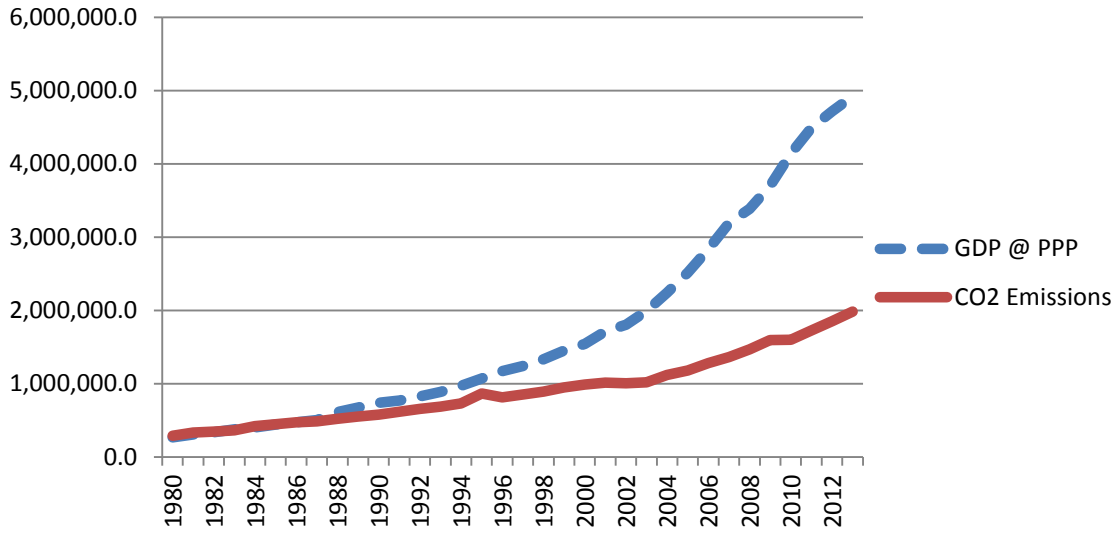
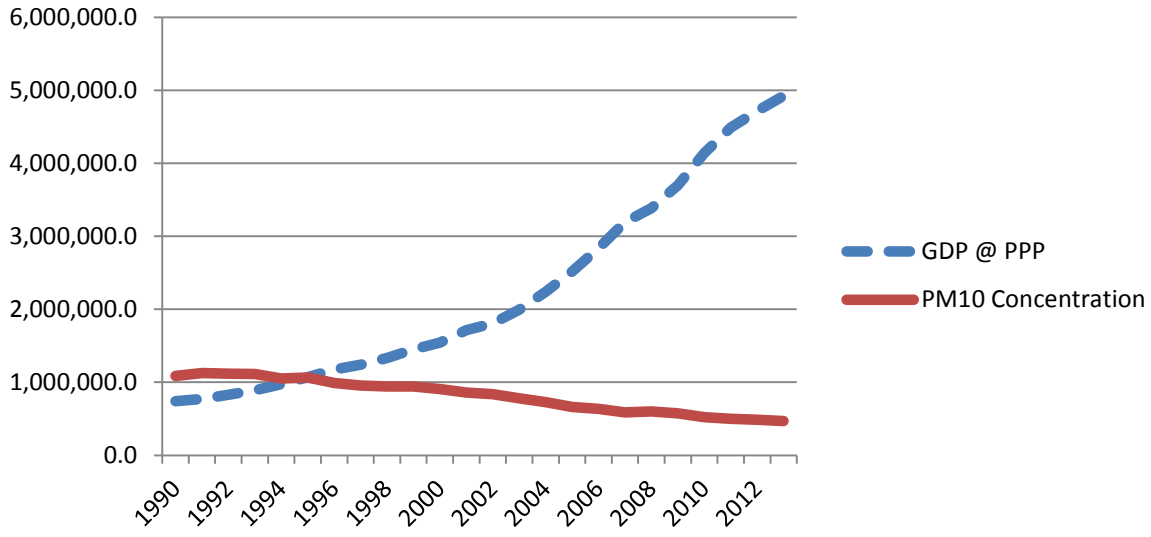


Figure 6. Concentration of PM_10 (Microgram per cubic meter) & GDP Measured at PPP



However, real GDP growth rates fluctuated within the last three decades. A spike is witnessed by the end of the 1980s and another two spikes are witnessed in 2007 and 2010. Upon comparing the trajectory of real GDP growth rate during the last three decades with the trajectory of annual growth rates of CO_2 emissions and the trajectory of the concentration of PM_{10} in the ambient air in India, respectively, It is shown in Figure 7 and in Figure 8 that between the years 1980-2005, growth rates of both of CO_2 emissions and PM_{10} concentration took a pro-cyclical trend with cycles of expansion and contractions in economic activities. However, as of 2005, this correlation started taking a counter-cyclical

movement, where periods of economic expansions are associated with decreasing rates of growth in CO_2 emissions and the concentration of PM_{10} in the ambient air.

Figure 7. Annual Growth Rate of CO_2 Emissions & & Real GDP Growth Rate

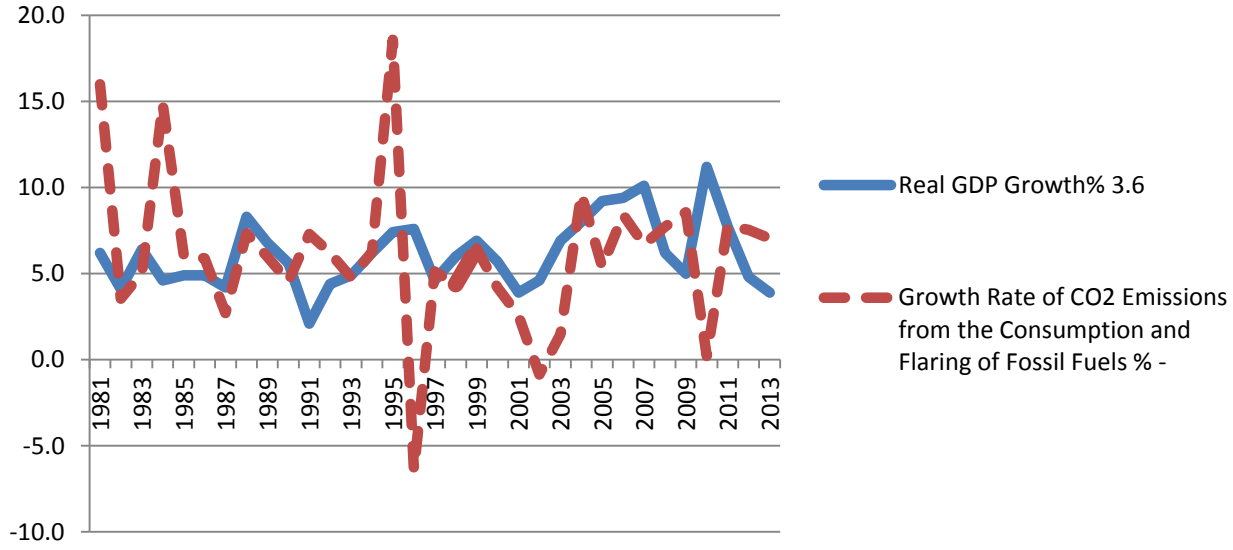
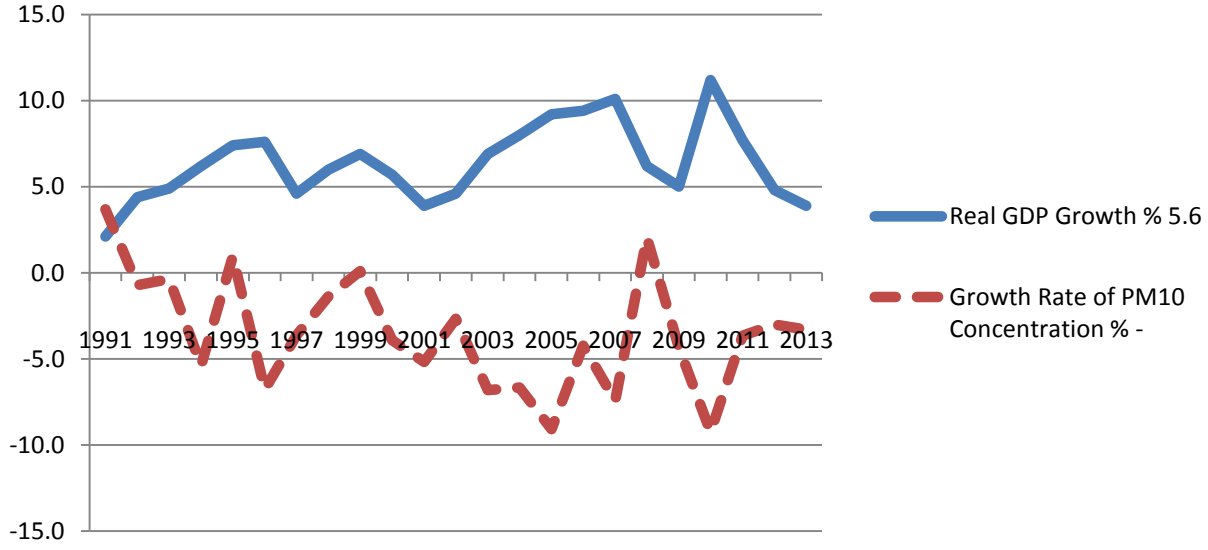


Figure 8. Concentration of PM_10 Concentration &Real GDP Growth Rate



Results and Discussion

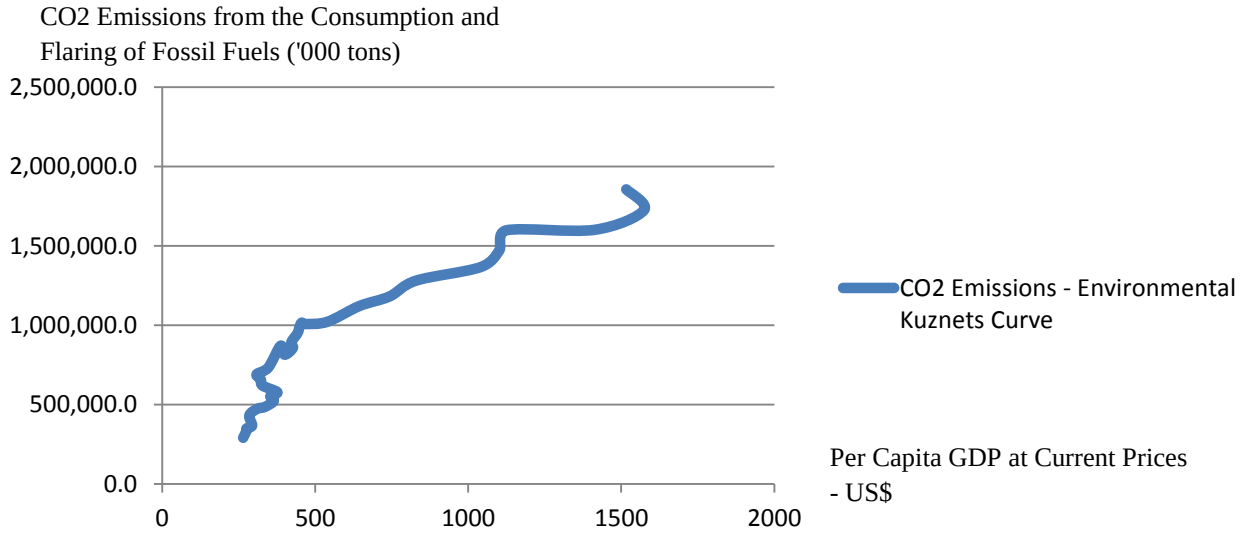
Proponents of Environmental Kuznets Curve (EKC) hypothesis suggest economic growth as an adequate solution to the problem of environmental deterioration, particularly in few developing economies which are witnessing accelerated rates of economic growth. EKC hypothesis assumes a systematic relationship between levels of per capita income and environmental quality represented by an

inverted U-shape curve, where environmental deterioration accelerates at a quicker pace than income in the early stages of economic development and slows down through the further stages of GDP growth, thus. Nevertheless, EKC hypothesis does not specify the point at which economic expansion starts boosting environmental quality. Moreover, empirical studies proved that only some air quality indicators support the EKC hypothesis (Dinda, 2004).

Torras and Boyce (1998), however, attribute the allegedly hypothesized KCE inverted U-shaped pattern of the relationship that exist between increasing levels of per capita income and few pollution variables to a more equitable distribution of power and policy effects among those who bear the costs of pollution and those who benefit from polluting activities. They assert that the relationship between per capita income and environmental quality depends on three effects; scale, composition and technology effects. Higher per capita income is expected to worsen environmental quality as a result of more pollution created by expansion of economic activities, unless this scale effect was overshadowed by: first the composition of output that shifts among sectors which differ in their pollution intensity, and second by adoption of more advanced environmental technologies as a response to either related governmental regulations or market incentives (Torras & Boyce, 1998).

Upon plotting the behavior of the two environmental indicators, CO_2 emissions and the concentration of PM_{10}, respectively in accordance with the increasing levels of per capita income as a measure of economic progress lately observed in India, each of the indicators behaved differently. Figure 9 shows that CO_2 emissions were positively related to the increasing levels of per capita income. Nevertheless, the intensity of CO_2 emissions fluctuated relative to levels of per capita income during the last decade. As economic growth witnessed accelerated rates for the last couple of decades in India, this observed relationship may represent the dominance of the scale effect over the other two effects of composition and technology described by Torras and Boyce.

Figure 9. CO2 Emissions - Environmental Kuznets Curve



As for the other environmental indicator, the concentration of PM_{10} in the ambient air, Figure 10 shows that it was inversely related to the increasing levels of per capita income for the last two decades. This may also be explained by the dominance of both of the composition and the technology effects over the scale effect. That may be the case as during the last couple of decades, India witnessed an expansion in the service sector proportionally to the industrial sector due to the outsourcing of many offshore services and business processes like telecommunication and information technology by the industrial economies to India (Jayaraman, Narayanan, Luo, & Swaminathan, 2013), and that was associated with the implementation of few policy measures and regulations that promotes environmental sustainability.

Though the form of the relationship was not uniformed, neither of the above indicators demonstrated the alleged inverted U-shaped curve when plotted in accordance with levels of per capita income. Emissions of CO_2 behaved according to the assumed manner of increasing pollution in the early stages of economic development. Though not guaranteed, the relationship may take the assumed inverted U-shaped form during further stages of economic progress, but obviously it did not demonstrate this behavior yet.

According to Torras and Boyce (1998), the relationship between income and environmental quality may not be strictly monotonic. It may vary among different pollution variables; it may also depend on other factors like enhanced policy regulations, political rights and democratic measures (Torras & Boyce, 1998). The above mentioned environmental variables demonstrated a non-uniformed correlation with increasing level of GDP per capita in India. Thus, in contrast to the alleged supremacy of economic growth which is hypothesized by the proponents of EKC hypothesis, economic growth may not be the ultimate solution for environmental deterioration within the context of the economic progresses lately achieved in India.

Figure 10. Concentration of PM10 - Environmental Kuznets Curve

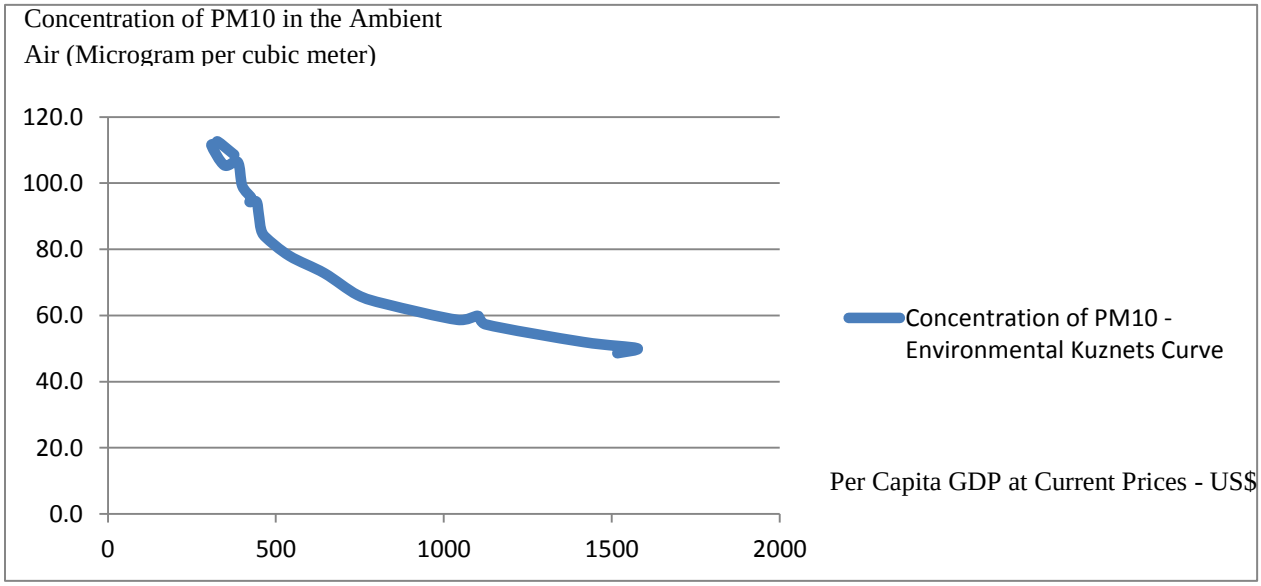


Figure 3 shows that the decreasing concentration of PM_{10} in India's ambient air started almost 10 years before the implementation of CNG conversion policy. Hence, as it is suggested by Ravindra et. al (2006), these reductions could be attributed to other factors than the implementation of the policy. Moreover, though the annual growth rates of CO_2 emissions generated by the consumption and flaring of fossil fuels showed a fluctuating movement relative to cycles of economic expansion and contraction during the last three decades, Figure 2 shows that CO_2 emissions have been increasing in India's ambient air even after the implementation of the policy.

In addition to the environmental aspects that the policy may fail to address, proposing the policy as a measure for prompting environmental sustainability brings into the discussion other social and economic sustainability aspects that the policy may also fail to address. In terms of economic efficiency, the implementation of the policy requires further investments in the development of an adequate and safe fuel supply infrastructure. It also requires purchases of new vehicles or retrofitting existing vehicles to be compatible with CNG engines. Moreover, in order to make the CNG available from local resources rather than increasing the imports of it to meet the hiking demand, substantial amount of investments is required to improve the local natural gas production sector.

Perceived as unjustifiable by the policy opponents (Jackson & Rosencranz, 2003), the incurred costs will likely necessitate an increase in bus fare. As suggested by Takeuchi et. al (2007), this increase may induce lower-income populations to switch from public to private transportation means like rickshaws and two-wheelers, which are also major emitters of diesel exhausts. It may also induce middle income population to shift to the use of privately owned cars, thus accentuating the level of emissions per passenger mile traveled (Takeuchi, Crooper, & Bento, 2007). As a remarkable portion of the population depends on public transportation means, the implementation of this policy which is intended to reduce vehicular emissions and to mitigate the growth of the private vehicle fleets may in fact aggravate the pollution problem rather than restraining it.

CNG supply crises generated by the implementation of the policy constitute another productivity aspect in terms of economic efficiency. In addition to the inadequate infrastructure of CNG distribution, the rapid increase in demand on CNG resulted from the implementation of the policy is not compatible with the growth of the supply. Consequently, long queues on the few CNG fueling stations in Delhi often exist at times of peak demand. These refueling queues aggravate congestion and hazardous traffic incidents when interfering with traffic flow. They also reduce public fleet productivity and quality of transportation services. Economic losses may be incurred as vehicles cannot provide transportation services during the time spent waiting for refueling (Erlandsson & Weaver, 2002).

In terms of social sustainability, the policy may result in an unequal distribution of economic benefits and costs among different social classes. As mentioned above, the policy requires either substituting or upgrading existing vehicles to conform to CNG engines. This process, affordable by the government who covers the cost of either substituting or upgrading state-owned public bus fleets, benefits some

major automobile manufacturers and auto suppliers like Telco India and Ashok Leyland (Erlandsson & Weaver, 2002). Nevertheless, the policy also targets other diesel-fueled private means of transportation like two-wheelers and auto-rickshaws. These private vehicles may represent the only source of income for many middle-income individual owners who may not be able to afford the cost of converting or upgrading their vehicles. Moreover, as the priority is likely given to public buses in the long queues on CNG fueling stations, many auto-rickshaws drivers are left behind and had to wait for too many hours in the refueling queues (Jackson & Rosencranz, 2003). So as suggested by to Banerjee and Sood's (2012), the policy promotes the interests of the private sector, on the other hand, it may end up with more losses of livelihoods and may accentuate economic distress and social divides among the less advantaged lower-income population.

Conclusion

Assessing the feasibility of the CNG conversion as a policy instrument intended to address sustainability aspects requires further in-depth analysis of the policy's potential social, economic, and environmental outcomes. The policy's uncertain effectiveness in terms of environmental sustainability buttresses the controversy over its economic feasibility. In addition to the environmental aspects that the policy may fail to address, it may end up with undesirable social outcomes instead of promoting social sustainability and equitable development.

Further, policy makers should also be sensitive to contextual specificities and pay more attention to the peculiarities of India's developing economy. CNG conversion falls into the class of policies that can be prescribed to economies endowed with considerable reserves of natural resources, high level of technology, and significant financial resources to explore and process domestic endowments of natural gas and to provide an adequate CNG distribution network. When mimicked as a panacea for environmental damages created by vehicular emissions in developing economies, such policies may not achieve the desired outcomes.

References

Bandela, N. N., & Tare, D. G. (2008). Reducing air pollution by using CNG as a vehicle fuel: A study from Mumbai. *Environmental Quality Management*, 67-70.

Banerjee, P., & Sood , A. (2012, April). The political economy of green growth in India. *Social Dimensions of Green Economy and Sustainable Development*.

Dinda, S. (2004). Environmental Kuznets Curve hypothesis: a survey. *Ecological Economics*, 431-455.

Erlandsson, L., & Weaver, C. (2002). *Safety of CNG business in Delhi: findings and recommendations.* New Delhi: Centre for Science and Environment.

Jackson, M., & Rosencranz, A. (2003). The Delhi pollution case: can the Supreme Court manage the environment? *Environmental Policy and Law*, 88-91.

Jayaraman, V., Narayanan, S., Luo, Y., & Swaminathan, J. (2013). Offshoring business process services and governance control mechanisms: an examination of service. *Production and Operations Management*, 314-334.

Kumari, R., Attri, A. K., & Gurjar, B. R. (2011). Impact of CNG on emissions of PAHs and PCDDs/Fs from the road transport in Delhi. *Atmospheric Pollution Research*, 394-399.

Pandian, D. J., Mansingh, L., Singhvi, L. K., Tambraparni, S., Sharma, S., & Perrin, A. (2010). City gas India rountable 2010: intiatives and challenges. *The Journal for Decision Makers*, 61-91.

Ravindra, K., Wauters, E., Tyagi, S. K., Mor, S., & Van Greiken, R. (2006). Assessment of air quality after the implementation of compressed natural gas as fuel in public transport in Delhi, India. *Environmental Monitoring & Assessment*, 405-417.

Takeuchi, A., Crooper, M., & Bento, A. (2007). The impacts of policies to control motor vehicle emissions in Mumbai, India. *Journal of Regional Sciense*, 27-46.

Torras, M., & Boyce, J. K. (1998). Income, ineqaulity, and pollution: a reassement of environmental Kuznets Curve. *Ecological Economics*, 147-160.

Wadud, Z., & Khan, T. (2011, April). CNG conversion of motor Vvehicles in Dhaka: valuation of the co-benefits. *Transportation Research Board 90th Annual Meeting Compendium of Papers* .

Yang, L., Tyner, W. E., & Sarica, K. (2013). Evaluation of the Economics of Conversion to Compressed Natural Gas for a Municiple Bus Fleet. *Energy Science & Engineering*.

Appendix 1. Dataset

Table 1. India - CO_2 Emissions from the Consumption and Flaring of Fossil Fuels ('000 tons) & Annual Growth Rate %

Time Periods	CO2 Emissions from the Consumption and Flaring of Fossil Fuels ('000 tons)	CO2 Emissions Growth Rate %
1980	291,225.3	-
1981	337,776.1	16.0
1982	349,744.4	3.5
1983	367,401.4	5.0
1984	421,913.0	14.8
1985	447,383.2	6.0
1986	473,738.6	5.9
1987	486,585.2	2.7
1988	522,277.8	7.3
1989	553,477.0	6.0
1990	578,618.7	4.5
1991	620,847.7	7.3
1992	659,370.1	6.2
1993	690,763.6	4.8
1994	733,906.0	6.2

1995	870,233.6	18.6
1996	814,415.9	-6.4
1997	856,069.2	5.1
1998	893,430.8	4.4
1999	951,137.2	6.5
2000	990,967.7	4.2
2001	1,016,284.9	2.6
2002	1,007,494.8	-0.9
2003	1,022,324.3	1.5
2004	1,120,876.6	9.6
2005	1,181,397.6	5.4
2006	1,280,646.4	8.4
2007	1,366,213.1	6.7
2008	1,471,769.2	7.7
2009	1,597,752.5	8.6
2010	1,601,236.0	0.2
2011	1,725,761.8	7.8
2012	1,855,707.6	7.5
2013	1,986,331.1	7.0

Table 2. India – Concentration of PM_{10} Microgram per cubic meter & Annual Grwoth Rate %

Time Periods	PM10 Concentration: Microgram per cubic meter	Growth Rate of PM10 Concentration %
1990	108.6	-
1991	112.6	3.68
1992	111.8	-0.71
1993	111.4	-0.36
1994	105.4	-5.39
1995	106.4	0.95
1996	99.2	-6.77
1997	95.6	-3.63

1998	94.3	-1.36
1999	94.4	0.11
2000	90.7	-3.92
2001	86.0	-5.18
2002	83.7	-2.67
2003	78.0	-6.81
2004	72.8	-6.67
2005	66.2	-9.07
2006	63.4	-4.23
2007	58.7	-7.41
2008	59.9	2.04
2009	57.3	-4.34
2010	52.0	-9.25
2011	50.1	-3.65
2012	48.6	-2.99
2013	47.0	-3.29

Table 1.1 India – GDP measured at Purchasing Power Parity (PPP) and Real GDP Annual Growth Rate %

Time Periods	GDP Measured at Purchasing Power Parity	Per Capita GDP at Current Prices - US$	Real GDP Growth Rate %
1980	268,482.0	264.3342	3.6
1981	311,059.2	275.5931	6.2
1982	340,726.9	275.1106	4.1
1983	380,339.0	293.5288	6.4
1984	406,715.9	284.3637	4.6
1985	443,647.4	289.6888	4.9
1986	473,339.8	310.5611	4.9
1987	504,925.0	336.3565	4.2
1988	613,857.1	364.2859	8.3
1989	675,250.0	353.2167	6.8

1990	739,974.0	376.1066	5.6
1991	772,100.7	326.8256	2.1
1992	830,415.0	321.8972	4.4
1993	888,909.6	308.3087	4.9
1994	972,788.4	346.6795	6.2
1995	1,071,386.2	386.3136	7.4
1996	1,173,393.5	399.9073	7.6
1997	1,241,795.4	426.6425	4.6
1998	1,333,028.8	422.0046	6.0
1999	1,451,978.6	442.313	6.9
2000	1,544,793.9	448.82	5.7
2001	1,713,234.1	455.8447	3.9
2002	1,806,066.2	468.9735	4.6
2003	1,994,868.6	540.6286	6.9
2004	2,241,107.3	644.1946	8.0
2005	2,517,806.3	743.0279	9.2
2006	2,835,728.0	829.1095	9.4
2007	3,196,237.9	1040.562	10.1
2008	3,385,484.1	1101.69	6.2
2009	3,700,771.3	1124.448	5.0
2010	4,140,715.0	1414.035	11.2
2011	4,489,270.7	1574.775	7.7
2012	4,715,576.5	1516.32	4.8
2013	4,923,953.0		3.9

Conversion to a Greener Fleet

A Cost-Benefit Analysis of a Conversion to Compressed Natural Gas for a Municipal Bus Fleet

Shlair Abdulkhaleq Al-Zanganee

Ishik University, Erbil, Iraq, Email: shlair.abdulkhaleq@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Concerns about global warming and energy security, associated with rising oil derivative fuel prices, are spurring interest in exploring alternative sources of energy supply to road transportation means, especially motor vehicles that constitute a major source of air pollution in the world. Natural gas is an important source of energy that is lately being considered as an alternative to fossil fuel and other oil derivatives as a fuel to states' fleets and pacts. In addition to being a domestically abundant and a secured source of energy, it helps reducing pollution and maintaining a clean and healthy environment. In its attempt to find an economically viable solution to overcome the problem of the rising costs of fuel, CityBus Corporation of Lafayette/ West Lafayette, IN considers improving the energy efficiency of its vehicle fleet whose operation and greenhouse gas emissions are part of the factors affecting local air quality. Thus, the following cost-benefit study compares the total costs of two potential options for municipal bus replacement: standard diesel fueled buses and Compressed Natural Gas (CNG) fueled buses.

Since the results shows that the implementation of the CNG alternative has a lower Net Present Value (NPV) cost, moreover, it would potentially reduce greenhouse gases and particulate emissions in comparison to the standard diesel option; the study concludes that the CNG alternative is more viable from both the economic and the environmental perspectives. Thus, the study recommends the conversion of the states' bus fleet to the use of CNG as a source of fuel to municipal bus fleets.

Key Words: Compressed Natural Gas, Pollution, Environmental Sustainability

Introduction

Concerns about the global climate change and energy security, associated with rising oil prices, are spurring considerations on alternative sources of energy supply to road transportation means, especially motor vehicles that constitute a major source of air pollution in the world. The degradation of the quality of air and environmental resources, coupled with fears about the depletion of the non-renewable resources, jeopardizes the future of coming generations and the sustainability of the environmental resources. Moreover, the excessive use of oil derivatives as a source of energy raises concerns about the economic dependency of the industrial countries, which do not produce oil, on oil producing and exporting economies and increases their vulnerability to oil price shocks and to the political instability in oil producing countries. Thus, the continuous search for sustainable and more environmentally friendly sources of energy is recently preoccupying policymakers.

Natural gas is an important source of energy that is lately being considered as an alternative to fossil fuel and other oil derivatives as a fuel to states' fleets and pacts. In addition to being a domestically abundant and a secured source of energy, it helps reducing pollution and maintaining a clean and healthy environment. Classified as the cleanest of all the fossil fuels by the Environmental Protection Agency (Natural Gas Issues and Trends:1998, 1999), the main products of the combustion of natural gas are carbon dioxide and water vapor if compared to other fuel source. Coal and oil are composed of much more complex molecules, and oil release higher carbon ratio and higher nitrogen and sulfur contents, so when combusted, coal and oil release higher level of harmful emissions. In addition to higher ratio of carbon emissions, nitrogen oxides NO_x, and sulfur dioxide SO_2emissions, coal and fuel oil release major pollutant substances that do not burn like ash particles. Meanwhile, the combustion of natural gas releases lower level of reactive hydrocarbons like carbon dioxide CO_2, carbon monoxide CO_1, very small amounts of both NO_x and SO_2, and no ash or particulate matter. (Natural Gas Issues and Trends:1998, 1999).

The levels of greenhouse gases have been increasing due to the widespread burning of fossil fuels by growing human population. The transportation sector is the greatest contributor to air pollution in the United States. According to the Department of Energy (DOE), about half of the all air pollution and greenhouse gases and more than 80 percent of air pollution in cities are produced by cars, trucks, and buses in the United States.

Carbon dioxide is one of the principle greenhouse gases. It makes up a high proportion of the United States greenhouse emissions. The reduction of greenhouse gas emissions in general and carbon dioxide emissions in particular, plays an important role in combating the negative environmental effects of the global warming. As the combustion of natural gas emits almost 30 percent less carbon dioxide than oil, and 45 percent less than coal, natural gas can be used in the transportation sector to cut down on the high levels of pollution generated by gasoline and diesel fueled cars, trucks, and buses. According to the U.S. Environmental Protection Agency (EPA), carbon monoxide emissions of vehicles operating Compressed Natural Gas (CNG) are 90 to 97 percent less than traditional gasoline and diesel fueled vehicles, carbon dioxide emissions are 25 percent less. Other non-methane hydrocarbon emissions can be reduced by as much as 50 to 75 percent using CNG-fueled vehicles, and NO_xemissions can be reduced by 35 to 60 percent.

Domestic natural gas production has increase remarkably in the United States during the recent years. The extraction of many natural gas unconventional sources like coal-bed methane and shale gas has positively impacted the total domestic production (Yang, Tyner, & Sarica, 2013). The Energy Information Administration (EIA) 2013 Annual Energy Outlook (Annual Energy Outlook 2013 with projections to 2040, 2013) reported that natural gas production in the United States was States was 21.6 trillion cubic feet in 2010 and is expected to increase significantly until 2035. The increased production of natural gas in the United States lowered the prices making the U.S. exports of natural gas more attractive. In 2011, the U.S. net imports of natural gas were almost 2 trillion cubic feet as the United States consumed more natural gas than it produced. However, the expected increase of U.S. natural gas production by about 1 percent per year from 2011 to 2040 will enable meeting the domestic demand while also allow for more exports (Yang, Tyner, & Sarica, 2013). Hence, compressed natural gas has the potential to become a less expensive energy source than diesel fuel for use in public transportation

sector, especially the city bus fleets. However, the conversion of public fleet and buses to CNG fueled vehicles incurs enormous additional capital costs of constructing natural gas fueling stations. Unless such additional capital costs are fully compensated by savings of fuel costs over vehicle lifetimes, public fleet companies will not take the initiative to switch to CNG fueled vehicles.

Faced by the rising costs of fuel and the increasing concern over emissions caused by fleet operations, CityBus Corporation of Lafayette/ West Lafayette, IN considers improving the energy efficiency of its vehicle fleet whose operation and greenhouse gas emissions are part of the factors affecting local air quality. CityBus is the operating name of the Greater Lafayette Public Transportation Corporation (GLPTC). GLPTC is a nonprofit corporation serving the adjacent cities of Lafayette and West Lafayette in Indiana State. However, the main goal of CityBus Corporation is to reduce the total cost of maintaining its fleet and expects to find a long-term solution to maintain the current level of services. One of the biggest parts of the total cost is fuel cost. Most of the transit buses in the United States use diesel for fuel. As CNG fueled vehicles are being explored as means of decreasing fuel costs, CityBus Corporation considers the replacement of its retired vehicles of its fleets with more environmentally friendly vehicles, thus using the cleanest technology that could result in significant monetary savings.

This study compares the total costs of two potential options for municipal bus replacement: standard diesel fueled buses and CNG fueled buses. In the next section, relevant literature is reviewed to inspect how the option of converting to CNG fueled vehicles is approached from different perspectives. The following section shows how the total costs of both of the two options are estimated over a 15-year project's lifespan. A detailed explanation of how all of the capital, fuel, and environmental costs of the two options are estimated is provided in this particular section. The results suggest that the CNG option has a lower Net Present Value (NPV) cost, and that cost savings would be larger if the corporation could obtain a grant to cover the costs, or even part of the cost of constructing new CNG fueling stations. Then the study concludes that, from both economic and environmental perspectives, the CNG option would generate remarkable fuel costs savings and would reduce greenhouse gases and particulate emissions in comparison to the standard diesel option and. Then, a sensitivity analysis is conducted to the breakeven value of the annual growth rate of CNG fuel price that would make total costs of both options equal.

Literature Review

Throughout the economic literature, the interest in gasoline alternatives was mainly approached via addressing concerns about greenhouse gas emissions and the generated adverse impacts that would impede the applications of sustainability measures.

The degradation in the air quality that is attributed to the motor vehicles gas emission in Dhaka, the capital of Bangladesh, urged for some governmental initiatives that were addressed to alleviate the air pollution (Wadud & Khan, 2011). Wadud and Khan conducted a study that quantified the ex-post social benefits of a government policy which resulted in a widespread conversion of petroleum based vehicles to CNG vehicles. To determine the effects of the policy intervention, a model that links the change in gas emissions due to the implementation of the policy to the changes in the quality of ambient air and the number of avoided premature deaths was developed via multiple steps. In the first step they quantified the gas emission that was determined through a vehicle emissions inventory model for the

current policy case. The changes in the modeled emissions were then fed into an air quality model that was developed to determine the changes in the quality of the ambient air. In the final step, the resulted improvements in air quality were coupled with population distribution and functions of health impacts. The cost savings that are associated with these specific health impacts were used to evaluate the willingness to pay to avoid an adverse health cases and to determine the avoided costs due to the policy intervention. Wadud and Khan strongly recommended the policy intervention, the study concluded that the conversion policy resulted in around 6,000 avoided premature deaths in 2009, in an amount of saving of US$ 1.15 billion that makes around 1.3% of the country's GDP, and in around US$ 0.6 million benefits of pollution reduction.

In addition to the concerns of air pollution in Beijing city in China, Jha *et al.* addressed more concerns of the heavy dependence of China upon foreign oil imports from the Middle East to support its growing economy. The vulnerability China's economy to the volatile prices and the unstable political environment of the Middle East puts China in a politically compromising position ((Jha, Ngo, Patel, Trusova, & Kutcher, 2011). As China has large coal deposits, thus coal bed methane is also a highly available resource from which compressed natural gas vehicles can gain advantages and improve national, political, and environmental position. They stressed the double advantages of increasing the use of CNG vehicles that defuse fewer pollutants than gasoline based vehicles and lower the demand for foreign energy resource. They chose Beijing as a case study, wherein pollution levels are 23 times those of New York City, because it has an established infrastructure favoring CNG vehicles as it has four pipelines that carry natural gas to the city. Their paper examines the positive aspects related to the mass introduction of CNG vehicles in China through running a social and consumer cost-benefit analysis.

They constructed their analysis on a number of assumption related to the adopted discount rate, inflation rate, exchange rate, oil prices, and transportation costs to calculate the life cycle for mid-sized passenger "Volkswagen Jetta" car with few listed characteristics. They concluded that the implementation of CNG project will result a societal benefits as it decreases the pollution levels and generates great savings regarding the amount of vehicles used in Beijing.

As the Department of Public Works in the city of Milwaukee considered using alternative source of energy for its vehicles fleet, a detailed cost-benefit analysis was conducted to evaluate the net benefits of the replacement of a portion of the city's fleet of diesel-fueled garbage trucks with trucks fueled by compressed natural gas (Cheng, Grigg, Jones, & Smith, 2011). The analysts compare the marginal cost of replacing the retired garbage trucks with CNG-fueled trucks with the currently adopted practice of replacing them with diesel-fueled trucks. They constructed a model with fours specifications upon assumptions about renewed tax incentives and non-fiscal costs associated with gas emissions. They also conducted a sensitivity analysis to account for the inherent uncertainty in the predictions of few factors, such as fuel costs. The study resulted in positive net benefits for the purchase and use of 10 CNG-fueled garbage trucks over a 12-year truck life time.

Though the analysts recommended the purchase of the trucks, they emphasized that the relevance of the study estimates will be influenced by further parameters in the future, like the costs of vehicle purchase, fuel, and fuel economy. Thus, they strongly recommended a continuous monitoring for the vehicles' performance and other external circumstances to achieve an economically and environmentally sustainable fleet.

A similar study was conducted to evaluate the transition of the State's vehicular fleet to natural gas in West Virginia (Mason, 2013). This transition was spurred by the fact that for more than a century West Virginia has been a leader in the exploration and production of abundant natural gas resources in the United Sates. The study addressed the main obstacle to the introduction of the natural gas as a vehicular fuel, which is the supporting of natural gas-fueling infrastructure. To overcome this obstacle, the natural gas fuel stations should be located in heavily populated areas that contain the largest concentration of federal, state, and municipal fleet vehicles. The study also stressed the conversion of state fleet vehicles will overcome the problem of the inadequate demand for these stations in these areas, the thing that will result in an immense costs savings to the state.

Upon referring to the above analysis that shows how the conversion of petroleum based vehicles to the use of a more environmentally efficient fuel alternative was approached from different perspectives, the following analysis will attempt to compare the impact of CityBus decision to replace their current standard diesel fueled bus fleets with the alternative of CNG fueled buses.

To keep the number of buses in their fleet the same, each year some of the existing buses of the CityBus Corporations fleet need to be retired and replaced by the same number of new buses. This study will compare the costs of two alternatives. The first one is replacing the retired buses with the same type of standard diesel fueled buses which are currently used. This option is considered as the status quo in this study. The second option is to convert to a CNG fueled buses which are presumably more economically and environmentally viable, in terms of generating cost savings due to lower fuel costs, and causing less greenhouse gas emissions.

Data Source & Description

The data analyzed in this study are a secondary dataset taken from a study that was conducted by Yang *et al.* (Yang, Tyner, & Sarica, 2013) who used actual primary dataset provided by CityBus Corporation to evaluate the economics generated by the conversion of the municipal bus fleet to hybrid diesel-electric buses and CNG fueled vehicles. The nominal discount rate in this study is assumed to be 0.05.

In following is a detailed explanation of how the total costs, including environmental costs, of the two potentially considered options are estimated within the 15 years lifespan of the project.

Cost Estimates

Capital Cost

When considering the status quo's option, the capital cost will be the cost of purchasing new standard diesel fueled buses. Meanwhile, the capital cost of the second option will include both the cost of purchasing CNG fueled buses and the cost of building new CNG fueling stations. The price CityBus would pay for the purchase of a new standard diesel bus is $400,000, and for the purchase of CNG bus is $450,000 calculated in 2012 dollars. The actual CityBus vehicle replacement schedule was used to estimate the costs during the lifespan of the project. CityBus estimated that the total of 65 of the existing buses in the fleet of 75 buses need to be replaced and predicted the annual price increase rate of bus prices to be 5%. Table 1 shows the number of buses purchased each year during the project lifespan. The costs of buses purchased are estimated in Appendix 1 for the project's 15 years accordingly.

The other component of the capital cost is cost of building new CNG fueling stations that are required for the second option to be implemented. This cost is estimated by CityBus to be $2 million and would happen at the beginning of the first year. This cost needs to be amortized under a certain amortization rate to evaluate the annualized cost. The amortization of this cost was found to have no impact on the net present value cost calculation of the second option by Yang *et al.* because the discount rate and the amortization rate used in the study are the same at 5% (Yang, Tyner, & Sarica, 2013).

The calculations of the capital costs estimates for the both types of fleet buses during the project lifespan are shown in Appendix 1(Project's Total Costs Estimates).

Table 1. Number of Buses Purchased Each Year

	Year	Number of Buses Purchased
1	2013	7
2	2014	3
3	2015	3
4	2016	4
5	2017	4
6	2018	4
7	2019	4
8	2020	4
9	2021	4
10	2022	4
11	2023	4
12	2024	5
13	2025	5
14	2026	5
15	2027	5
Total		65

Fuel Cost

It is assumed in the study of Yang *et al.* that both of the two types of transit buses in the fleet, the diesel-fueled and the CNG fueled, traveled the same distance. CityBus fixed the annual total mileage of the

fleet at 1.8 million since the distance of the route from the fuel station is usually not so long, so each kind of bus can finish the route without coming back to the fuel station. Fuel cost of each type of the buses is calculated via multiplying the price of the fuel by the amount of fuel used for the type of bus. The initial diesel fuel price in 2012 was reported by CityBus as $3.11 per gallon and CNG price $1.5 per Diesel Gallon Equivalent (DGE). The annual cost of each fleet option is calculated as the summation of each kind of bus's fuel cost in that year. Accordingly, the annual fuel costs of the project's CNG vehicles are roughly estimated as $1,200,000, and $1,800,000 for the standard diesel vehicles. The increase in the annual fuel costs for the subsequent years are estimated according to the growth rates in the prices of the two types of fuel. The US Department of Energy (DOE) projections of crude oil price from 2010 to 2035 states that crude oil price and diesel price have the same price growth rate of 4.9%.

The CNG price is mainly comprised of two parts: natural gas wellhead price and transmission distribution cost. DOE projections show that the growth rate of transmission/distribution cost is highly correlated with the general inflation rate. Using information from the Henry Hub spot natural gas price projection from U.S. Energy Information Administration (EIA) Annual Energy Outlook 2012, the wellhead price of CNG is 0.52 per DGE and the transmission/distribution cost of CNG is 0.98 per DGE. So the average annual growth rate of CNG price is 3.9%, while the price growth rate of diesel is 4.9%.

Appendix 1 shows the calculations of the fuel costs estimates. It also shows the summation of the capital costs and fuel costs for each type of buses.

Environmental Cost

The environmental cost is estimated in this study to account for the environmental effect of using each of the two fleet options, whether standard diesel fueled buses or CNG fueled buses. This study follows the same approach that was followed in Yang *et al.* evaluation of the environmental costs of using different types of municipal fleets.

Since it makes up a high proportion of the United States greenhouse emissions, Carbon dioxide (CO_2) is considered by the Environmental Protection Agency (EPA) as one of the principle greenhouse gases. The reduction of (CO_2) emissions plays an important role in sustaining better environmental measures. Another important component of greenhouse emissions caused by transit buses is Particulate Matter with a diameter of 10 μm or less (PM10). Passenger and bus drivers are among the most vulnerable groups of people with immediate and long lasting exposure to these small particles. (Cheng, Grigg, Jones, & Smith, 2011). The two kinds of emissions accounted for in this study are the Carbon Dioxide Equivalent (CO_2e) and PM10. CO_2e is used to describe the environmental cost of the two types of fleet options.

In addition to CO_2 emissions, the other two types of greenhouse gases emissions considered in this study are the Methane gas emissions (CH_4) and the Nitrous Oxide gas emissions (N_2O). Both are typically calculated in the units of Carbon Dioxide Equivalent (CO_2e). The Gas's Global Warming Potential (GWP) factor developed by EPA is used in order to convert them to CO_2e (Emissionn Factors for Greenhouse Gas Inventories, 2011). According to U.S. EPA Annual Energy Outlook of 2011, if the GWP of CO_2 is set at 1, the GWP of CH_4 and N_2O are 21 and 310 respectively. Thus, CNG transit buses

release 1.966 g of CH_4 per mile and 0.175 g N_2O per mile. For the standard diesel bus, the emission factor is 0.0051 g per mile for CH_4 and 0.0048 g per mile for N_2O. With these emission factors, the amount of greenhouse gas and PM10 emissions for each fleet option could be estimated upon incorporating data of CityBus fleet emissions. Emission of CH_4 and N_2O are converted into CO_2e equivalent emissions when multiplied by the corresponding GWP of CH_4 and N_2O. Hence, the total CO_2e emissions for CH_4 over the 15-year project's lifespan are 61,432 tons, and 66,560 tons for N_2O. In the same study (Yang, Tyner, & Sarica, 2013), in order to calculate the environmental costs of the two options of fleet buses, *Yang et al*. used the shadow price of avoiding these two pollutants.

A carbon tax levied on CO_2 emissions could be applied as a shadow price for estimating the related CO_2 environmental costs. The carbon tax design suggest by Metcalf (Metcalf, 2009) at a range from $55 to $110 per ton of carbon is used, which is equivalent to $15 to $30 per ton of CO_2 when divided by GWP factor of 3.67.

The PM10 estimates developed by Wayne (Wayne, Sandoval, & Clark, 2009) are used in this study to proxy the PM10 emissions level. This particular study measures the average PM10 emissions for each type of the buses during the period between 2007 and 2009. These averages are reported as 0.013 g/mile for CNG buses and0.022 g/mile for standard diesel buses.

For PM10 emission, the 2007 report of the Federal Transit Administration in the U.S. Department of Transportation (FTO), The transit bus life cycle and cost and emissions estimation reported estimated that the shadow price of PM10 emission is $6,367 per ton in 2006 dollars. After adjustment by the historical inflation from 2006 to 2011, the social cost of PM10 is estimated as $7,384 in 2012 dollars (Clark, Feng, Wayne, & Lyons, 2007). The Net Present Value (NPV) of environmental cost of the two fleet options, when considered at the upper bound of Metcalf's range which is $30 per ton of CO_2e, are $1,552,102 for the CNG fueled bus option and $1,672,650 for the standard diesel fueled buses. Thus, the NPV of the environmental cost for CNG is $120,548 less than the standard diesel option.

Results

Appendix 1 reports the results of discounting the total costs of the two alternatives using 5% discount rate.

When comparing the present values the total costs of each option, where total costs refer to the summation of the capital cost and the fuel cost for each of the options upon excluding both of the environmental costs and the cost of building new CNG fueling stations, the CNG option total costs are $6,507,293 less than the standard diesel option.

When comparing the fuel costs of each option during the project's lifespan, the fuel cost differences between the CNG bus option and the standard diesel bus option will equal $14,699,820 by the end of the project's 15-year lifespan. Thus, the fuel cost savings of CNG bus should be accounted for as an advantage that tilts the balance to the CNG option as alternative to the fleet buses.

As for the environmental costs, the results show how much greenhouse gas and PM emissions are reduced when the fleet converts to the use of CNG buses alternative in the next 15 years. The CNG option would produce 6,300 tons of CO_2, 24.5 tons of CH_4 and 2.1 tons of N_2O less when compared

with the diesel option. The standard diesel option has a higher emission rates in terms of both CO_2e and PM emissions, and the emission amount is expected to increase after 2020.

Even upon adding both of the environmental costs and the cost of building new CNG fueling stations, the present value of the CNG option total costs, including capital, fuel, and environmental cost, is $19,327,661 less than the present value of the standard diesel option's total costs.

Sensitivity Analysis

The trajectory of prices of both the diesel fuel and the natural gas constitutes a key source of future uncertainties in this analysis. As mentioned above, the strong correlation between the price of crude oil and the price of diesel fuel indicates that the fluctuation of the crude oil is the key driver of diesel price. Meanwhile, the growth rate of CNG prices is influenced by multiple factors like the technological progress in the development of shale gas extracting techniques, the natural gas transportation and storage cost, as well as the speed of U.S. economic recovery. Thus, a sensitivity analysis is conducted on the breakeven value of the annual growth rate of CNG prices. The annual growth rate of the diesel fuel price is assumed to be constant at the same rate of 4.9%, and a sensitivity analysis is solved for the breakeven of annual growth rate of CNG price that can make the NPV of the total costs for both alternatives the same. The calculations that are shown in Appendix 2 (Sensitivity Analysis – Changing CNG Price Growth Rate) indicates that when CNG price has an average annual growth rate of 9.3%, the total costs of the two alternatives would be the same. Consequently, the CNG prices would have to go up by almost as double as the standard diesel fuel growth rate of 4.9% for the two alternatives to have the same NPV of total costs.

Conclusion

In its attempt to find an economically viable solution to overcome the problem of the rising costs of fuel, CityBus Corporation has the option to choose between two alternatives of bus types in order to replace the retired vehicles of its bus fleets. When comparing the two alternatives of buses, the CNG fueled buses and the standard diesel fueled buses (the status quo), the CNG alternative is recommended. From an economic perspective, the CNG alternative has a lower NPV of the total costs over the project's lifespan of 15 years than the standard diesel alternative. Even in the case of not receiving a grant to cover the costs of constructing a new CNG fueling station, and despite the higher cost of purchasing new CNG fueled buses than standard diesel fueled buses, the generated savings in fuel costs will compensate for the CNG alternative higher capital costs, whether the higher costs of purchasing new buses or the cost of building CNG fueling stations. Moreover, since the demand of CNG buses in total is steadily increasing, the total fuel cost of the CNG alternative will fall. Thus, beyond the 15 years of the project's lifetime, the fuel cost differences between the CNG alternative and diesel alternative will become larger. Thus, the fuel cost savings that would occur upon implementing the CNG bus alternative is considered the most important advantage for choosing it.

From an environmental perspective, the CNG buses would produce lower levels of greenhouse gases

and PM emissions, thus, reducing the environmental social costs of the project which are true costs to society though they are not paid by CityBus Corporation under the current policy, they are a true cost to society. Moreover, the potential environmental benefits of using CNG buses may allow for CityBus

Corporation to get either a state grant form Indiana State Government or a federal government grant to cover part of the cost of building the CNG fueling station.

Thus, converting to "Greener" municipal fleets is likely to allow for social, environmental, in addition to economic benefits to all the interested parties who have standing in similar projects. From national standing, the conversion will potentially lower air pollution levels, the thing that will be reflected in better health measures and a higher sustainability of environmental resources. Moreover, since natural gas resources are domestically abundant, similar conversion to CNG fuel fleet will allow for less economic vulnerability to oil price shock and the political instability of energy global markets.

References

(2013). *Annual Energy Outlook 2013 with projections to 2040.* Washington DC: US Energy Information Administration, US Department of Energy.

Cheng, E., Grigg, L., Jones, E., & Smith, A. (2011). Compressed Natural Gas Vehicles for the City of Milwaukee's Department of Public Works: A Cost-Benefit Analysis. *La Follette School of Public Affairs*.

Clark, N. N., Feng, Z., Wayne, W. S., & Lyons, D. W. (2007). *Transit Bus Life Cycle Cost and Year 2007 Emissions Estimation.* U.S. Department of Transportation, Federal Transit Administration.

(2011). *Emissionn Factors for Greenhouse Gas Inventories.* U.S. Environmental Protection Agency.

Jha, P., Ngo, K., Patel, P., Trusova, M., & Kutcher, R. (2011, March 17). Prospects and Analysis of Potential CNG Vehicle: Implementation in China. *EcoPol Escapting Energy Poverty - Portland State Unversity*.

Kosub, J. (2010). *Transitioning to a Greener Fleet: A Cost-Benefit Analysis of a Vehicle Fleet Program at the.* Austin,: Texas State University-San Marcos, Dept. of Political Science.

Mason, H. S. (2013). Natural Gas Vehicle Task Force Report. *West Virginia Department of Commerce - National Renewable Energy Laboratory*.

Metcalf, G. E. (2009). Designing a Carbon Tax to Reduce U.S. Greenhouse Gas Emissions. *Review of Environmental Economics & Policy*, 63-68.

(1999). *Natural Gas Issues and Trends:1998.* Energy Information Adminisgtration.

Wadud, Z., & Khan, T. (2011, April). CNG Conversion of Motor Vehicles in Dhaka: Valuation of the Co-benefits. *Transportation Research Board*.

Wayne, W. S., Sandoval, J. A., & Clark, N. N. (2009). Emission Benefits from Alternative Fuels and Advanced Technology in the United States Transit Bus Fleet. *Energy and Environment*.

Yang, L., Tyner, W. E., & Sarica, K. (2013). Evaluation of the Economics of Conversion to Compressed Natural Gas for a Municiple Bus Fleet. *Energy Science & Engineering*.

Pharmacological Properties and Cytotoxic Effects of *Matricaria Chamomilla* Plant Extracts *by MTT* Assay

Duran Kala

Ishik University, Erbil, Iraq, Email: duran.kala@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: The paper describes pharamacolgical properties of therapeutic plants Matricaria chamomilla,is referred to as chamomile or German chamomile. It is used in folk medicine and in modern medicine as therapeutic plant in the thearapy of upper respiratory infections and various disorders. Chamomile can live in large areas in nature. Every herbal plant has cytotoxic effects. In determination of any possible cytotoxic effects of Matricaria chamomilla, extracts on HeLa CEACAM cells, serial solutions (1/10, 1/50, 1/100, 1/1000,) of Matricaria chamomilla, extracts were incubated with HeLa CEACAM cells for 24 and 48 h. The cell viability was calculated by the tetrazolium salt 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Matricaria chamomilla, plant extracts showed toxic effect at 1/10 solution, however toxicity of the extracts definitely decreased at 1/50 solution for 24 and 48 hours. Results suggested that the cytotoxic effect of Matricaria chamomilla extracts were concentration dependent but not time-dependent in that less cells were viable at 1/10 solution compared to 1/1000 solution. According to results, the plant extract solution of 1/1000 was calculated as an effective dose for future researches.

Key Words: Chamomile, Matricaria Chamomilla, HeLa CEACAM, Cytotoxcity, MTT, Cancer

Introduction

Matricaria chamomilla, generally known as the chamomile or German chamomile, is a species of the Asteraceae family that consist of most species of flowering plants in scientific classification, and is one of the significant medicinal plant native to Europe and Western Asia (Renuka, 1992). The plants live in North Africa, Asia, North and South America, Australia, and New Zealand (Ivens GM., 1979). Turkey has more than 133 genera and 1100 species of this family (Davis PH, 1965-1985). Chamomile is growing in different geographic regions of Turkey. Chamomile is extendable up to 25 centimeters long, flowering in April-September, an annual herbaceous plant. The leaves are finely divided and sessile. The middle part of the flower is yellow, the edges are white. It has been reported that harvesting in the summer , after dried it should be stored dry and moisture free places (Maranki, 2008).

Chamomile has been used in medical therapies for thousands of years, known in ancient Egypt, Greece, and Rome (Issac O, 1989). This plant has been considered by Anglo-Saxons as 1 of 9 religious plant given to human population by the God (Crevin JK, 1990). The chamomile medicine is kept in the pharmacological stores of 26 countries (Ompal Singh, 2011; Pamukov D, 1986). Chamomile is

available to use as a common source of healing in the world. It is used as sedative, anxiolytic, antiseptic, antispasmodic, anti-inflammatory, mildly sudorific and treating for skin infections (Krishna Murti, 2012; Mericli AH., 1990; Salamon, 1992a).

The hydro alcoholic extract of Chamomile stops the early developmental stages of cellular and viral RNA synthesis in polioviruses (Vikas et al, 2010; Vilaginès P, 1985). German Chamomile extracts with ethanol stops the growth of polio and herpes viruses (Krishna Murti, 2012; Suganda, 1983). Some scientists reported that when cancer cells and normal cells exposure with same dose of Chamomile extracts that are formed by water and methanol triggers apoptosis in cancer cells but there is no change in normal cells (Srivastava JK, 2007; Vikas et al, 2010).

Matricaria chamomilla is a typical herbal plant used for its medical therapies. It was used in folk medicine and is still used in modern medicine nowadays. It can be used to treat upper respiratory tract disorders and some other diseases in daily life of human population. Therefore *Matricaria chamomilla* is a significant curing plant (Jackson, 2001) .

Ecological Aspects

The following ecological aspects reported about Chamomile. They are harmless wild flowers so their seeds are distributed by different factors. They can be grown in large areas in nature (Royer, 1999). They can form dense colonies and some species can occupy more than 50% of the vascular plant species in an ecosystem (Royer, 1999). They like to live sunny places, slightly clayed and calcareous soils (T.C. M.E.B, 2008). German chamomile grows on all type of soil, on the other hand, growing the plant on rich, heavy, and damp soils should be avoided. Chamomile likes to live temperature ranging from 2°C to 20°C. (Ompal Singh, 2011)

Chemical Methods that are Used in Preparation of Chamomile Extracts.

Ethanol, dimethyl sulfoxide (DMSO), methanol, dichloromethane, petroleum ether, ethyl alcohol, hydroalcohol, water, gas etc. substances are solvents used during the preparation of chamomile extract. Air-dried and freezing methods are used in the preparation of Chamomile extracts. A. Raala et al. reported analysis of 5 different species of Asteraceae flowers oil by gas chromatography chemical analysis (SPB-5 and SW-10) and mass spectrometry methods in Estonia. Analyzed results are presented in the following tables (Ain Raala*, 2011).

Table 2.1 Chemical analysis of Chamomile oil (Ain et al, 2011).
Analysis methods 1- SPB-5, 2-SW-10, 3- Mass spectrometry

Chemical compound	**SPB-5**	**SW-10**	***Matricaria chamomilla***	**Identification Methods**
α-Pinene	927	1125	Tr	1,2,3
β-Pinene	969	1116	0.2	1,2,3

6-Methyl-5-hepten-2-one	984	1344	0.1	1,2,3
Myrcene	988	1168	0.1	1,2,3
n-Octanal	1002	1278	0.2	1,2,3
α-Terpinene	1012	1181	Tr	1,2,3
p-Cymene	1018	1272	0.2	1,2,3
Limonene	1023	1202	Tr	1,2,3
1,8-Cineol	1026	1208	0.2	1,2,3
(E)-β-Ocimene	1044	1254	0.2	1,2,3
γ-Terpinene	1054	1246	0.2	1,2,3
Artemisia ketone	1058	1353	0.8	1,2,3
2-Methylbutyl 2-methylbutyrate	1100	1300	0.2	1,2,3
n-Nonanal	1103	1400	0.2	1,2,3
Terpinen-4-ol	1172	1606	0.1	1,2,3
α-Terpineol	1187	1704	0.1	1,2,3
cis-3-Hexenyl isovalerate	1234	1454	Tr	1,2,3
α-Copaene	1367	1485	Tr	1,2,3
Decanoic acid	1398	2292	0.2	1,2,3
(E)-β-Caryophyllene	1408	1588	0.1	1,2,3
(E)-β-Farnesene	1455	1668	2.3	1,2,3
Alloaromadendrene	1464	1632	0.1	1,2,3
Germacrene D	1470	1696	0.2	1,2,3
α-Muurolene	1485	1725	0.2	1,2,3
Bicyclogermacrene	1490	1720	Tr	1,2,3
n-Undecanoic acid	1492	2350	0.2	1,2
Isofaurinone	1503	1900	0.2	1,2

δ-Cadinene	1510	1750	0.1	1,2,3
γ-Cadinene	1523	1752	0.1	1,2,3
NI (4), hotrienol structure, acetate?	1554	2035	Tr	1,2,3
(*E*)-Nerolidol	1563	2032	0.3	1,2,3
Dendrolasin	1563	2044	Tr	1,2,3
Spatulenol	1568	2120	**2.4**	1,2,3
Caryophyllene oxide	1572	1965	0.1	1,2,3
Dihydronerolidol	1580	2108	0.2	1,3
Viridiflorol	1595	2044	0.1	1,2,3
NI (8)	1600	2051	0.1	1,2,3
Geranyl isovalerate	1608	1924	0.3	1,2,3
Cubenol	1619	2100	0.1	1,2,3
γ-Eudesmol	1627	2157	0.3	1,2,3
γ-Cadinol	1635	2182	0.2	1,2,3
Bisabolol oxide B	1644	2125	**9.9**	1,2,3
α-Eudesmol	1646	2218	0.1	1,2,3
Alloaromadendrene epoxide	1657	2226	Tr	1,2,3
Bisabolone oxide A	1675	2163	**13.9**	1,2,3
α-Bisabolol	1688	2215	**5.6**	1,2,3
Geranyl tiglate	1700	2184	0.5	1,2,3
Chamazulene	1713	2370	**4.7**	1,2
Bisabolol oxide A	1748	2421	**39.4**	1,2,3
Myristic acid	1773	2713	0.1	1,2,3
n-Octadecane	1800	1800	0.2	1,2
Hexahydrofarnesyl acetone	1842	2160	0.1	1,2,3

Table 2.1- Continue **-** Chemical analysis of Chamomile oil (Ain Raala*, 2011).

Chemical compound	**SPB-5**	**SW-10**	***Matricaria chamomilla***	**Identification Methods**
(*E*)-En-yne-dicycloether, MW200	1882		0.4	1,2,3
n-Nonadecane	1900	1900	0.5	1,2,3
(*Z*)-En-yne-dicycloether, MW214	1933	-	0.4	1,3
Palmitic acid	1975	2920	Tr	1,2,3
n-Eicosane	2000	2000	0.1	1,2,3
γ-Palmitolactone	2100	-	0.1	1,3
cis-Linoleic acid	2120	-	0.1	1,2,3
n-Tricosane	2300	2300	0.1	1,2,3
n-Tridecanal	1500	1795	Tr	1,2,3
Compound groups				
Monoterpenes			0.9	
Oxygenated monoterpenes			1.5	
Sesquiterpenes			3.1	
Oxygenated sesquiterpenes			73.4	
Polyacetylenes			12.3	
Aliphatic acid and esters			0.7	
Other compounds			6.6	
Not identified			0.1	
Total			98.6	
Oil volume, %			0.15	

NI:Non Isomer, tr: traces (< 0.05%),

According to result of chemical analysis of 5 different species of Asteraceae flowers oil 115 compounds analyzed in the studied samples, which assumed for 49.1–98.5% of the total amount of oil (Ain Raala*, 2011). The results of chemical analysis showed that most abundant compounds in chamomile oil are bisabolol oxide A, bisabolone oxideA, (*Z*)-en-yne-dicycloether, bisabololoxide B, α-bisabolol, and chamazulene (Ain et al, 2011). According to results of five different species flower oil of Asteraca family 14 common chemical compounds identified (Ain et al, 2011).

4. Pharmacological Properties of Chamomile

The chamomile has many chemical compounds that contain pharmacological effects. The main active components of chamomile oil are Chamazulene, Apigenin and Bisabolol (Gardiner, 1999). Chamazulene has stopped leukotriene synthesis in neutrophil, have got antioxidant activity (Gardiner, 1999; Safayhi, 1994). 50% Bisabolol German chamomile consist of essential oil and clears spasm in smooth muscle in intestine (Achterrath-Tuckermann, 1980; Forster, 1980) also it has got antibacterial, anti-inflammatory, pain relief, ulcer-protective and antifungal effects. (Achterrath-Tuckermann, 1980; Berry, 1995; Gardiner, 1999). Flavonoids, apigenin and luteolin are responsible for anti-inflammatory effect, eliminating gas and spasm (Salamon, 1992). The presence of apigenin bounds to GABA receptors, which causes calming effect in humans (Gardiner, 1999; Salamon, 1992a; Viola, 1995).

4.1. Anti inflammatory Effects of Chamomiles

Matricaria chamomilla is an aromatic and medicinal plant with antioxidant,anticancer, antigen toxic, anti-inflammatory, antimicrobial and neuroprotective activities (Lim, 2014). Bisabolol compound has been found to reduce inflammation, fever and joint disorders (Isaac, 1979; Krishna, 2012). Studies were conducted in animals showed that apigenin has got anti-inflammatory effect(Isaac, 1979; Krishna, 2012).

4.2. Antimicrobial and Antiviral Effects of Chamomiles

Chamomile has some chemical compounds that have antimicrobial and anviral effects. Chamomile oil helps in healing of ear infections (acute otitis) due to effect on 3 subspecies of *Staphylococcus aureus* and Candidas (Nogueira, 2008; Vikas, 2010).

Chamomile oil has been found to be a candidate that can be used in therapy as agents in herpes genitalis disorders (Koch C, 2008). Hydro alcoholic extract of chamomile oil has stopped the early developmental stages of cellular and viral RNA synthesis of poliovirus (Vikas, 2010; Vilaginès, 1985). Extracts which is consist of German chamomile and ethanol, was stopped the growth of herpes virus and polio virus (Krishna, 2012; Suganda, 1983).

One of the components of Chamomile oil is a alpha-bisabolol, which was identified that has strong effect against component of gram positive and gram negative bacteria (Kedzia, 1991; Krishna, 2012). Chamazulene has potent antimicrobial activity (Kedzia, 1991; Krishna, 2012). Spiroeter has weak

activity against gram-positive, while strong activity against gram negative (Kedzia, 1991; Krishna, 2012). Mexican daisy(*Tridax procumbens*) has got potential presence of antimicrobial activity opposite to *Staphylococcus aureus* and *Escherichia coli* bacteria (G. Thilagavathi, 2007). Chamomile and tea tree oil is used in the elimination of various stains (Sadr, 2006; Vikas, 2010). Antiviral effects of chamomile extract was patented in Russia by patent number 2311194 (Buryakova, 2007).

5. Cytotoxic Activity of Chamomile Extracts

Cytotoxicity assays (cell viability) are mostly used by the pharmaceutical industry to monitor for cytotoxicity in compounds of medical plants. Microculture tetrazolium salt 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) cytotoxic assay was utilised to determine the cancer (HeLa CEACAM) cell viability after addition of extracts or compounds. This assay is depend on the ability of the dehydrogenase enzymes in surviving cells to change soluble yellow MTT (into insoluble purple formazan) (Mosmann, 1983). The assay was carried out in the Laboratory of Medical Biology and Genetics, Department of Medical Biology and Genetics, Faculty of Medicine, Gaziantep University.

6. Material and Methods

6.1. Preparation of Plant Extracts:

100 gram Air-dried chamomile flowers were measured into 250ml Erlenmeyer beaker and 200 ml of ethyl alcohol were added to the samples and the suspension was stirred slightly. After addition of ethyl alcohol Chamomile extract were stayed one day in a dark room at room temperature. Filtering of the extracts were done by Whatman filter paper and ethanol was removed by rotary vacuum evaporator at 80 ºC . After filtration through filter paper, the debris was re-extracted twice, and then the combined extracts of every sample were evaporated in evaporator. After complete removal of ethyl alcohol chamomile extracts was made ready for use by dissolving in sterile distilled water.

6.1.1. Cultivation of HeLa CEACAM Cells

Cells, virus and time-course analysis of MHV infection HeLa-CEACAM (Ulasli, et al., 2014; Verheije et al, 2008) that were used to propagate and titrate MHV-A59 (mouse hepatitis virus–A59) were maintained in Dulbecco's Modified Eagle Medium (DMEM; Sigma,St. Louis, MO) containing 10 % fetal calf serum (Thermo,Waltham, MA), 100 IU of penicillin/ml and 100 lg/ml of streptomycin (both from Life Technologies, Rochester,NY). HeLa-CEACAM cells were inoculated with MHVA59 at a minute of 30 (Ulasli, et al., 2014; Ulasli M, 2010; Verheije et al, 2006). After 30 min, the infected cells were washed and maintained in complete medium. Subsequently, the infected cells and culture supernatants were collected for analysis at 0, 6, 8 hours post infection. When plant extracts were poured to the HeLa-CEACAM cells, they were poured after viral infection and were washed away 1 hour later. Cells are counted on Thoma slide and they (1×10^4 cells per each well) were implanted into 24-well micro culture plates and allowed to observe for 24 hours. Then fresh growth medium was poured onto the cells. Then we waited for getting confluence of 70% of the cultivated cells in each micro culture plate.

6.1.2. Adding of Chamomile Extracts onto the Cells.

Different concentrations ratio such as 1/10, 1/50, 1/100, 1/1000 were calculated for *Matricaria chamomilla* extracts . After getting confluence of 70% of the cultivated cells in each micro culture plate. Then, each HeLa CEACAM cell line was exposed to extracts at 10, 50, 100,1000 µg/ml Chamomile extract concentrations for 24 hours and 48 hours. Viability was measured by MTT assay.

6.2. Cell Viability Test by MTT Assay

The cytotoxic effects of *Matricaria chamomilla* extracts on HeLa CEACAM cells was measured by MTT (3- (4,5-dimethylthiazol-2-yl) -difeniltetrazoliumbromid) assay. Medium of micro culture cell was removed after 24 and 48 hours and 500 µl (ml/mg) MTT agent was added in each plate. Micro culture cells was checked under microscope and was incubated 1hour at 37° C in incubator that containing 5% CO_2 under dark condition. Then 500 µl Dimethyl Sulfoxide (DMSO) was added in each well and was evaluated by the spectrophotometer (Biotek, USA) at 570 nm. MTT operation was repeated twice.

7. Results

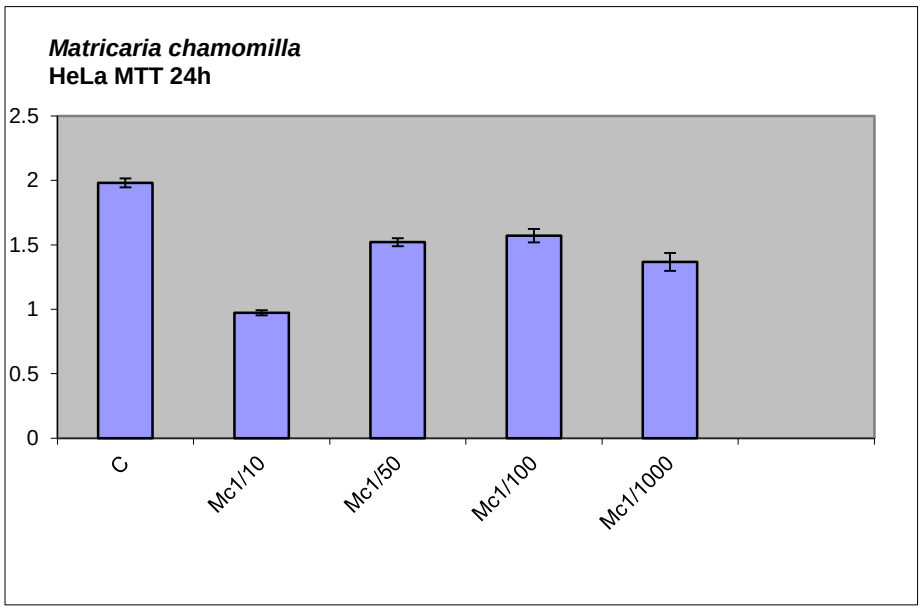


Figure 1. Effects of Chamomile extracts on the survival of HeLa CEACAM cells. HeLa CEACAM cells were incubated with the diluted extracts for 24 hours and cell toxicity was tested by MTT assay. C is control.

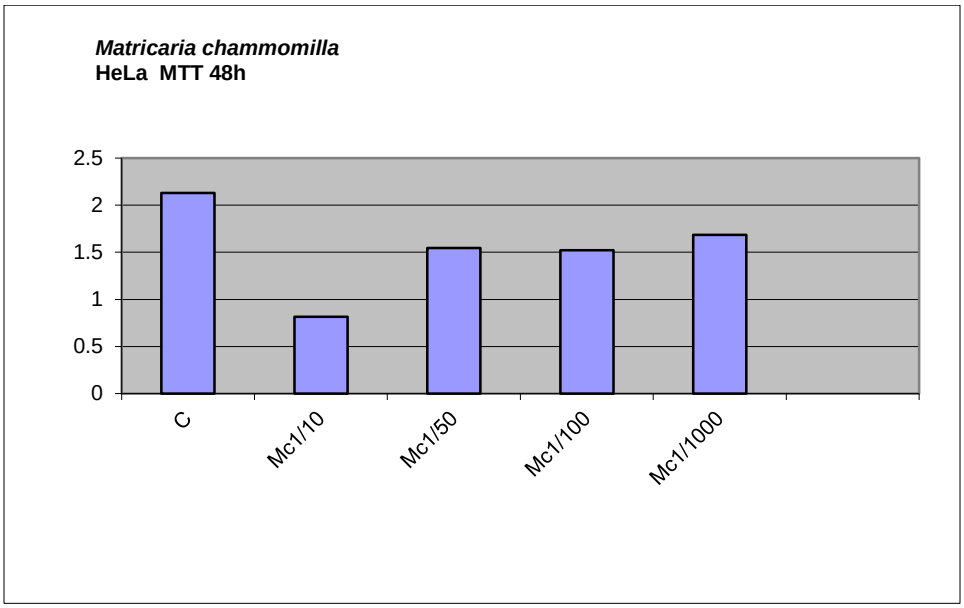


Figure 2. Effects of *Matricaria chamomilla* extracts on the survival of HeLa CEACAM cells. HeLa CEACAM cells were incubated with the diluted extracts for 48 hours and cell toxicity was measured by MTT assay. C is control.

In order to determine any possible toxic effects of *Matricaria chamomilla* extracts on HeLa CEACAM cells, serial solutions (1/10, 1/50, 1/100, 1/1000,) of *Matricaria chamomilla*, extracts were incubated with HeLa CEACAM cells for 24 and 48 hours. The cell viability was measured by the MTT assay. *Matricaria chamomilla* extracts showed toxic effect at 1/10 solution, however toxicity of the extracts definitely reduced at 1/50 solution for 24 and 48 hours (**Figures. 1, 2**). These results suggest that the cytotoxic effect of *Matricaria chamomilla* extracts were concentration dependent but not time-dependent in that less cells were viable at 1/10 solution compared to 1/1000 solution. According to results, the plant extract solution of 1/1000 was calculated as an effective dose.

8. Conclusion

There are many publications about pharmacological properties of *Matricaria chamomilla*. In this article I tried to demonstrate pharmacological properties and cytotoxic effect of *Matricaria chammomilla* extracts with ethyl alcohol. Nowadays, one of the most popular topic of researches is study with cancer cells. Many plant extracts used in folk medicine and in modern medicine. Studying cytotoxic effect of plants extracts is one of the basic step of cancer researches. The main aim of this kind of researches is to find medical treatment against cancer cells development. In this study just I tried to find active dose of *Matricaria chamomilla* extract for future researches.

Acknowledgements

The author thanks Assistant Prof. Mustafa Ulasli for assistance and University of Gaziantep for giving facilities to do experimental part of this article.

References

Achterrath-Tuckermann U, K. R., Flaskamp E, Isaac O, Thiemer K. (1980). Pharmacological investigations with compounds of chamomile. V. Investigations on the spasmolytic effect of compounds of chamomile and Kamillosan on the isolated guinea pig ileum. *Planta Medica, 39*, 38-50.

Ain Raala*, H. K., Anne Oravb, Elmar Araka, Tiiu Kailasb, and Mati Müüriseppb. (2011). Content and composition of essential oils in some Asteraceae species. *Proceedings of the Estonian Academy of Sciences, 60*(1), 55-63. doi: doi: 10.3176/proc.2011.1.06

Berry, M. (1995). Herbal products. Part 6. Chamomiles. . *Pharmaceutical Journal, 254*, 191-193.

Buryakova, I. V., Kurilova, A. I., Badytchik, L. I., andZamarenov, N. A. (2007).

Crevin JK, P. J. (1990). *Herbal medicine past and present.* USA: Duke University Press.

Davis PH. (1965-1985). *Flora of Turkey and East Aegean Islands.* Edinburgh: Edinburgh University Press.

Forster HB, N. H., Lutz S. . (1980). Antispasmodic effects of some medicinal plants. *Planta Medica, 40*, 390-319.

Gardiner, G. (1999). Chamomile (Matricaria recutita, Anthemis nobilis). from The Longwood Herbal Task Force,The Center for Holistic Pediatric Education and Research

Isaac, O. (1979). Pharmacological investigations with compounds of camomile, I. On the pharmacology of - (-)alpha-bisabolol and bisabolol oxides. *Planta Med., 35*, 118-124.

Issac O. (1989). *Recent progress in chamomile research- medicines of plant origin in modern therapy.* Czecho-Slovakia: Prague press.

Ivens GM. (1979). Stinking mayweed. *N Z J Agric, 21*(3), 138.

Jackson, T. (July, 2001). Medical Attributes of Matricaria chamomilla - Chamomile

Kedzia, B. (1991). Antimicroorganism`s activity of Oil Cammomillae and its components. *Herba Polonica, 37*, 29-38.

Koch C, R. J., Schneele J, Schnitzler P. . (2008). Inhibitory effect of essential oils against herpes simplex virus type 2. *Phytomedicine, 15 (1-2)*, 71-78.

Krishna Murti, M. A. P., Vipul Gajera and Jinal Solanki,. (2012). Pharmacological properties of Matricaria recutita: A Review. *Pharmacologia, 3(8)*, 348-351.

Lim, T. (2014). Matricaria chamomilla. Edible Medicinal And Non-Medicinal Plants. . *Springer.*

Ahmet Maranki. (2008). *Kozmik bilgiler ışığında Şifalı Bitkiler*: Mozaik yayınları.

Mericli AH. (1990). The lipophilic compounds of a Turkish Matricaria chamomilla variety with no chamazuline in the volatile oil. . *Int J Crude Drug Res. , 28*(145), 7.

Mosmann T. (1983). Rapid colorimatric assay for cellular growth andsurvival: Application to proliferation and cytotoxicity assays. *J.Immunol. Methods, , 65*, 55-63.

Nogueira JC, D. M. F., Lima EO. . (2008). In vitro antimicrobial activity of plants in Acute Otitis Externa. *Braz J Otorhinolaryngol, 74(1)*, 118-124.

Ompal Singh, Z. K., 1 Neelam Misra, and Manoj Kumar Srivastava. (2011). Chamomile (Matricaria chamomilla L.): An overview. *Pharmacogn Rev. , 5(9)*, 82–95.

Pamukov D, A. C. (1986). *Natural pharmacy (in Slova).* (1st ed ed.). Bratislava: Priroda.

Renuka, C. (Ed.). (1992). *Rattans of the Western Ghats: A Taxonomic Manual.* .

Royer, F. a. R. D. (1999). Weeds of the Northern US and Canada. (Germplasm Resources Information Network - (GRIN) 2004). Retrieved USDA, ARS, National Genetic Resources Program., from University of Alberta Press

Sadr Lahijani MS, R. K. H., Heady R, Yazdani D. . (2006). The effect of German chamomile (Marticaria recutita L.) extract and tea tree (Melaleuca alternifolia L.) oil used as irrigants on removal of smear layer.a scanning electron microscopy study. *int Endod J, 39(3)*, 190-195.

Safayhi H, S. J., Sailer ER, . (1994). Ammon HPT. Chamazulene: An antioxidant-type inhibitor of leukotriene B-4 formation. *Planta Medica, 60*(410-413).

Salamon, I. (1992a). Chamomila: A medicinal plant. Herb. *Spice Med. Plant digest,, 10*, 1-4.

Salamon I. (1992). Chamomile, A Medicinal Plant. The Herb, Spice, and Medicinal. *Plant Digest, 10*, 1-4.

Srivastava JK, G. S. (2007). Antiproliferative and apoptotic effects of chamomile extract in various human cancer cells. . *J Agric Food Chem., 55(23)*, 9470-9478.

Suganda, A. G., M. Amaros, L. Girre, and B. Faucconnier. (1983). Inhibitory effects of some crude and semi-purified extracts of France on multiplication of human herpes virus I and Poliovirus 2 in the cell culture. *J. Nat. Prod., 46*, 626-632.

T.C. M.E.B. (2008). *Bahçecilik Compositae familyası*. Ankara.

Thilagavathi, S. K. B. (2007). <microencapsulation of herbal extracts for.pdf>. *Indian journal of Fibre and Textile research, 32*, 351-354.

Ulasli M, V. M., de Haan CA, Reggiori F (2010). Qualitative and quantitative ultrastructural analysis of the membrane rearrangements induced by coronavirus. *Cell Microbiol, 12*, 844–861.

Ulasli, M. S. A. G. R. B. O. Y., Cakmak, S. O. M. I. Y. Z. I. E. A., & Ahmet Arslan. (2014). The effects of Nigella sativa (Ns), Anthemis hyalina (Ah) and Citrus sinensis (Cs) extracts on the replication of coronavirus and the expression of TRP genes family. *Mol Biol Rep, 41:1703–1711*. doi: DOI 10.1007/s11033-014-3019-7

Verheije MH, R. M., Mari M, Te Lintelo EG, Reggiori F,, & van Kuppeveld FJ, R. P., de Haan CA, . (2008). Mouse hepatitis coronavirus RNA replication depends on GBF1-mediated ARF1 activation. *PLoS Pathog 4:e1000088*.

Verheije MH, W. T., van Beusechem VW, de Haan CA,, & Gerritsen WR, R. P. (2006). Redirecting coronavirus to a nonnative receptor through a virus-encoded targeting adapter. *J Virol, 80*, 1250–1260.

Vikas, G. P. M., Parveen Bansal1, Sukhbir L Khokra3, Dhirender Kaushik3. (2010). Pharmacological Potential of Matricaria recutita-A Review. *International Journal of Pharmaceutical Sciences and Drug Research, 2(1)*, 12-16.

Vilaginès P, D. P., Vilagines R. . (1985). Inhibition of poliovirus replication by an extract of Matricaria chamomilla (L). *C R Acad Sci III., 301(6)*, 289-294.

Viola H, W. C., Levi De Stein M, et al. . (1995). Apigenin, a component of Matricaria recutita flowers, is a central benzodiazepine receptors-ligand with anxiolytic effects. *Planta Medica, 61*, 213-216.

Development of Performance Management Concept in Higher Education Context

Karwan Hushyar Sherwani

Ishik University, Erbil, Iraq, Email: karwan.sherwani@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: This paper aims to analyze the development and application of performance management in higher education institutions context and identifying the recent trends of Performance Management and their applicability for Higher Education Institutions by reviewing the literature. The literature shows a confusion of using the terms of Performance Management and Performance Appraisal interchangeably. The literature confirms the applicability of Performance Management in Higher Education sector, but it needs to be redefined and adapted to the vision and needs of the universities. The recent trends of Performance Management are 360° appraisal and Balanced Scorecard the literature confirms and recommends their applicability in Higher Education Institutions. Performance Management enables the universities to improve the overall performance to achieve its goals and the outcomes need to be employee satisfaction, motivation and commitment and to help the university understand job performance through measures, and individuals rewarded and recognized through an accurate and constructive feedback.

Key Words: Performance Management, Performance Measurement, Performance Appraisal, Higher Education Institution, 360° appraisal, Balanced Scorecard

Theoretical Background

This study aims to provide a description of the development of Performance Management in the universities and the applicability of Performance Management in Higher Education sector and the recent trends of Performance Management by reviewing the literature.

Introduction

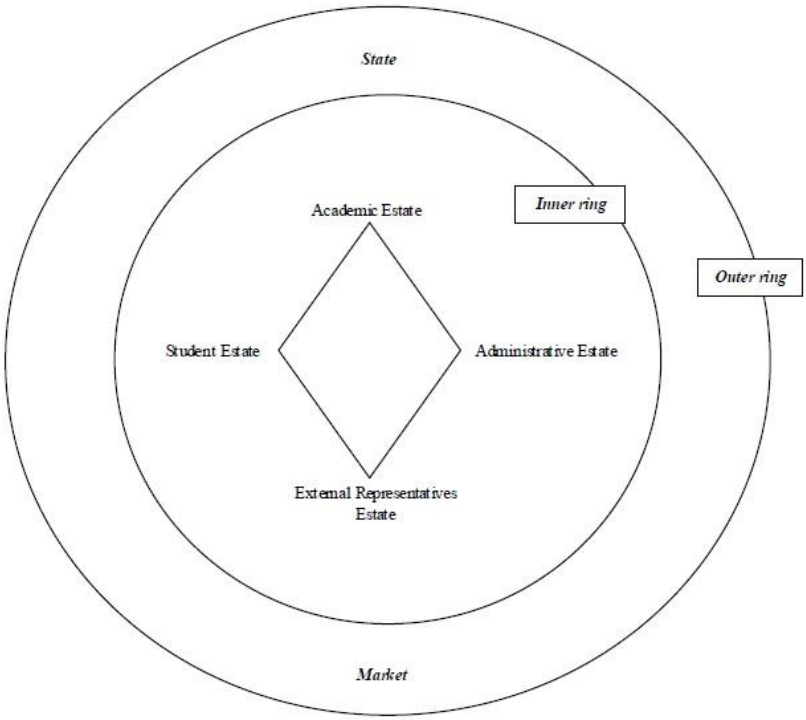
In the past, universities enjoyed their autonomy, but have been recently confronted with pressures such as accountability, instable environment and global competition and are affected by current trends like marketization and changing roles of governments (Deshmukh, et al., 2010; Decramer, et al., 2008; Decramer, et al., 2007; Johnes & Taylor, 1990).

Universities are playing a vital role in developing human capital in the economic and development growth of countries (Jalaliyoon & Taherdoost, 2012). Therefore, higher education plays a fundamental role in the future of nations and their position in the world economy.

However, in a simple context of input-process-output model of universities, the input of universities are students and lecturers, the process is teaching and conducting research, the output is graduated students and published articles. One of the New Public Management's characteristics is performance measurement and accountability (Tolofari, 2005). Nevertheless, the process can be improved and gain more efficiency through the best use of Performance Management (PM) practices and policies as recommended in Hoare 1995's report. The report suggests for a phase in a comprehensive approach to PM for both academic and general staff (Morris, 2011). De Waal suggests developing countries to use western management technique of PM to improve and manage performance (de Waal, 2007).

The topic gathers two distinct literature areas of research, PM as one of the HRM's function and higher education institutions or tertiary education. Higher education institutions are multi-product organizations, which produce two different outputs, research and teaching by using multiple inputs (Warning, 2004). HEI's setting is characterized by goal diversity, uncertainty, and diffused decision-making but it is not mainly guided by the principles of profit maximization and cost minimization (Lindsay, 1981).

Governance of universities or higher education institutions consists of two rings structures. The first is an outer ring includes the state and market; the second is an inner ring includes academic estate, administrative estate, external representative estate and student estate as illustrated in Figure 1 Governance Structures of Higher Education.



"Governance Structures of Higher Education" Adapted from (Morris, et al., 2007)

Clearly, it can be noticed that the government underpins HEIs and already recognizes the significance of their outcomes and its impact on region's growth and development. However, HEIs need to introduce various PM practices in their organizations for motivation in order to cope with development and demands to make their PM more result-oriented for the overall improvement of organizational performance (Decramer, et al., 2008).

Performance Management in Higher Education Institutions

Performance Management is a" process for establishing shared understanding about what is to be achieved and how it is to be achieved, and an approach to managing and developing people that improves individual, team and organizational performance" (Armstrong, 2009). PM is one of the key practices of Human Resource Management (CIPD, 2009), and it is the 'Achille's Heel' of human resource management and the most difficult system to be implemented (Pulakos, 2009) due to its complexity in reality (Den Hartog, et al., 2004, CIPD 2013, Abdulkareem & Oyeniran 2011). Universities need to manage performance effectively to develop and become more accountable to respond to the environmental changes and to gain a competitive advantage through an effective use of PM. Moreover, in higher education institutions, control is limited and is not easy due to specialization, tenure, faculty decisions and staff rigidities (Lindsay, 1981).

PM predicted as an important issue in many organizations, and defined as one of the human resources practices bundle (Leopold & Harris, 2009). PM practices are most effective when they are aligned with the organization's HR competitive strategy (Stewart & Brown, 2009). Huselid (1995) has studied the impact of human resource management and found that it has an economic and statistical impact on employee performance and different practices of human resource management can affect performance differently.

In fact, there is a clear link between HRM and PM, the approach of PM that involves aligning human resource management practices in such a way that they maximize current and future employee performance (Den Hartog, et al., 2004). PM played a central role in modernizing and reforming organizations in other countries (Decramer, et al., 2007) and organizations that implemented PM system and are using it, performed both financially and non-financially better than organizations less PM driven (Ana-Maria, et al., 2009). Hence, it might be necessary for higher education institutions to have a HR department to functionalize the other practices of higher education institutions and support the holistic process of PM that brings together the elements to improve organizational performance.

However, in order to be effective, PM should firstly, ensure that people have the knowledge and ability to perform it, secondly, it should be strategic to include broader issues and longer-term goals and thirdly integrated, to link various aspects of the business, people management, individuals and teams (CIPD, 2009; CIPD, 2013). It can be noticed from the literature that PM is a systematic process that develops the skills of the organization and it leads to the best use of human resources when applied to the whole levels of workforce.

PM has three different models, including PM as a system to manage organizational performance, PM as a system for managing employee performance and PM for integrating the management of organizational and employee performance (Den Hartog, et al., 2004).

In CIPD surveys indicated that PM is a sophisticated and powerful tool that can't be separated from other management systems and helps the line managers to exercise people management responsibilities effectively and gets the best out of the people (CIPD, 2005). The outcomes of an effective PM are employee satisfaction, employee motivation and commitment which ultimately lead to higher performance (Decramer, et al., 2012).

It is critical to create a PM system in HEIs, it helps to understand job performance through performance measures, individual employees rewarded and recognized, having development opportunities through accurate performance evaluation and in providing constructive feedback, but PM needs to be redefined to function effectively in HEIs (Deshmukh, et al., 2010).

Some studies suggest a cynical perception of PM practice in higher education institutions. For example, (Morris, et al., 2011) in their survey findings concluded that performance should be appraised and the focus should be on development and motivation of academics, findings also indicate failure of the current PM to motivate or develop higher education institution academics to their satisfaction. Moreover, there is a disconnect between the rhetoric of PM and the reality being experienced in universities and in the research they require for specific key findings for PM in higher education institutions (Morris et al., 2011) and these results are consistent with (Stavertis, 2007 as cited in Morris, et al., 2011).

However, the concept of PM is applicable in the segment of higher education as it is in profit-oriented enterprises (Serdar, 2010). Alternatively, a different concept states that the typical business approach to PM would not work in higher education institutions, therefore, the existing PM models and approaches need to be adapted to the needs and visions of higher education institutions for a gradual system that allows institutional transformation and systematic adjustment (Abdulkareem & Oyeniran, 2011).

Performance Measurement

Performance evaluation is a critical component of strategic human resources management in public and nonprofit organizations (Pynes, 2009). Performance measurement defined as a set, process or parameter which are used for quantifying the efficiency and effectiveness of past actions (Neely, et al., 2002). In addition, it is clear that universities need to understand the past actions in order to base the future decisions on, Hubert states that "Without a general understanding of past events, there will be no permanent change and improvement" (Hubert, 1984 as cited in Azmaa, 2010).

Measuring efficiency and effectiveness in organizations is a difficult task in all organizations, but in HEIs, it is hardly likely to be any easier (Johnes & Taylor, 1987). Universities should emphasize on academic performance measures rather than financial performance (Pingle & Natashaa, 2011).

Among the measurement systems, Balanced Scorecard BSC is increasingly applied in higher education and recommended for universities to use it in order to evaluate their work in different perspectives

(Wang, 2010; Jalaliyoon & Taherdoost, 2012). It is a promising and valuable tool for implementing PM system (Pingle & Natashaa, 2011). Balanced scorecard is to help to show the importance and need to balance four different organizational elements financial, customer, learning and growth and internal process (Smither & London, 2009; Pingle & Natashaa, 2011).

Figure 2 illustrates the performance measurement framework for universities.

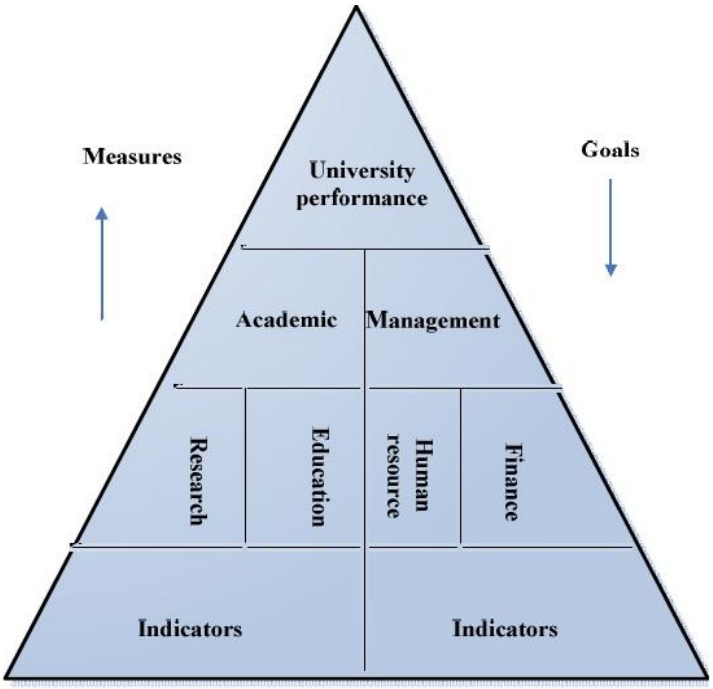


Figure 2 Performance measurement framework of Higher education Institutions. Source adapted from (Wang, 2010).

In order to measure performance, universities need to develop indicators of performance to measure the outcomes that best reflect the uniqueness of the HEI. Therefore, performance of individuals can be measured by reference to key performance indicators KPIs and metrics. Key performance indicators are results or outcomes that are identified as being crucial to the achievement of high performance and forming the basis for the performance monitoring and measurement system (Armstrong, 2009).

Performance indicators, if used intelligently and flexibly, it can give useful insight into university performance and it is important that performance indicators be accompanied by a clear statement of goals (Ball & Halwachi, 1987).

There are four basic performance indicators identified by (Johnes & Taylor, 1990) for higher education institutions are 1- The non-completion rate of each university's student entrance. 2- The success of alumni has obtained a job. 3- The degree results of each university's graduates. 4- Research output rates.

Moreover, three major categories of performance indicators in higher education institutions identified by (Higgins, 1989):

1- Internal: e.g. first grade graduation rates, attraction of research funds.
2- External: e.g. number of graduates in employed, staff publications and patents.
3- Operating: e.g. unit costs, staff ratios, and staff workloads.

Performance Appraisal

Performance appraisal (PA) has been focused on as a part of a broader organizational context in which PA is a major part and a key component of a systematic process of PM (Armstrong & Appelbaum, 2003; Den Hartog, et al., 2004; DeNisi, 1996; Toppo & Prusty, 2012; Bach, 2005. PA is a "formal assessment and rating of individuals by their managers at, usually, an annual review meeting" (Armstrong, 2006). PA has been discredited because often it has been used as a top-down and mainly bureaucratic system (Armstrong, 2009).

In universities, PA systems server three function, first to identify and evaluate the performance of university individuals, second to provide incentives for the university individuals and third to monitor the university's progress to attain its goals (Dilts, et al., 1994).

Obviously, the literature shows the advantages of using PA. Nevertheless, there is a significant amount of dissatisfaction with the appraisal process, due to lack of leadership that supports the process, supervisors not been held accountable for the timely completion of their appraisals, and lack of training provided for supervisors for doing PA (Flaniken, 2009). PA schemes can degenerate into worthless routines and rituals, especially when adequate time, training and budgeting for follow-up action are not associated (Casey, et al., 1997). Moreover, Managers are more satisfied than employees are with most aspects of PA (Mount, 1984)

The key factors in the acceptability and effectiveness of PA systems in higher education institutions are the degree to which those appraised believe that performance review outcomes are used in a developmental way (Simmons & Iles, 2001).

360° performance feedback or appraisal is a multi-source feedback, that defined as "a process in which someone's performance is assessed and feedback is given by a number of people, who may include their manager, subordinates, colleagues and customers" (Armstrong, 2009). 360° appraisal is recommended to be used in higher education institutions context (CUCSA, 2011; Morris, et al, 2007).

Conclusion

The concept of PM is applicable in the segment of Higher Education Institution, but it needs to be redefined and adapted to the needs and vision of universities. Higher Education Institutions need to recognize and differentiate between Performance Management and Performance Appraisal but commonly the literature approves that the terms used interchangeably but Performance Appraisal is a part of Performance Management. Universities need to implement PM Policy to improve the performance of

individuals and align individual goals and objectives with the university strategic goals to improve the overall performance of the university to achieve its goals.

Performance Appraisal in universities needs to appraise the performance of everyone in the university that includes academics and administrates, the focus should be equally on both academics and administrates but with different key performance indicators. Availability of a well-functioning Human Resource Department in a university can be very beneficial to the university to implement and design an effective PA to review and to keep the records of the results. Universities can take advantage of the recent trends of Performance Management such as 360° Appraisal and Balanced Scorecard, the literature shows their applicability in HEI segment and recommends these methods of PM to be practiced in HEIs context. Moreover, the outcomes of PM should be employee satisfaction, motivation and commitment and help the university to understand job performance through measures, individuals rewarded and recognized through an accurate and constructive feedback.

References

Abdulkareem, A. Y., & Oyeniran, S. (2011). Managing the performance of Nigerian Universities for sustainable Development using Data Envelopment analysis. *International Journal of Academic Research in Business and Social Sciences, 1*(Special Issue), 1-9.

Ana-Maria, G., Constantin, B., & Cătălina, R. (2009). The Strategic Performance Management Process. *Annals of Faculty of Economics, 4*(1), 276-279.

Armstrong, M. (2006). *Human resource management practice* (10th ed.). Philadelphia: Kogan Page.

Armstrong, M. (2009). *Handbook of Performance Management* (4th ed.). London: Kogan Page.

Armstrong, S., & Appelbaum, M. (2003). *Stress-free Performance Appraisals: Turn your Most painful management duty into a powerful motivational tool* (1st ed.). Franklin Lakes: Career Press.

Azmaa, F. (2010). Qualitative Indicators for the evaluation of universities performance. *Procedia Social and Behavioral Sciences, 2*(2), 5408–5411.

Bach, S. (2005). *Managing Human Resouces: Personnel Management in transition* (4th ed.). Malden: Blackwell.

Ball, R., & Halwachi, J. (1987). Performance Indicators in Higher Education. *Higher Education, 16*(4), 393-405.

Casey, R. J., Gentile, P., & Bigger, W. S. (1997). Teaching Appraisal in Higher Education: An Australian Perspective. *Higher education, 34*(4), 459-482.

CIPD. (2005). *Performance management, Survey report.* London: cipd.

CIPD. (2009). *Discussion Paper: Performance Management.* London: Chartered Institute of Personnel and Development.

CIPD. (2013). *FactSheet: Performance management: an overview.* London: Chartered Institute of Personnel Development.

CUCSA. (2011). *Performance Management.* Oakland: CUCSA.

de Waal, A. A. (2007). Is performance management applicable in developing countries? the case of tanzanian college. *International Journal of Emerging Markets, 2*(1), 69 - 83.

Decramer, A., Christiaens, J., & Vanderstraeten, A. (2007). Individual Performance management in Higher education institutions. *Dilemmas in Higher education.* Innsbruck: EAIR.

Decramer, A., Christiaens, J., & Vanderstraeten, A. (2008). Implementation Dynamics of performance management in higher education. *21st EIASM Workshop on Strategic Human Resource Management.* Birmingham: 21st EIASM.

Decramer, A., Smolders, C., Vanderstraeten, A., & Christiaens, J. (2012). The impact of Institutional pressures on Employee performance management systems in Higher education in the law countries. *British Journal of Management, 23*(S1), S88–S103.

Den Hartog, D. N., Boselie, P., & Paauwe, J. (2004). Performance Management: A Model and Research Agenda. *International Association for Applied Psychology, 53*(4), 556-569.

DeNisi, A. S. (1996). *A Cognitive Approach to Performance Appraisal* (1st ed.). New York: Taylor & Francis or Routledge.

Deshmukh, A. M., Sharma, S., & Ramteke, A. Y. (2010). Performance Management Practices in Higher Education. Nagpur: Excel India Publisher, New Delhi.

Dilts, D. A., Haber, L. J., & Bialik, D. (1994). *Assessing What Professors Do: An Introduction to Academic Performance Appriasal in Higher Education* (1st ed.). Westport: Greenwood Press.

Flaniken, F. W. (2009). PERFORMANCE APPRAISAL SYSTEMS IN HIGHER EDUCATION: AN EXPLORATION OF CHRISTIAN INSTITUTIONS.

Higgins, J. C. (1989). Performance measurement in universities. *European Journal of Operational Research, 38*(3), 358-368.

Huselid, M. A. (1995). The impact of Human resouce Management practices on Turnover, productivity and corporate financial performance. *Academy of Management, 38*(3), 635 - 672.

Jalaliyoon, N., & Taherdoost, H. (2012). Performance evaluation of higher education; a necessity. *46*, pp. 5682–5686. Barcelona: ELSEVIER : Procedia - Social and Behavioral Sciences.

Johnes, J., & Taylor, J. (1987). Degree Quality: An investigation into Differences between UK Universities. *Higher Education, 16*(5), 581-602.

Johnes, J., & Taylor, J. (1990). *Performance Indicators in Higher education* (1st ed.). Buckingham: Open University Press.

Leopold, J., & Harris, L. (2009). *The Strategic Managing of Human Resources.* Essex: Pearson Education.

Lindsay, A. (1981). Assessing institutional performance in higher education a managerial perspective. *Higher Education, 10*(6), 687-706.

Morris, l. (2011). *From collegial Engagement to performance management: the changing academic landscape in Australia.*

Morris, L., Stanton, P., & Mustard, J. (2011). Rhetoric and reality: an examination of performance management in australian universities. Auckland: Association of Industrial Relations Academics of Australia and New Zealand .

Morris, L., Stanton, P., & Young, S. (2007). Performance Management In Higher Education - The Great divide. *Association of Industrial Relations Academics of Australia and New Zealand* (pp. 18-32). Auckland: University of Auckland.

Mount, M. K. (1984). Satisfaction with a performance appraisal system and appraisal discussion. *Journal of Occupational Behaviour, 5*(4), 271-279.

Neely, A., Adams, C., & Kennerley, M. (2002). *The Performance Prism: The scorecard for measuring and managing business success* (1st ed.). London: Pearson Education.

Pingle, S., & Natashaa, K. (2011). Performance Management in Institutes of Higher education Through Balanced Scorecard: A conceptual Study. *Ganpat University-Faculty of Management Studies Journal of Management and research, 2*, 0-20.

Pulakos, E. D. (2009). *Performance Management: A new Approach for Driving a Business Results* (1st ed.). Malden and Oxford: Wiley - Blackwell.

Pynes, J. E. (2009). *Human Resources Management: For Public and non-profit Organizations* (3rd ed.). San Francisco,: John Wiley & Sons.

Serdar, A. M. (2010). Education and Sustainable Development: Performance managemenet and key performance indicators for higher education institutions in serbia. *Perspectives of Innovations, Economics & Business, 6*(3), 116-119.

Simmons, J., & Iles, P. (2001). Performance Appraisals in Knowledge-Based organizations: Implications for Management Education. *The International Journal of Management Education, 2*(1), 3-18.

Smither, J. W., & London, M. (2009). *Performance Management: Putting research into action* (1st ed.). San Francisco: Wiley & Sons.

Stewart, G. L., & Brown, K. G. (2009). *Human Resouce Management: Linking Strategy to Practice* (1st ed.). New Jersey: Wiley & Sons.

Tolofari, S. (2005). New Public Management and Education. *Policy Futures in Education, 3*(1), 75-89.

Toppo, L., & Prusty, T. (2012). From Performance Appraisal to Performance Management. *IOSR Journal of Business and Management, 3*(5), 1-6.

Wang, X. (2010). Performance measurement in universities: Managerial Perspective.

Warning, S. (2004). Performance Differences in German Higher Education: Empirical Analysis of Strategic Groups. *Review of Industrial Organization - Kluwer Academic Publishers, 24*(4), 393–408.

Effect of Employee Commitment on Organizational Performance: Analysis of Northern Iraq Private and Public Banks

Fatih Cura

Ishik University, Erbil, Iraq, Email: fatih.cura@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Commitment is one of the key factors that affects organizational performance. In this study, I tried to analyze relationship between employee commitment and organizational performance. A 17 items questionnaire with demographic questions was used to test the model. The survey was delivered to private and public banks in Erbil. I found out that there is a positive relationship between employee commitment and organizational performance. Furthermore public bank employees' commitment level was higher than that of private bank.

Key Words: Commitment, Organizational Performance, Northern Iraq, Banks

Introduction

Day by day organizations will get new challenges to go through for reaching their objectives and goals, and these challenges are various in their kinds each has its difficulties. But none of the organizations in the world can go through these challenges and pass through them unless if they have a committed workforce who they work loyally for their organization and think of it as if it is their own organization, because when employees are committed to their organization, they feel that they are trusted and they will do everything to make their organization the most successful in the area. Employee commitment can be achieved through many ways but the most important factor, which is the key factor, is to build a trust relationship between employees and their supervisors and managers. Because when the employees feel they are trusted and appreciated, they will be more committed to their organization and this will affect the monitoring and evaluating costs.

Also commitment can be achieved by providing the employees with many types of incentives which make them stay with the organization and be more committed to it, and one of the incentives is commissions and bonuses on their great work and their effort spent for their organization to achieve its goals and objectives. Providing the employees with training and sending them to other places to get trained is another way to get committed employees, since they feel they are important and appreciated by their organization, so they will be more committed and work harder for their organization to show their loyalty towards it. Sometimes it is a good idea to give employees authority and some power to take decisions to feel they are important and the organization cares about them, so they will be more committed and see the organization as their own, but the authority which is given to employees should be limited and controlled not to be misused against the organization's benefit. On the other hand, the

employee commitment will affect the organizational productivity and organizational performance, the more they are committed, the more the productivity and the higher performance, since the committed employees contribute more to their organization and try harder to achieve the organization's goals and objectives.

In this research I have explained the effect of employees' commitment on organizational performance, and I chose bank employees in Erbil city in Iraq as a sample. Employee commitment concept was evaluated as independent variable and organizational performancewas taken as dependent variable. Data is collected through close-ended questionnaire and statistically analyzed through SPSS 20 software program.

Review of the Literature
Employee Commitment

Employee commitment is when an employee remains with an organization for a long period of time and wants to continue his career life with the same organization. This statement always had been the subject of many researches. At last as it was resulted, the employees who are committed to their organizations stay with their organizations for a longer period of time than those who are less committed to their organizations. (O'Reilly & Chatman, 1986) define employee commitment as "The extent to which employees identify with their organization and managerial goals, show a willingness to invest effort, participate in decision making and internalize managerial values". And (Mowday, Porter, & Steers, 1982) define it as "relative strength of an individual's identification with, and involvement in, a particular organization". Also (Bateman & Strasser, 1984) define commitment as "multidimensional in nature, involving an employee's loyalty to the organization, willingness to exert effort on behalf of the organization, degree of goal and value congruency with the organization, and desire to maintain membership". According to (Buchanan, 1974) most scholars define commitment as being a bond between the employee and the organization, though his own definition of commitment. (Tolentino, 2013) found that the employees who have strong desire to stay in their organization, which could signify less probability of employee turn-over. Also (Steers, 1977) says that "employee commitment is directly related with the company turnover". And (Boulian, Porter, Steers, & Mowday, 1974) talks about the strong relationship between employee commitment and turnover as he says: "Some evidence exists that a stated intention to remain with the organization, a component of commitment, is strongly and inversely related to turnover". So when an employee is committed to his job and organization his probability of leaving the job or quitting is becoming less and the organization's turnover rate will decrease when its employees are more committed to their organization. (Schuler & Jackson, 1996) stated that stronger could result in less turnover and absenteeism, also increasing an organization's productivity. (Chughtai & Zafar, 2006) say that "highly committed employees are likely to continue their association with their current organizations, and at the same time, they are likely to put more effort on behalf of their respective organizations and thereby perform at higher levels than their uncommitted counterparts". Also (Mishra, 2005) found in his research the same result as the others before him, the employees and managers that are committed to their organization are less likely to leave their organization than their counterparts who are less committed to their organization, their quitting probability is more. Some researchers define

commitment as it is when the goals of the organization and the employee are the same and overlap so the employee becomes more committed to the organization and tries harder to achieve the goals of the organization since they became his/her goals as well. "The process by which the goals of the organization and those of the individual become increasingly integrated or congruent" is commitment (Hall, Schneider, & Nygren, 1970) . According to (Meyer & Allen, 1997) Commitment is "a psychological state that characterizes the employees' relationship with the organization and has implication for the decision to continue membership in the organization." Of course when an employee is committed to an organization he/she has some reasons behind that (Boulian, Porter, Steers, & Mowday, 1974), (Wadhwa, Deka, Verghese, Sharma, & Wadhwa, 2011) and (Mishra, 2005) talk about these factors: "a) A strong belief in and acceptance of the organizations' goals and values. b) A willingness to exert considerable effort on behalf of the organization. c) A strong desire to maintain membership in an organization.". Commitment of the employees to their organization is very important, and it has effects on many other concepts, (Sutanto, 1999) says "Committed employees give a big contribution to organizations because they perform and behave on achieving organization's goals. Furthermore, workers who are committed to their organizations are happy to be members of it, believe in and feel good about the organization and what it stands for, and intend to do what is good for the organization." The employees who are committed to their organization are valuable factors used by their managers to achieve the organizational goals and objectives, so they can be accounted as the organization's competitive advantage to achieve its goals with. (Dessler, 1993) says: in today's environment, the future is those managers' who can manage change in the best way, but for change management you need to have the best committed employees, since they will have the same goal as the organization's.

There are many ways to create commitment among employees to their organization to get a high productivity and performance, for that case (Becker, 1992) gives a suggestion that increasing commitment of employees to their supervisor's goals and objectives can be done through leadership training, socialization, and team building. And (Sutanto, 1999) explains these factors in his journal article "Leadership training should be the role of managers. Managers as a leader need to be role models for their subordinates, by being committed. Also, they need to empower subordinates in their jobs and roles. Intense socialization results in increased commitment to the success of the company, willingness to work long hours, and decreased absenteeism and turnover. Team building, a common method of improving relationship within a group, is similar to process consultation except that all members of a group participate together to try to improve their work interactions. For example, group members discuss with a change agent who is trained group facilitator the quality of the interpersonal relationship between team members and between the members and their Supervisor". One of the most important factors of creating commitment in an organization is training. Some people think that training only supposed to increase the skills and knowledge of the employees, but that is not correct as researches and studies have proven that. An example of these researches is the one that was done in Nigeria on a sample of Financial Firm's managers and employees by (Owoyemi, Oyelere, Elegbede, & Gbajumo-Sheriff, 2011), they found that; the more training given to employees, the more committed they will be to their organization. When an organization trains its employees, there will be more chances to increase its performance, and this is because the employees think that their organization is committed to them and cares about them, so they will appreciate it and show their commitment to their organization too, also try to achieve its goals and

objectives. "When an organization communicates honestly and openly, builds a trusting relationship, and offers a sense of belonging to the employee, the organization will increase the likelihood of retaining a morally committed employee" (Zangaro, 2001). Also he says that the managers should ask what their employees' needs and wants are and should educate them about organizational needs, also the manager should be mentors for their employees in order to increase their commitment to the organization. (Dessler, 1993)

Organizational Performance

Organizational performance is the results of the organization and its outputs, whether good or bad. It is also the way that an organization tries to achieve its goals and objectives efficiently and effectively. (Mahapatro, 2010) defines organizational performance as "the ability of an organization to fulfill its mission through sound management, strong governance and a persistent rededication to achieving results. Effective nonprofits are mission-driven, adaptable, customer-focused, entrepreneurial, outcomes oriented and sustainable." There are three indicators of organizational performance which are: financial performance, market performance and shareholder value performance (and in some cases, production capacity performance might be analyzed too).

A continuous high performance is the goal of any organization, because only through performance organizations are able to grow progress and maintain in the market. Performance was defined in many ways in the past, as (Gavera, Ilies, & Stegerean, 2011) states them according to decades passed. (Georgopoulos & Tannenbaum, 1957) says "the extent to which organizations, viewed as a social system fulfilled their objectives" this was in the fifties where organizational performance was evaluated and measured by working, labor force and organizational structure. (Yuchtman & Seashore, 1967) Define it as "an organization's ability to exploit its environment for accessing and using the limited resources". In the eighties and nineties managers realized that organizational objectives are more complex than were thought of before. They realized that the organizations that achieve their goals effectively by using minimum amount of resources efficiently are more close to high performance.

Then (Lebans & Euske, 2006) defined performance as "a set of financial and nonfinancial indicators which offer information on the degree of achievement of objectives and results" So organizational performance has a lot of definitions and can be defined according to the elements characteristics to each area of responsibility. And to be able to evaluate and measure performance of an organization, you need to quantify the results of the organization.

The Relationship between Employee Commitment and Organizational Performance

The employees who are committed to their organization contribute more to the organization through performing better and spending more effort to achieve and attain the organization's goals and objectives, and they are happy and proud to be the members of the organization. (Fink, 1992) says that employee commitment is one of the many factors that affect organizational performance, but it is a key factor. He also says that when managerial system is good, there will be a good reward system and employee

commitment, and when there is an effective reward system will result in employee commitment and a great organizational performance, at last the key factor which is employee commitment results in organizational performance.

Employees might be committed to their organization, job, colleagues, supervisors and managers. (Becker, 1992) states that employees who are committed to their supervisors are the most contributors to the organizational performance, more than other types of commitment targets. (Benkhoff, 1997) found in her research that the organizational performance in terms of sales target met and profits increased in a bank is positively related to employee commitment, also commitment to supervisors has the strongest impact on organizational performance than other commitment targets. (BinDost, Ahmed, Shafi, & Shaheen, 2011) Also found the positive and strong relationship between employee commitment and organizational performance. (Boxall & Macky, 2009) and (Purcell, Kinnie, Hutchinson, & Rayton, 2003) all prove by their researches and studies that there is a strong and positive relation between employee commitment and organizational performance.

Research Model and Hypothesis

I developed the model with two variables, employee commitment and organizational performance. The conceptual model is presented in figure 1.

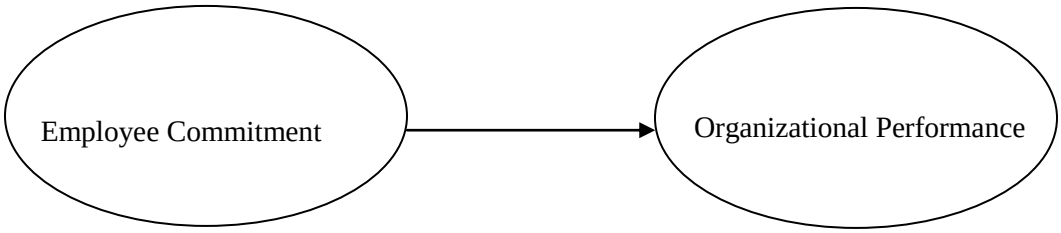


Figure 1: Hypothesized Model

I formulated the research questions as;

- Is there any relationship between employee commitment and organizational performance?
- Is there any difference in the level of commitment of private and public banks in Erbil?
- Is there any difference between level of commitment of male and female employees in the banks.

Hypotheses

H1: Employee commitment is an important factor affecting organizational performance.
H2: There is a direct relationship between employee commitment and organizational performance.
H3: The commitment level of employees in public banks is higher than the private banks in Erbil.

H4: There is a difference between private and public banks in Erbil in the level of employee commitment.

Method

Sampling Method

Convenient sampling was used for data collection. Totally 157 questionnaires were distributed and 135 of them collected after being filled out completely from 15 public and private bank employees in Erbil city, the capital of Kurdistan Region of Iraq.

Instrument

The questions' part consisted of 17 close-ended questions. Based on Likert scale of 5 scales (from strongly disagree to strongly agree) the first 5 were measuring commitment and the remaining 12 were measuring performance. I used (Bakiev, 2011)'s questionnaires about commitment that he got them from (Nyhan, 2000) (Porter & Smith, 1970). The remaining 12 question about organizational performance were adopted from (Sahin, 2010) which he took them from (Brewer & Selden, 2000).

Sample Demographics

The research involved 110 employees and managers in 15 banks, 10 of the banks were private and the remaining 5 were public banks. The majority of the respondents were female employees and the minority is males. The number of the female respondents was 63 which equals 57.27% of the total 110 respondents. On the other hand, 47 male respondents constitute 42.72% of the total employees.

DATA ANALYSIS AND RESULTS

Demographic Variables

Variable	Frequency	(%)
Age		
20-30	63	57.27
31-40	34	30.9
41-50	9	8.1
50+	4	3.6
Gender		
Female	63	57.27
Male	47	42.72
Education Level		
Primary School	0	0
High School	16	14.54
University	80	72.72
Post Graduate	14	12.72

Marital Status		
Married	51	46.36
Single	49	44.54
Divorced	10	9.09
Job Experience		
1-5	44	40
6-10	33	30
11-15	20	18.18
16-20	6	5.45
20+	4	3.63
Job Title		
General Manager	15	13.63
Division Manager	32	29.09
Regular Employee	63	57.27

Table 1: Demographic Variables **n=110**

The distribution of the respondents over the demographic variables is shown in Table 1. The respondents of the survey questionnaires were 110 employees and managers in 15 banks, 10 of the banks were private and the remaining 5 were public banks. The table shows that the majority of the respondents were female employees and the minority is males. The number of the female respondents was 63 which equals 57.27% of the total 110 respondents. On the other hand, 47 male respondents constitute 42.72% of the total employees. For the distribution of the respondents in terms of age, 63 employees were relatively young with, 20-30 years old, and the next largest group, 34, was 31-40 years old. These two groups account for 57.27% and 30.9% respectively of the total participants. The respondents who were aged 41-50 were 9 constitutes 8.1% of the survey participants and the smallest age group was those who were 50 years old and above, they were only 4 people and they made only 3.6% of the total 110 respondents.

The participants' education level was normal as no one was a primary school graduate and only 16 (14.54%) of them had high school certification, but the majority of them respondents had bachelor degree who were 80 respondents making 72.72% of the total, about the post graduate certification holders, they were only 14 people constitute 12.72% of the total participants which most of them were general managers.

The marital status of the employees who responded to the questionnaires was as follows: 51 (46.36%) married, 49 (44.54%) single and 10 (9.09%) were divorced. In terms of respondents' work experience at banks, the majority of them were beginners, as their years of experience was 1-5 years working at banks and they made 40% of the total respondents, 44 of 110, and the second group according to size was those who had experience 6-10 years and they were 33 people (30%), the third group was making 18.18% of

the total which they were 20 people, they had 11-15 years of experience. For those who had 16-20 years of bank job experience, they were 6 people (5.45%). And the last group was consisting of employees or managers who have 20 years of experience or more, they were only 4 people and they were all the general managers constituting 3.63% of the total respondents. The last grouping was about the job titles of the respondents in their organizations which were banks in our study.

The top managers made the smallest group, which were only 15 general managers and making 13.63% of the total people who responded to our survey questionnaires. The second smallest group was the group of division managers. They were 32 people (29.09%). Lastly the majority of the respondents group, the regular employees, they made 57.27% of the total respondents and they were 63 employees.

Data Analysis

The data was collected through questionnaires then entered into Statistical Package for Social Sciences (SPSS) version 20. I found out the reliability test shows that the Cronbach's Alpha is 0.9 which makes the questionnaires highly reliable which is shown results of reliability test at **Table 2**. I found out the relationship between Employee commitment and Organizational performance, as it is shown in **Table 3**, there is a positive correlation between them ($p<0.001$). I made the correlation analysis to show the relationship between organizational performance and employee commitment and found that there is a positive relationship between them and it is a strong relationship as the Pearson Correlation is 0.694 which is very close to 1.00.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.900	.901	17

Table2. Reliability Test

		Commitment	Performance
Commitment	Pearson Correlation	1	.694**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	1965.055	1899.909
	Covariance	18.028	17.430
	N	110	110
Performance	Pearson Correlation	.694**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	1899.909	3815.818
	Covariance	17.430	35.008
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Table3. Relationship between Organizational performance and Employee commitment

Dependent Variable	R^2	Independent variable	B	Beta	*T*	Sigma
Performance	.481	Commitment	.477	.694	10.013	.000

Table4. Regression analysis of Performance and Commitment

	Mean	Std. Deviation	N
Public banks	3.94	.86694	26
Private banks	3.79	.79974	84

Table5. The commitment level of private and public banks

As a result of this the hypothesis 1 is proved right that says, employee commitment is an important factor affecting organizational performance. Also hypothesis 2 is proved right by the results mentioned before that says; there is a direct relationship between employee commitment and organizational performance. **Table4** illustrates that (in organizational performance) employee commitment explains 48% of total variance. By looking at the private banks employees' commitment answers of the questionnaires separately, I realized that the level of commitment of private bank employees in Erbil is lower than the public bank employees by looking at the mean of their answers in which in the private banks the mean is 3.79 and the public banks the mean is 3.94 which is higher than the private banks. By this the hypothesis 3 is also accepted since it says the employee commitment is higher in public banks, and the hypothesis 4 is approved, since it says there is a difference between private and public banks in Erbil in the level of commitment .

Conclusion

The primary purpose of the research was to find that if there is any relationship between employee commitment and organizational performance in the private and public banks of Erbil. The results of the study show that there is a direct relationship between employee commitment and organizational performance. By the results I could approve all the hypothesis. Furthermore I could analyze from the results that, the commitment level among public bank employees is more than of private bank employees, and that might be because of the public banks being more relaxed and working less so that they are more committed to their organization not to lose the opportunity of working there.

In contrast the private bank employees might be more tired and busy with their job and might not be satisfied with their salary according to their being tired and spending effort, so that they might want better jobs in better organizations with better salaries and less work.

In conclusion, our findings and results of the research were consistent with the previous studies about the same topic, that there is a strong and direct positive relationship between Employee commitment and Organizational performance and Employee commitment affects on Organizational performance positively (Kashefi, Mahjoub, Rahimi, Hesabi, Keshavarz, & Nadimi, 2013), (Sutanto, 1999), (BinDost, Ahmed, Shafi, & Shaheen, 2011) and (Mishra, 2005).

Yet, there was not a single paper measuring the commitment level of banks employees in Northern Iraq, and this study has significance to encourage other researchers to do more paper about similar issues in this region.

Discussion and Limitation of the Research

In this research we used the questionnaires to take only one factor into consideration that affects organizational performance, which is employee commitment. Further study could also be done on the other factors that may have direct or indirect impact on organizational performance, which are employee satisfaction, pay satisfaction, organizational learning, burnout and some more other concepts. In this research we could only reach 15 banks from private and public in Erbil city due to the time limitation and the employee banks are very busy doing their job, they couldn't specify a lot of time to answer the questionnaires.

This subject is a very broad subject; many researches can be done about it. For better ones researchers can include personal interviews with the managers to know the level of commitment of their employees and the performance of the organization they work for. Also they can visit more banks to make the measurement of the sample more general, since if the sample is bigger and the number of respondents is higher, you can generalize your findings more (Saunders, Lewis, & Thornhill, 2009).

Significance of the paper lies it, being the first of its sample to be done in the region and it is attracting and creating awareness about the development and understanding the factor of commitment in the success of the organizations.

REFERENCES

Bakiev, E. (2011). *Determinants of Interpersonal Trust, Organizational Commitment for Performance within Kyrgyz National Police.* Orlando, Florida.

Bateman, T., & Strasser, S. (1984). A longitudinal analysis of the antecedents of organizational commitment. *Academy of Management Journal* , 95-112.

Becker, T. E. (1992). Foci and bases of commitment: Are they distinctions worth making? *Academy of Management Journal* , 232-244.

Benkhoff, B. (1997). Ignoring commitment is costly: New approaches establish the missing link between commitment and performance. Human Relations , 701-726.

BinDost, M. K., Ahmed, D. Z., Shafi, N., & Shaheen, W. A. (2011). Impact of employee commitment on organizational performance. *Arabian Journal of Business and Management Review* , 87-98.

Boulian, P. V., Porter, L. W., Steers, R. M., & Mowday, R. T. (1974). Organzational Commitment, Job Satisfaction, and Turnover among Psychiatric technicians. *Journal of Applied Psychology* , 603-609.

Boxall, P., & Macky, K. (2009). Research and theory on high-performance work systems: progressing the high-involvement stream. *Human Resource Management Journal* , 3-23.

Brewer, G. A., & Selden, S. C. (2000). Why elephants gallop: Assessing and predicting organizational

performance in federal agencies. *Journal of Public Administration Research and Theory* , 685-712.

Buchanan, B. (1974). Building organizational commitment: The socialization of managers in work organizations. *Administrative Science Quarterly* , 533-546.

Chughtai, A. A., & Zafar, S. (2006). Antecedents and Consequences of Organizational Commitment Among Pakistani University Teachers. *Applied H.R.M. Research* , 22-23.

Dessler, G. (1993). Winning commitment. *New York: McGraw-Hil* .

Fink, S. L. (1992). *High commitment workplaces.* New York: Quorum Books.

Gavera, C., Ilies, L., & Stegerean, R. (2011). Determinants of organizational performance: the case of romania. *Management & Marketing Challenges for the Knowledge Society* , 285-300.

Georgopoulos, B., & Tannenbaum, .. (1957). A Study of Organizational Effectiveness. *American Sociological Review* , 534-540.

Hall, D. T., Schneider, B., & Nygren, H. T. (1970). Personal Factors in organizational identification. *Administrative Science Quarterly* , 176-189.

Kashefi, M. A., Mahjoub, R. A., Rahimi, H. G., Hesabi, M. B., Keshavarz, H. M., & Nadimi, G. (2013). Organizational Commitment and Its Effects on Organizational Performance. *Interdisciplinary journal of contemporary research in business* , 501-510.

Lebans, M., & Euske, K. (2006). A conceptual and operational delineation of performance. *Business Performance Measurement, Cambridge University Press* .

Mahapatro, B. B. (2010). *Human Resource Management Ch # 10,page # 272 to 279.* New Delhi: New Age International.

Meyer, J. P., & Allen, N. J. (1997). Commitment in the workplace. *Theory, research and application*

Mishra, G. P. (2005). Role of employee commitment in organizational effectiveness. *Delhi Business Review* , 89-92.

Mowday, R., Porter, L., & Steers, R. M. (1982). Organizational Linkage: The psychology of Commitment Abesnteeism and Turnover. *Academic Press, New York* .

Nyhan, R. C. (2000). Changing The Paradigm: Trust and Its Role in Public Sector Organizations. *American Review of Public Administration* , 87-109.

O'Reilly, C., & Chatman, J. (1986). Organizational Commitment and Psychological Attachment; the effects of compliance, identification and internalisation of pro-social behaviour . *Journal of Applied Psychology* , 492-499.

Owoyemi, O. A., Oyelere, M., Elegbede, T., & Gbajumo-Sheriff, M. (2011). Enhancing Employees' Commitment to Organisation through Training. *International Journal of Business and Management* , 280-283.

Porter, L. W., & Smith, F. J. (1970). *The etiology of organizational commitment.* California.

Purcell, J., Kinnie, N., Hutchinson, S., & Rayton, B. (2003). *Understanding the People and Performance Link: Unlocking the Black Box. The Chartered Institute of Personnel and Development.* London: Erasmus Institute of Management.

Sahin, I. (2010). *Organizational social capital and perceived performance of drug law enforcement departments: a case study in turkey.* Orlando, Florida.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students.* Edinburgh Gate: Pearson Education.

Schuler, R. S., & Jackson, S. E. (1996). *Human resource Management: Positioning for the 21st century*. New York: West Publishing Company.

Steers, R. M. (1977). Antecedents and outcomes of organizational commitment . *Administrative Sience Quarterly* , 46-56.

Sutanto, E. M. (1999). The relationship Between Employee commitment and Job Performance. *Jurnal Manajemen dan dewirausahaan* .

Tolentino, D. R. (2013). Organizational Commitment and Job Performance. *International Journal of Information Technology and Business Management* , 4-5.

Wadhwa, D. S., Deka, K. K., Verghese, M., Sharma, S., & Wadhwa, D. S. (2011). Organizational commitment: "a study on faculty members of technical institutes in bhilai and durg region". *International Journal of Management Research and Development (IJMRD)* , 1-17.

Yuchtman, E., & Seashore, S. (1967). Factorial Analysis of Organizational Performance. *Administrative Science Quarterly* , 377-395.

Zangaro, G. A. (2001). Organizational Commitment: A concept Analysis. *Nursing Forum* , 14-22.

Smart Phone Assisted Language Learning

Mustafa Azmi Bingol

Ishik University, Erbil, Iraq, Email: mustafa.bingol@ishik.edu.iq

Behcet Celik

Ishik University, Erbil, Iraq, Email: behcet.celik@ishik.edu.iq

Naci Yildiz

Ishik University, Erbil, Iraq, Email: naci.yildiz@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Nowadays mobile phones have a remarkable impact on language learning. Because it is not imaginable to live without mobile phone and every single individual has at least one. Most learners consider smartphone applications as a significant facility in the progress of language learning. Mobile learning in other words m-learning is a very new topic. This term also overlaps with e-learning that means learning by electronic devices such as computers, laptops, tablets and internet. M-learning can take place either in-classroom or out-of-classroom. Programs or applications can be downloaded and installed easily. There are thousands of programs that may help to improve students' language skills, grammar, reading, writing, speaking, listening, pronunciation, vocabulary and increase their consciousness of such international tests like TOEFL, IELTS, SAT and so on. It is confirmed by many researchers that effectiveness of mobile assisted language learning is indisputable. Many experts put emphasis on the need for sufficient technical assist (e.g., Cochrane, 2007; Franklin & Peng, 2008).

Key Words: Smartphone Assisted Language Learning, Mobile Learning, E-learning,

Introduction

Today English is the most important second language all over the world. That is why producing helpful smartphone applications for encouraging influential English learning is a vital issue in the English-language studying area (Collins, 2005). Students have to memorize and practice a large number of vocabulary and they should learn grammatical structures in order to have acceptable English.

Students specify that the main benefits from using their smartphones are speed of access to the Internet, their own information, course material, personal organization and time management program. In some

cases, "mobile learning" refers to handheld devices, potentially available anytime, anywhere, assisted learning whether that learning is formal or informal (Kukulska-Hulme & Shield 2008).

Mobile-Assisted Language Learning

Chinnery (2006) used the term mobile-assisted language learning (MALL) as a first time. The advantages of using MALL are considerable; MALL provide students easily access language learning materials and communicate with people at any time, from anywhere and the nature of digital technology ease students' participation in both cooperative and personal language learning activities development of speaking, listening, reading, and writing, skills. Students do not have to study a second language inside the classroom. They can learn it using mobile devices when and where they want.

Benefits of Smart Phone Assisted Language Learning

There are a lot of advantages of smartphone assisted language learning. Some of them are; MALL allows students to access language learning materials easily and more quickly and communicates with other people anytime and anywhere. The character of digital technology ease students' take part in both collective and individualized language learning activities allowing fast development of speaking, reading, listening, and writing, skills. Mobile technology supplies several resources and devices for language learning that inspire learners to be more motivated, confident, and social.

According to Klopfer and his colleagues (2002) the features mobile devices have are Portability, Social interactivity, Context sensitivity, Connectivity, Individuality.

Skills That Can Be Developed By M-Learning

The best application does not try to do everything. It aims to develop one thing particularly. Application makers who come from the desktop computing often overload too much into a program. Smartphone users do not want one application perform everything and they want lots of little programs that develop one thing well. So as teachers we should define first on what purpose we need the application for.

Vocabulary

Teachers can prepare vocabulary exercises covered in the classroom. Students can be given the assignment in the classroom and asked to accomplish them via their mobile phones before sending them back to the instructor (Miangah & Nearat, 2012). SMS is another common method of learning new vocabulary based on the subjects covered in the classroom. Vocabularies can also be explained by the pictures shown on learners' mobile displays for better comprehension of new words.

Pronunciation

Dictionaries are not just to look up the meanings of the words they also show how to pronounce the words. Mobile dictionary applications contain sound functions so that learners may download to their mobile phones and learn the pronunciation of new words. They may also record their own voices and

send them to the teacher via multimedia function. This would help in evaluation the students' weaknesses in pronunciation (Miangah & Nearat, 2012).

Reading

There are a lot of reading related applications and activities. A well-designed reading activity can be used as a course material. It can be sent to the learners through SMS or e-mail. And then they may be asked to read and complete the exercises. Also English news articles can be sent to the students' mobile phones. Personalized Intelligent Mobile (PIM) learning system was generated by Chen and Hsu (2008). Through this system, learners receive English news articles on their mobile phones based on their reading abilities measured by lecturers. The PIM system can automatically discover unknown words from the articles.

Reading passages help learners to enrich their vocabulary knowledge and help them to promote reading comprehension. Reading activities can be conveyed to learners through e-mail or SMS. After that they may demanded to reply the assignment in order to evaluate. Technology changes day by day and a new device come into life every day. In addition e-books may allow more social atmosphere, with a group of students cooperating to read, discuss on the same topic, all of them are using their own devices (Sharples et al., 2012).

Grammar

Programs can be found and installed that explains grammatical points. These applications teach rules and structures that are followed by multiple-choice questions. Such applications contain a great deal of exercises. Different exercises can be developed, like true-false or fill-in the blank, and practiced by the students (Miangah and Nearat, 2012).

Listening and speaking

Teachers may establish a platform in which students listen to listening passages on their mobile phones. Then, they may ask listening comprehension test related with listening part. Another example of m-learning for listening was described by Huang and Sun (2010) who formed multimedia system for English language learners depend on their mobile devices' strengths. Students were told to access a special multimedia material contains website and order learning courses which consist of a set of video materials and exercises. They consider that mobile multimedia English listening exercise system increases learner's listening abilities to a higher degree.

Blogs

Blogs are one of the latest trends in language learning and teaching. They provoke language productivity; enable to share ideas and collaborative activities. Time and space boundaries disappear; learners share and argue their ideas in a cyber-world. In addition, live conversations and visual contents become popular (Gholami & Azarmi, 2012).

Blogging and sharing memories, experiences and ideas are unlimited to written form language. The trending new form of media known as podcasting stimulates users to have audio blogs or podcasts. These podcasts are free to use and also downloadable. Subscribers can follow any podcaster they like to receive updates. Actually, podcasting is already widely utilized in language learning by learners who record their own content or access authentic resources (Chinnery, 2006).

Game-Like Activities

Games and game-like activities are for all kind of people who like them. Such games can be integrated to language learning activities easily. Especially grammar and vocabulary games are addictive for adults. When they try to increase their high scores they learn a lot of grammar rules and new words. Games might look like for children, but bear in mind on the smartphone, adults also like playing games, as well. Therefore, even the programs that are not really games may contain game-like features. As in the games they have feedback cycles, awards, get extra properties. The difficulty of trying to complete sections or to reach better scores will retain students playing and learning. On the other hand paper based activities would quickly become tedious.

The real life knowledge and the game's virtual world are attached by mobile learning activities. This has been implemented in MALL by game producers who invented game-based language learning for ESL (English as Second Language) learners.

Conclusion

Understanding the practicality of mobile learning will necessitate new roles for teachers. One obstacle to the improvement of mobile learning is the lack of experienced instructors who can efficiently adapt mobile technologies into their lessons. There is huge demand in research on the methods that helps providing convenient MALL environment for learners. In addition, some skills as listening and speaking need further improvements in MALL research (Miangah & Nearat, 2012).

Development in technology causes other types of mobile technology, such as tablets and laptops with many extra functions. Smartphones now have the same features as microcomputers. Smartphones enhance the learners' autonomy and collaboration. In other word, MALL can be a practical formula to language learning obstacles in terms of place and time. Smartphones cannot substitute qualified teachers, but the growing trend of smartphones among ESL learners build possibilities to provide additional language practice anytime, anywhere.

References

Chinnery, G. M. (2006). Going to the MALL: Mobile assisted language learning. Language Learning & Technology, 10(1), 9–16. Retrieved from: http://llt.msu.edu/vol10num1/pdf/emerging.pdf

Chen, C., & Hsu., S. (2008). Personalized intelligent mobile learning system for supporting effective English learning. Educational Technology and Society, 11 (3), 153-180.

Cochrane, T. (2007). Mobile web2 pedagogies. In D. Parsons & H. Ryu (Eds.), Proceedings of the Conference on Mobile Learning Technologies and Applications

Collins, T. G. (2005). English Class on the Air: Mobile Language Learning with Cell Phones. Paper

presented at the Fifth IEEE International Conference on Advanced Learning Technologies, July 5-8, 2005, Kaohsiung, Taiwan.

Franklin, T., & Peng, L.-W. (2008). Mobile math: Math educators and students engage in mobile learning. Journal of Computing in Higher Education, 20, 69–80.

Gholami, J., & Azarmi, G. (2012). An introduction to mobile assisted language learning. International Journal of Management, IT and Engineering, 2 (8), 1-9. Retrieved from: http://www.academia.edu/2214648/An_introduction_to_Mobile_Assisted_Language_Learning

Huang, C., & Sun. P. (2010). Using mobile technologies to support mobile multimedia English listening exercises in daily life. The International Conference on Computer and Network Technologies in Education. Retrieved from: http://nhcuer.lib.nhcue.edu.tw/ir/bitstream/392440000Q/649/1/120.pdf

Kukulska-Hulme, A.& Shield, L.(2008).An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. *ReCALL 20*(3), 271-289.

Klopfer, E.; K. Squire, and H. Jenkins. (2002). "Environmental Detectives: PDAs as a window into a virtual simulated world." In: Proceedings of IEEE International Workshop on Wireless and Mobile Technologies in Education. Vaxjo, Sweden: IEEE Computer Society, pp. 95-98

Miangah, T., & Nearat, A. (2012). Mobile-assisted language learning. International Journal of Distributed and Parallel Systems, 3 (1), 309-319

Sharples, M., McAndrew, P., Weller, M., Ferguson, R., FitzGerald, E., Hirst, T., Mor, Y., Gaved, M. and Whitelock, D. (2012). *Innovating Pedagogy 2012: Open University Innovation Report 1*. Milton Keynes, UK, The Open University. http://www.open.ac.uk/blogs/innovating (Accessed 30 September 2012.)

Genetically Modified Organism under the New Iraqi Patent Law (Compared to United States Patent Law)

Marwan Al-Khalidy

Ishik University, Erbil, Iraq, Email: marwan.khalidy@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: One of the controversial issues nowadays in the world is the effectiveness of the genetically modified Foods (seeds). Many articles come out daily showing the negative impact of such seeds on the human health, while we can see the recognized and authorized health agencies licensing these kinds of seeds. This paper is addressed specially to tackle the impact of adopting such kind of seeds on Iraqi Farmers, and how was the situation before the American Inversion? I would also like to articulate this case to find out some possibilities to fix what has been provided in the new Iraqi Patent law. It is also important to mention, that we need to increase the people awareness of this types of food.

Key Words: Genetically modified seeds, Health, Law adopting, Awareness, Environment, Energy, Farmers.

INTRODUCTION

The term GM foods (seeds) or GMOs (genetically-modified organisms) is a term used to refer to crop plants which has been created for human or animal consumption by using special biology techniques. “These plants have been modified in the laboratory to enhance desired traits such as increased resistance to herbicides or improved nutritional content. The enhancement of desired traits has traditionally been undertaken through breeding, but conventional plant breeding methods can be very time consuming and are often not very accurate” (Whitman, 2000).

Genetically modified seeds been refused by many private health institutes, doctors, even some governments arguing the negative consequences, for example, ‘Occupy Monsanto Protest’ was created in many different cities all around many different countries such as United States, Australia, Canada, Brazil, and many more countries to push their countries prohibiting and illegalizing such kinds of foods.

Some Scientists believe that “medical professionals and climate experts warn us that a food and agriculture system built around poisons like Monsanto's Roundup and Dow's 2,4-D, a system that promotes soy and corn monocultures instead of crop diversity, is unhealthy for humans and the environment” it shows that aware and minded people are so suspicious about Monsanto and other GMO producers. Scientists and even politicians are striving to push their countries to labeling GMO laws (Katherine Paul 2014).

1. THE IMPACT OF THE NEW IRAQI PATENT LAW ON THE IRAQI FARMERS

I. The Period pre-2003

After the invasion of Iraq in 2003, Paul Bremer as the Administrator of the Coalition Provisional Authority of Iraq passed around 100 orders. These (Orders) laws were related to different fields of life, one order passed as an amendment to the Iraqi original patent law. The new order named 'Order 81 of Paul Bremer ("Patent and Industrial Designs," 1970). This new law has been in controversy in Iraq since the time it was passed, that because framers had not used to have such rules that restrict them from reusing seeds before. It's important to mention that the previous Iraqi patent law had not prohibited framers from reusing seeds again or to let the seeds be transferred among the farmers after harvest. Moreover the constitution of 1970 had prohibited the private ownership of biological resources. The order No.81 has clearly explained in a new added chapter, in which was named 'Plant Variety Protection' (PVP) that there were many reasons to amend the previous patent law, as was mentioned in the Order 81 that there is also a big issue that Iraq is facing regarding to Patent and Industrial Design Law, which is the challenge of becoming a full member of International trading system in which known as the World Trade Organization (WTO). The standards that WTO requires are challenging for Iraq as long as several provisions of the Patent Law in Iraq infringe and does not meet the international standard of the World Trade Organization.

Iraqi farmers were for a long time reusing the seeds either the conventional (traditional) seeds or the genetically modified seeds. Iraq during thousands of years was not in need of importing seeds "farmers must have realized that by saving a certain portion of the seeds from the previous year's crop they could insure themselves of a future harvest. (In Jarmo, Iraq, archeologists have found seed deposits that date from 6750 B.C.)" (Boylan, 2013) Particularly during the economic embargo and sanctions on Iraq during the 1990s, where farmers were not be able to import seeds, all the seeds and crops had been recycling among farmers. There was an Iraqi national seeds bank, where the ancient (Traditional) seeds kept.

II. The Period after 2003

After the United States invasion in 2003, when the Iraqi national archaeological museum was robbed by unknown mercenaries; plenty of media outlets, national organization condemned the action, while the country's national seed bank received no attention even it was destroyed. Such a cultural heritage and scientific edifice had many different kinds of crops once grew in Mesopotamia. Some of these traditional seeds were kept in special box and sent to the international bank in Aleppo, Syria, hopefully it could be used in Iraq once again. Unfortunately, the news are coming along that the original seeds in the international bank in Aleppo were sent to Norway (Seabrook, 2007).

Soon after the invasion of 2003 many fields and farms were destroyed and demolished either during the war or after. Famers were not able to find seeds to implant unless by importing it. The Coalition Provisional Authority worked hardly to pass such law; moreover it had

enforced the Iraq government to enter into contracts with American seeds companies. The Iraqi government has entered into contracts with the world's largest seed companies, such as Monsanto, Farmers who do not fulfill the requirement in the new law would not be able to get seeds and even more their farms gears and land might be seized. According to Food and Agriculture Organization (FAO) the Country was able to provide the farmers with only around 4 percent of the seeds demanded by its own resources, these seeds were preserved by farmers and distributed to others. Need to be mentioned that even such seeds were not at the max quality demanded. Tekeste Tekie, FAO Project Manager for Iraq added that"Iraq has currently no system in place that provides certified high-quality seeds of improved varieties. As a result, crop productivity remains very low because farmers are using their own, mostly low-quality, seeds. If no immediate action is taken, serious seed shortages can be expected in the near future, threatening the country's food security" (Iraq, 2005).

III. The New Law Consequences, and Paul Bremer Administration Justification

For what have been mentioned above and will be mentioned below, the Iraqi farmers were shocked with the new law. It had seemed to them as knockout, and they had to deal with it. The U.S administration in Iraq (CPA) has justified the law under the pretext of development, describing that this law would be an easy bridge for Iraq to be a member of the World Trade Market. "economic restructuring" in the name of a US-mandated 'free market' model, advertised in the name of Iraqi prosperity, was the only news we saw hit bylines in America's papers while Iraq's farming economy silently collapsed under the occupation's rule" (Smith, 2008). So, there are no ways for Iraqi farmers unless purchasing the (G.M) to start farming again. "In 2002, the Food and Agriculture Association (FAO) estimated 97 percent of Iraqi farmers utilized saved seeds to grow their crops." (Smith, 2008) As, I have stated above, that Iraqi framers have not been familiar with the rules of prohibiting reusing the seeds, or enforcing the farmers to but only the Genetically modified seeds. The farmers have been considered as the creators of many of the various seeds of wheat for a long time. Many farmers and authors who have wrote and talked about this issue believe that the American administration (CPA) wanted to take position of agriculture in Iraq. as a definite, the time is moving forward and year after year people 'farmers' will get use to buying, planting, and harvesting the new seeds 'GMO' ones. In other words the order 81 of Paul Bremer would prevail and Monsanto Corporation would be the main legitimate source of providing seeds to Iraqi farmer for many years.

2. THE ASPECT OF LAW ANALYSIS

IV. The Iraq Law Aspect

We have seen above that the previous Iraqi constitution of 1970 and also the Law No. 65 of 1970 on Patent and Industrial Designs had not prohibited farmers from reusing seeds. And that was because the Iraqi farmers used to save seeds and change it among them for years. "For years, the Iraqis had held samples of such precious natural seed varieties in a national seed bank, located, ironically, in Abu Ghraib… Following the US occupation and various

bombing campaigns, the historic and invaluable seed bank in Abu Ghraib vanished, a possible further casualty of the Iraq war" (Smith, 2008). On the other hand, the new constitution of 2005 has never mentioned or talked granting protection to Genetically Modified Seeds invention, in the same time the new patent law (Order 81) has granted protection to such invention. Also, it's Important to mention that the orders by Paul Bremer currently are binding law in Iraq.

V. THE PATENT LAW IN UNITED STATES

In the U.S patent law 35 U.S.C. Genetically Modified Seeds goes under exhaustion or first sale doctrine in which mentioned under 35 U.S.C. Section 217 (a) that says "Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefore, infringes the patent."(Lane, 2006)

In *Monsanto Company, v. Homan Mcfarling, 488 F.3d 973.May 24, 2007* the United States District Court for the Eastern District of Missouri, entered an award of damages for patent infringement, rejected farmer's arguments for vacating judgment of liability, and refused patent owner's request to modify permanent injunction against farmer, In *Monsanto V. Vernon Hugh Bowman, .2:07-cv-283-Rly-Wgh.Sept. 30, 2009,* when the Owner of patents for genetically modified soybean seed has filed action against farmer alleging infringement for his soybeans. The Unite States District Court of Indiana held that:

a. "first sale" patent right exhaustion doctrine did not apply to sale of soybeans, that contained patented trait, by grain elevator/dealer to farmer as commodity who then used them for planting;
b. Infringement of patent was not exceptional case;
c. Award of costs of compliance monitoring and other risk related costs, in addition to estimated reasonable royalty that had been calculated at its upper bounds, for unlicensed use of patented technology, was not warranted; and
d. Permanent injunction could be imposed against farmer to prevent him from making, using, selling, or offering to sell any of owner's patented crop technologies.

The U.S Supreme Court has heard the oral argument on February 19, 2013, and on has held on May 13, 2013 that "Patent exhaustion does not permit a farmer to reproduce patented seeds through planting and harvesting without the patent holder's permission" (Hughes, 2013). In other words, farmers are not allowed by any form to reproduce any permitted patent seeds either by planting, selling to be planted by others, or harvesting as long as the patentee has not permitted the first party to do so. And the Federal Circuit of Appeal came out with stating that "if a grower buys patent protected seeds (first generation) without any restrictions and saves later generations of seeds for replanting, the grower can be liable for patent infringement with respect to the later generation seeds" (Hughes, 2013).

The issue of a third party, in which means that a third party purchases a genetically modified seeds from the first buyer, since he/ she didn't bay technology fees and did not buy it from the original provider would be infringing and that farmer would be liable for his/her action.

VI. MONSANTO ALL AROUND THE WORLD

Recently, there are many petitions have been raised against Monsanto, and other big GMO companies. In a list of petitions on the internet we could see the recent petitions:

"102689. Louise Afanasiw from Plymouth, MA signed this petition on Sep 7, 2014.
102688. Catricia Guerrero from bakersfield, CA signed this petition on Sep 7, 2014.
102687. Laura Davis from Hopkinton, MA signed this petition on Sep 7, 2014.
102686. M K Smith M D from Mankato, MN signed this petition on Sep 7, 2014.
102685. Sarah from Newportville, PA signed this petition on Sep 7, 2014.
102684. Laura Struckel from Lodi, OH signed this petition on Sep 7, 2014.
102683. Jenny Singleton from Australia signed this petition on Sep 7, 2014.
102682. trees from Netherlands signed this petition on Sep 7, 2014.
102681. Diana Steenhuis from Netherlands signed this petition on Sep 7, 2014.
102680. Cherry Garcia from Vacaville, CA signed this petition on Sep 7, 2014" (Katherine Paul 2014).

Regardless to the explicit and implied reasons beyond the invasion of Iraq and whether the United States has gained or not since 2003, many Iraqi scientists and experts in filed believe that what have been applied in Iraq is a part of a big game and adopting the new Iraqi patent Law in which grant protection to the Genetically Modified Organism is one of them. The Former American Secretary of State Hennery Kissinger said one "Control oil and you control nations; control food and you control the people" (Heinz & Agenda, 2012).

3. SOLUTIONS AND CONCLUSION:

In conclusion, a court in Iraq might go with protecting the invention. There are many reasons that the court would do so:

A. The protection to the invention for genetically modified seeds is existed almost in most of the world countries, and Iraq would not be different than these countries.

B. Iraqi government is seeking to be a part of the World Trade Organization, in which invention of genetically modified is protected unless it is found a threat to human health or the environment, even this issue is different among countries regarding to different tests of procedures they use. (Anderson & Nielsen, 2001) Moreover, as has been mentioned above, that the new Iraqi patent law (Order 81) has prefaced by saying "the demonstrated interest of the Iraqi Governing Council for Iraq to become a full member in the international trading system, known as the World Trade Organization, and the desirability of adopting modern intellectual property standards" (Authority, 2004)

C. Since the Iraqi constitution of 2005 has not granted reusing genetically modified as the constitution of 1907 did, then it is not a constitutional issue.

D. The only law applies in this situation is the (order 81) that because it is the only law in which handle such an issue, in other words, we could say it's the only valid law deals with GMOs.

E. The issue of a third party has solved in the United States of America, in the same time the new law (order 81) has not talked about it, so if such a case raise up to an Iraqi court, they might go with the same decision that the United States Supreme court came down with.

F. As I have been mentioned above about the Long term contract that Iraqi government has signed to import genetically modified seeds from United States big companies, there are no online evidence show such a contract. Taking in consideration that there are some articles talking about a long term contract and assuming that no traditional seeds left to cover all the Iraqi farmers' need. "The US, however, has decided that, despite 10,000 years practice, Iraqis don't know what wheat works best in their own conditions, and would be better off with some new, imported American varieties. Under the guise, therefore, of helping get Iraq back on its feet, the US is setting out to totally reengineer the country's traditional farming systems into a US-style corporate agribusiness" (Smith, 2008) The British Writer Jeremy Smith Said .If the Iraqi Government wants to start providing the farmers with traditional (conventional) seeds then it has to override any contracts been signed with these big American seeds companies even if there are any penalties clauses.

G. Along with the solution in number 6 above, Iraq might start importing traditional seeds from these countries which are still using the traditional seeds for planting.

H. One important solution to this issue would be the project that 'FAO' is working on which mainly focusing on rebuilding the Iraqi International seeds bank. FAO has clarified this project by addressing the steps in which list as two main activates:

a. The First, by the collaboration with the ministry of agriculture all together to develop the equipment and seeds needed in field. Also, FAO helps to renovate the destroyed and damaged seeds centers and laboratories.

b. The Second, FAO promised to contribute support regarding to the aspect of polices and new seed law.

References

Anderson, K., & Nielsen, C. (2001). GMOs, the SPS Agreement and the WTO. *The Economics of Quarantine and the SPS Agreement*, 305.

Authority, C. P. (2004). *Coalition Provisional Authority Order Number 81: Patent, Industrial Design, Undisclosed Information, Integrated Circuits and Plant Variety Law*: Coalition Provisional Authority.

Boylan, M. (2013). *Environmental Ethics*: Wiley.

Hughes, J. (2013). Bowman v. Monsanto Company. *Public Land and Resources Law Review*(1), 56.

Heinz, A., & Agenda, T. U. N. W. (2012). Henry Kissinger: "If You Can't Hear the Drums of War You Must Be Deaf" accurate satire: Kissinger, the most famous living practitioner of international statecraft. Retrieved 19/12, 2014

Iraq, T. T. F. P. M. f. (2005). Rebuilding Iraq's collapsed seed industry. http://www.un.org/News/Press/docs/2005/sag390.doc.htm Food and Agriculture Organization.

Katherine Paul. Hillary Clinton: It's time to dump Monsanto and support public health, and regenerative, organic agriculture. Retrieved 19/12, 2014

Lane, J. (2006). NTP, Inc. v. Research in Motion, Ltd.: Inventions Are Global, But Politics Are Still Local-An Examination of the BlackBerry Case. *Berkeley Tech. LJ, 21*, 59.

Patent and Industrial Designs (1970).

Seabrook, J. (2007). Sowing for apocalypse. *New Yorker, 27*, 60-71.

Smith, A. (2008). Seeds of False Hope: The Occupation of Iraq Farming Economy. *celsius Trade Journal* Retrieved 19/12, 2014

Whitman, D. B. (2000). Genetically modified foods: harmful or helpful? *CSA Discovery Guides. Np*.

Interseasonal Accumulation of Solar Heat

Doğan Özdemir

Ishik University, Erbil, Iraq, Email: dogan.ozdemir@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: The sun has been a powerful source of energy for years. Solar energy is the solar radiation which reaches the surface of the earth. The energy coming from the sun is immense. The potential of Solar Energy is at least 100 times greater than any other renewable energy source. The solar energy can be converted in other forms of energy such as heat and electricity. This information made us to conclude that the way of receiving the thermal energy by converting it from the solar energy is a good and relatively cheap way. So, the basic purpose of our project is the developing of a construction for interseasonal accumulation of the solar heat and using it in the form of thermal energy.

Key Words: Interseason, Thermal Energy and Solar Radiation

The solar energy

The sun has been a powerful source of energy for billions of years. Solar energy is the solar radiation which reaches the surface of the earth. The energy coming from the sun is immense. The potential of Solar Energy is at least 100 times greater than any other renewable energy source. The solar energy can be converted in other forms of energy such as heat and electricity. In 1830s, the British astronomer John Herschel used a solar thermal collector box (a device that absorbs sunlight to collect heat) to cook food. Nowadays the solar energy is used by people for lots of things. The traditional resources used in producing the thermal energy like gas, are not renewable, they are limited. With approaching to this limit it's logically to suppose that the cost for these resources will grow. We've studied information about the solar radiation reached to the surface of the earth during the year, about the consumption of the thermal energy in our country, the information about the prices for the thermal heat produced by traditional methods and for the materials used in converting solar energy into thermal energy. All this information made us to conclude that the way of receiving the thermal energy by converting it from the solar energy is a good and relatively cheap way. So, the basic purpose of our project is the developing of a construction for interseasonal accumulation of the solar heat and using it in the form of thermal energy.

Problem

The basic problem in usage of the solar heat in purposes of a heat supply is that the solar heat is mostly received in warm seasons, but the basic need of it takes place during the winter period.

Hypothesis

This project is looked at the opportunity and expedience to create an interseasonal accumulation of the solar heat by using innovative technologies. The price for the thermal energy received with the help of the construction is expected to be lower than the price of the same energy received by traditional methods.

Materials and Methods

The basic way of getting the data and the results was the mathematical way, or in other words the virtual way. In this chapter you will see the tables with our results which we obtained during our research. Our construction is collecting the solar energy and accumulating it in the same time, so we named it like collector-accumulator. The temperature of water used in heating houses in the winter period is approximately 70 ^{0}C, so our research's basic purpose is to achieve this temperature of water in our reservoir.

The construction is composed of 3 main parts:

1) The field of solar collectors

2) Floating platform

3) Water reservoir

To show different possibilities to build our collector-accumulator, we have researched 4 different constructions for the field of solar collectors:

- I – Horizontal solar collector without a transparent protector. Maximum water temperature reached – 40 ^{0}C.

- II – Horizontal solar collector with a transparent protector. Maximum water temperature reached – 70 ^{0}C.

- III – Rows of collectors which have a constant angle of inclination (30 ^{0}) with a horizontal surface. Maximum water temperature reached - 70 ^{0}C.

- IV - Rows of collectors which have an adjustable angle of inclination with a horizontal surface. Maximum water temperature reached 70 ^{0}C.

Basic parameters of the construction's elements **Table 1**

No.	Name of the construction's element Value of the element's parameter	I	II	III	IV

1	Reservoir Diameter, m Depth, m Volume, m^3	 100 6.6 51800	 100 6.6 51800	 100 6.6 51800	 100 6.6 51800
2	Floating platform Area, m^2 Thickness of the platform, m	 7850 0,3	 7850 0,3	 7850 0,3	 7850 0,3
3	Field of solar collectors Area of the field, m^2 Number of rows	 7850 1	 7850 1	 5703 38	 7500 50
4	Heating-pump installation Power, kW	 160	 160	 -	 -

I – Horizontal solar collector without a transparent protector. Maximum water temperature reached – 40 ^{0}C (by using a heating-pump installation we increase the temperature to 70 ^{0}C).

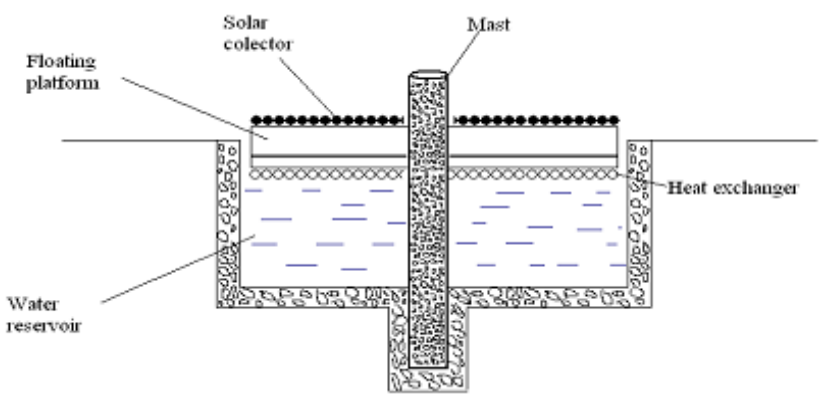


Fig. 1 Horizontal solar collector without a transparent protector.

II – Horizontal solar collector with a transparent protector. Maximum water temperature reached – 40 ^{0}C (by using a heating-pump installation we increase the temperature to 70 ^{0}C).

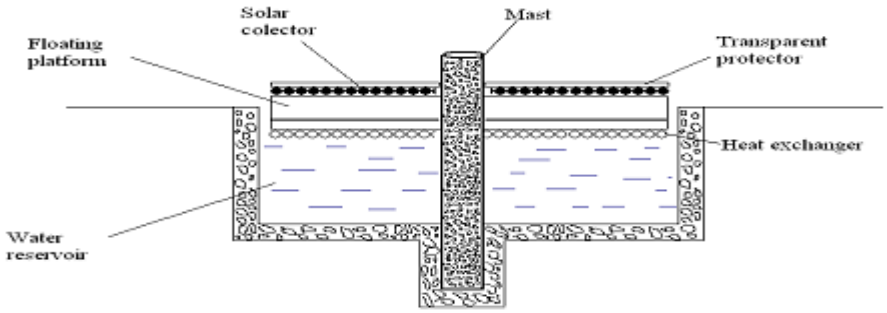


Fig. 2 Horizontal solar collector with a transparent protector.

III – Rows of collectors which have a constant angle of inclination (30 ^{0}) with a horizontal surface. Maximum water temperature reached - 70 ^{0}C.

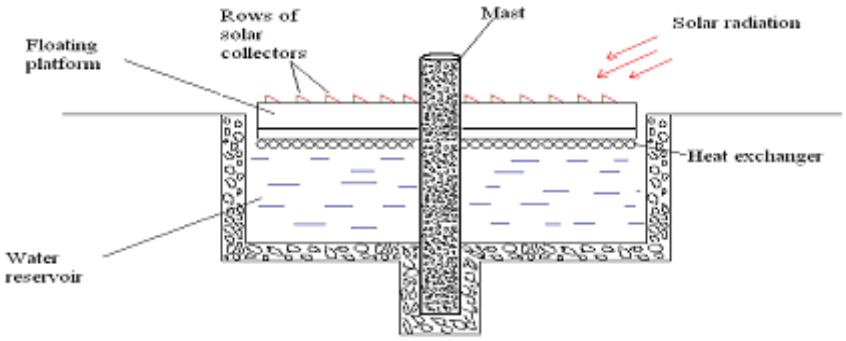


Fig.3 Rows of collectors which have a constant angle of inclination (30 ^{0}) with a horizontal surface.

IV - Rows of collectors which have an adjustable angle of inclination with a horizontal surface. Maximum water temperature reached 70 ^{0}C.

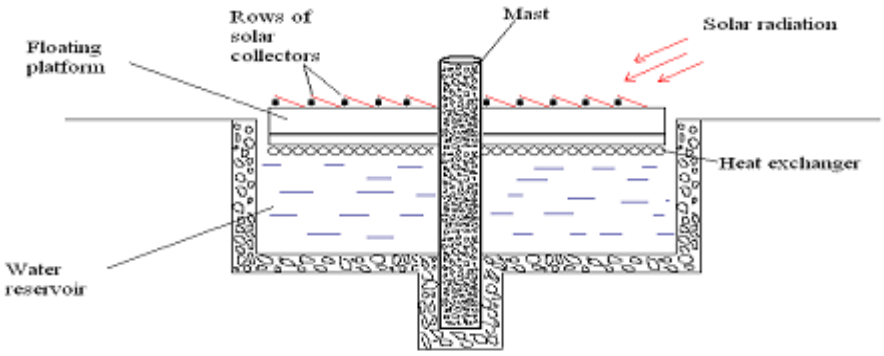


Fig.4 Rows of collectors which have an adjustable angle of inclination with a horizontal surface

Structure of the floating platform:

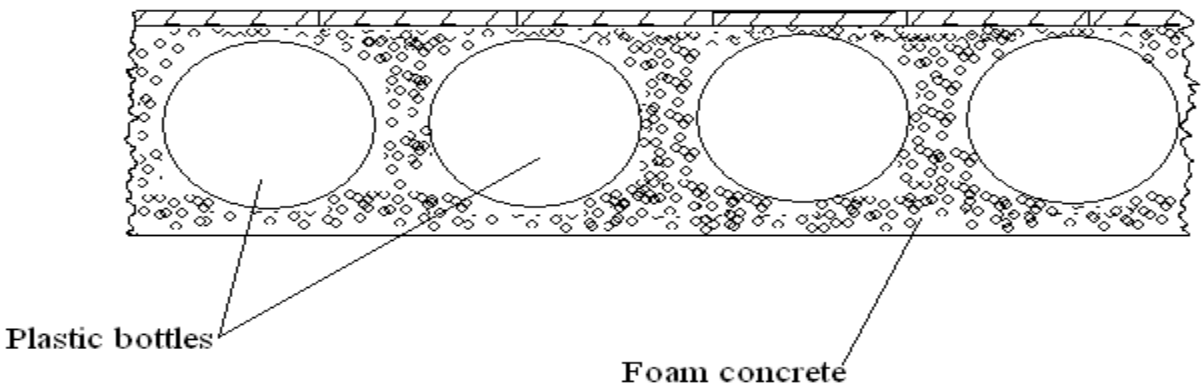


Fig.5 Structure of the floating platform

Collector's construction:

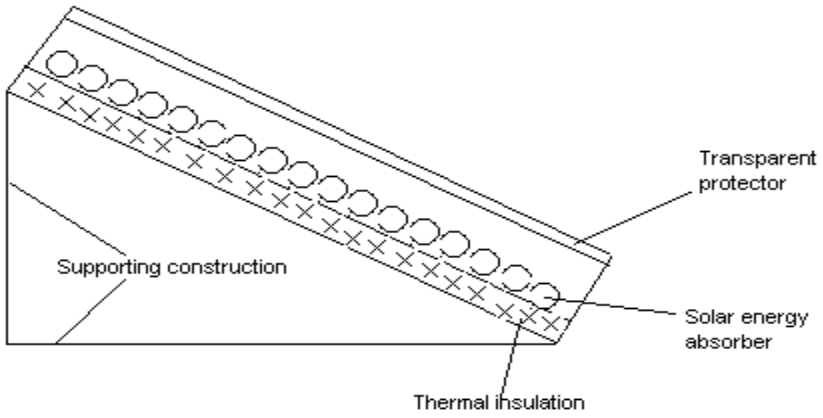


Fig.6 Collector's construction

Initial data for calculating the economical parameters of the collector-accumulator **Table 2**

Name	Value	Units
System lifetime	15	years
Present unit energy cost, c_q	0.12	$/kWh
Unit soil-excavation cost, c_e	3	$/m^3
Polyethylene tube	0,27	$/m
Armature	660	$/t
Thermo-insulation	90	$/m^3
Plastic bottles	0.01	$ per unit
Foam concrete	120	$/m^3
Polycarbonate	18	$/m^2
Concrete	90	$/m^3
Water-resistant veneer	5	$/m^2
Heating-pump installation	500	$/kW

Amount of materials and prices

Field of solar collectors

Length of the polyethylene tube spiral, D=20mm :

Number of turns $Nt = D_p/D = 100/0.02 = 5000$

Average length of the turn $La = 0.5\pi D = 157$m

Length of the spiral $Ls = LaNc = 785000$m

Table 3

Materials	I	II	III	IV
Polyethylene tube, m Cost, thousands $	785000 212	785000 212	142500 38	185250 49
Polycarbonate , m^2 Cost, thousands $	-	7860 141	5700 102	7500 133
Water-resistant veneer, m^2 Cost, thousands $	-	-	5700 29	7500 38
Thermo-insulation, m^3 Cost, thousands $	-	-	285 25	370 33

Additional equipment (supporting construction, hydro cylinders) Cost, thousands $	-	-	Supporting construction 1	Hydro cylinders 13
Total, thousands $	212	353	188	266

Floating platform **Table 4**

Materials	I	II	III	IV
Foam concrete, m^3 Cost, thousands $	943 113	943 113	943 113	943 113
Polyethylene tube of the heat exchanger, m Cost, thousands $	392000 11	392000 11	392000 11	392000 11
Armature, m Mass, kg (t) Cost, thousands $	78600 30654 (30,6) 20	78600 30654 (30,6) 20	78600 30654 (30,6) 20	78600 30654 (30,6) 20
Plastic bottles, pieces. Cost, thousands $	300000 3	300000 3	300000 3	300000 3
Total, thousands $	243	243	243	243

Reservoir

$$V = (2\pi R^2 + h2\pi R)\delta_w$$

δ_w =0.3 m, thickness of the reservoir's wall, h = 6, 6 m – reservoir's depth

$L_\Sigma = L_1 S_\Sigma$ L_1 =10m Armature's length on 1 m^2, S_Σ =17700$м^2$ area of the walls;

$m_\Sigma = m_1 L_\Sigma$ m_1 = 0,39kg/m, mass of 1m, 8mm armature;

L_Σ = 177000 m, total length of the armature

Reservoir, amounts and costs of the materials and the dredging **Table 5**

Materials	I	II	III	IV

Concrete, m^3 Cost, thousands $	5310 478	5310 478	5310 478	5310 478
Length of the armature, m	$17,7*10^4$	$17,7*10^4$	$17,7*10^4$	$17,7*10^4$
Weight of the armature, kg (t) Cost, thousands $	69000 (69) 45	69000 (69) 45	69000 (69) 45	69000 (69) 45
Dredging Cost, thousands $	155	155	155	155
Total, thousands $	**678**	**678**	**678**	**678**

Results

Energetic parameters of the collector-accumulator

Annual energetic parameters of the construction Table **6**

Construction and the operating mode	I	II	III	IV
Efficiency of the solar collector	0,4 (40 ^{0}C)	0,3 (40^{0}C)	0,35 (70 ^{0}C)	0,4 (70 ^{0}C)
Efficiency of the accumulator	0,8	0,8	0,8	0,8
S_{sc} , m^2 Area of the solar collectors' field	7850	7850	5703	7500
E_1 Energy received by 1 m^2 of the solar collectors, GJ/ m^2 (MWh/ m^2)	**2.5** **(0.7)**	**2,5** **(0.7)**	**5.4** **(1261*1,2= 1.5)**	**5.8** **(1261*1,3= 1.6)**
$E_g = S_{sc} * E_1$ Energy received by the of the solar collectors, TJ (GWh)	**5.6** **(1.5)**	**5.6** **(1.5)**	**19** **(5.2)**	**21** **(5.8)**
$E_{us} = E_g * \eta_{sc}$ Useful energy of the solar collectors' field, TJ (GWh)	**2.2** **(0.6)**	**1.6 TJ** **(0.4)**	**6.6** **(1.8)**	**8.4** **(2.3)**

$E_a = E_{us} * \eta_a$ Useful energy of the accumulator, TJ (GWh)	**1,7 (0,48)**	**1,2 (0,32)**	**5,3 (1,4)**	**6,7 (1,8)**

Calculation of annual parameters of the collector-accumulator with the heating-pump installation.

Heating period: November-March ($\tau \approx 5*30*24=3600$h)

Cost of electrical power: $C_{EP} = E_p P_p$ P_p - the tariff for the electric power;

$E_p = E_a/K_P$ - the electric power consumed per year.

The initial data for calculations of technical and economical parameters of the CA

Price of natural gas .....360$/thousand m^3

Inflation in the country.....10%

Rate in rising of the natural gas' prices.....12%

The period of the analysis of technical and economical parameters..... 30 years.

Service life of the solar collectors.....15 years

Heating-pump installation's resource….....60 th. h

Based on our procedures and methods, the period of the investments recovery can be found from the next formula : $\tau_r = I_0 / (VEN_b - C_a)$, where I_0 are the first investments; VEN_b - annual amount of saved natural gas due to the usage of the CA; C_a - annual costs for CA exploitation. The cost price of the solar heat we found with the next formula: $C_{sh} = (I_0 / \tau_l + C_a) / E_a$ where τ_l - settlement term of CA operation (the technical life of solar collectors); E_a - useful energy of the CA. The saved volume of natural gas we can find with the formula $V = E_a / q\eta$ where $q\eta$ is the efficiency of the natural gas. In our calculations we took η =0.8 and q = 32 MJ/m^3. The annual prevented emission of the CO_2 we calculate by proceeding from the annual volume of saved gas and also the dioxide of carbon formed at burning of 1m^3 of natural gas.

Table 7

Initial investments	**thousands. USA$**	1470	1680	1430	1650
Annual costs	**thousands. USA$**	12.7	12.7	-	-
Volume of saved natural gas	**thousands. USA$**	215	333	266	412
Annual cost of the natural gas	**thousands. USA$**	77	120	96	148
Cost price of the energy received					
	$/KWh	**0.23**	**0.39**	**0.08**	**0.06**
	Lei/Gcal	**2700**	**4500**	**900**	**600**
	Euro/MWh	**300**	**500**	**110**	**80**
Recovery of the investments	**$\tau_{ок}$, Years**	**22**	**16**	**17**	**12**
Prevented emissions of CO_2,	t/**year**	**120**	**186**	**150**	**231**
Prevented emissions CO_2 for 30 years	thousands t.	**3.6**	**5.6**	**4.5**	**6.9**

Technical data of the first generation CSHPSS systems in Germany **Table 8**

Units	Friedrichshafen	Neckarsulm Phase I (Phase II)
Housing area	Planning: eight multi-family houses with 570 apartments	Six multi-family houses, commercial centre, school, etc.
Heated living area, m^2	39,500	20,000
Total heat demand, MWh per annum	4106	1663
Solar collector area, m^2	5600	2700 (5000)
Heat storage volume, m^3	12,000 (hot-water)	20,000 (duct) (63,400)
Heat delivery of the solar system [a], MWh per annum	1915	832
Solar fraction [a], %	47	50
Cost of the solar system (excluding subsides), Million Euro	3.2	1.5
Solar heat cost [a] (excluding VAT and subsides), Euro/MWh	158	172

[a] Calculated values for long-time operation.

After comparing the values from the Table 8, we can say that our energy is cheaper that the thermal energy obtained by the CSHPSS systems in Germany.

Conclusion

The considered technical and technological decisions of the problem of interseasonal accumulation of solar heat showed us, that there is a good possibility to build a construction which can be a good opponent to the centralized heating systems which are using natural gas, and also is cheaper than the large combined solar-fuel systems used in Europe. The further work should be directed on the searching of ways of depreciation of received solar heat, and also reduction of losses of energy to the environment.

References

1.John A. Duffie, William A. Beckman Solar Engineering of Thermal Processes, NY 2006.

2.У. Бекман, С. Клейн, Дж. Даффи - “Расчёт систем солнечного теплоснабжения”, М. Энергоиздат 1982 г.

3.T. Schmidt , D. Mangold, H. Muller-Steinhaen, “2004” – Central solar heating plants with seasonal storage in Germany, Solar Energy v.76 , 165-174

4. И. Б. Крепис Солнце-Людям, Кишинёв Штиинца 1989 г.

5.В.В.Ермуратский «3Э-Энергетика, Экономика, Энергосбережение». Кишинёв, 2005.

6.Ambros T. s.a. Surse regenerabile de energie. Manual, Chisinau: Editura «Tehnica-info», 1999.

7.Necesitati tehnologice si prioritati de dezvoltare, PNUD Moldova, Chisinau 2002.

8.Petru Tudos si altii, Energia regenerabila strudiu de fezabilitate, PNUD Moldova, Chisinau 2002.

Technology Based Teaching and Learning English Language

Naci Yildiz

Ishik University, Erbil, Iraq, Email: naci.yildiz@ishik.edu.iq

Mustafa Azmi Bingol

Ishik University, Erbil, Iraq, Email: mustafa.bingol@ishik.edu.iq

Behcet Celik

Ishik University, Erbil, Iraq, Email: behcet.celik@ishik.edu.iq

Cemil Akdeniz

Ishik University, Erbil, Iraq, Email: cemil.akdeniz@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Everything is changing inevitably in our social milieu, as well as technology, educational teaching and learning methods. There is a change in the nature of everything that we are part of. Changing is the law of nature which influences our routine life. Educational institutions have to accommodate themselves to the changing environment. Technology and technological tools play a key role in the developing world in various aspects. Computers and language teaching have united as inseparable phenomenon for a couple of decades and technology has become main part of teaching and learning tool in the language classroom. In foreign language teaching and learning process, we can benefit from such technological tools as TV, Radio, Computers, The internet, CD player, Audio Cassettes, Electronic Dictionary, Mobile devices, Power point videos, Skype, different social networks and DVDs. Internet access and software programs have eased in many aspects of our lives, as well as our educational life. Owing to technological tools, Learners learn and pick up things quicker and easier than ever due to the use of technological devices.

Computer-based education is one of them, which has brought new facilities in our life. Computer-based teaching provides influential, motivating and different way of supporting knowledge to learners. Today most of the educational foundations started teaching language teaching lessons through the operation of computational devices. Using technology in the classes brings brilliant success and outcomes. This paper attempts to present the significance of Technology in foreign language teaching. It also aims to make English language educators aware of the approaches to practice it in an active way.

Key Words: Technology, Language Learning, Mobile Learning, Technological Tools

Introduction

In the couple of last decades of the 21st century the field of technological tools obtainable to use in language learning and teaching has become very diversified and the techniques are being used in schoolrooms all around the world.

Old-fashioned teaching devices have changed rapidly over the past years. Institutes and educational areas started using whiteboards with dry erase markers instead of blackboards and chalks in some places, from thick learner-books to computers, electronic devices that place a enormous world of current, up-to-date information at learners' fingertips. Furthermore, people started using smart boards which are more beneficial, practical and ease everything for users.

The usage of technology in a number of fields has been very effective and useful for educators to gain some certain targets particularly in schooling and for those who are learning a foreign language. The impact of technology is seen all around us nowadays. Web- based teaching, learning and non – stop internet assess supplies numerous new opportunities for the development of educational technology. English language is spoken and used by many people around the world. Thanks to technology, learners learn faster and easier than ever. It is obviously known that English has become a necessity of today.

The numbers of people, who are in need of English language, are increasing day by day. Technology supplies numerous possibilities to make teaching more fascinating and also make teaching more creative .Technology is one of the vital important tools for social and linguistic changes. The usage of English language has improved quickly after 1960. Nowadays English language is known as public context, political, sociocultural, commerce, schooling, industries, media, library, communicating along with boundaries, and essential matter in curriculum. As there is enough number of English learners in different parts of world, a good number of new teaching methods have been applied to investigate the effectiveness of the teaching process. As educators, we always seek for new approaches of instruction, new skills to use in the classroom to maintain the needs of our learners. Multimedia is one of them in ELT so as to form English contexts. English is being learned and used by a good number of speakers.

Explanation and Significance of Technology

Technology is a device that could change the nature of education. Essentially, technology is a word which is used to define different things to different persons. Pcs and digital devices are combined into education, no matter where you are or what you are doing. As a matter of fact, technology is a complicated norm in our life, which is changing our society and nowadays world. Briefly, Technology is designed to ease person`s life. Technology has become an indispensable part of our lives in recent years. We wake up with technology, we live with technology, and we act with technology, now it is essential to know how to benefit from technology and get our learners involved in the importance of technology in daily and academic life.

Technology plays great role in learning, teaching communicating, and in today's economic world. We are all somehow involved in technology in our daily lives. As for educational world, it eases everything both for our students and teachers. Since, things can be done easily, quicker and cheaper than ever. Technological devices should be used in the right place at the right time properly. Technological tools should be provided for teachers by educational institutions.

Teaching English via Technology

Writing and reading in English language quite different from each other, that is why, one needs to have correct pronunciation of each word that he or she hears. In this case, technological tools would play great role so as to get proper sound of the word by using technological devices , multimedia is the best option for those kind of complications. Each institute likes to have qualified instructors who are good at using technological tools.

If we do not follow new developments of Technology, we would remain behind humanity, since technology is a norm which never stops. As instructors we should aware of everything regarding technological inventions than anyone else in order to be a creative, productive and open-minded one. Contrary to teachers who use advanced technology, there are still a good number of teachers still teach in the traditional way. The traditional way has been used so far by majority of teachers as the easy and the known one. Nevertheless, there are numerous ways to be used by learners to advance their knowledge, especially for EFL learners who learn the language for pleasure. If the learners keep up with ELT via technology, especially, multimedia, they will get more confidence and success.

The Development of ELT Owing To Technology

Indication recommends that there can be important variability in practitioner and learner confidence with ICT (Wild, 1996; Ertmer and Ottenbreit-Leftwich, 2010, Ertmer et al. 2011), even though this is a speedily changing image as new generations of learners who have grown up in a digital world come into classes.

Globalization has progressed rapidly in the 21st century and is vital to comprehend on different foreign languages and especially, English language placed first. English Language Teaching has been taught for years and the importance of it is increasing day by day, nowadays, technology-based learning has become more popular by using the Internet.

Eventually, if educators do not use or be familiar with technological developments, they will not be able to catch up with new improvements regarding technological devices. Therefore, it is necessary for today`s language instructors to be involved in the up-to-date and finest innovations of technology and have a full knowledge of it, that they can be used in any given condition. Using technology colors and stimulates classes.

Benefits of Technology In Teaching And Learning English Language

Developing Learners' Awareness in Study

Since technological learning, teaching, and multimedia technology, entered to our life, naturally, the stereotyped traditional teaching methods is not used as it used to be. Because, multimedia technology compromises a sense of reality and functions very well, furthermore, technological devices color and ease the teaching and learning for both teachers and learners. At the same time, urge learners and instructors to take part in study and in class activities.

Upgrading Learners' Communication Capability

Traditional-based teaching and learning have hindered learners' capability to understand definite language and comprehending to meaning, function and structure of the language, in this case, learners are reluctant to knowledge. Therefore, it is difficult to get the goal of communication. We can see that multimedia technology teaching has great influence on students' positive thinking and communication skills in learning.

Advancing Learners' Awareness to Obtain Conceptual Understanding to Different Ethos

The multimedia–based classes can provide limitless resources to learners; furthermore, due to the multimedia; learners do not have to have more textbooks than ever, and owing to fast internet access, learners gain new innovations regarding education, vivid cultural background, wealthy content and language equipment, which are much vital and more important to us. Owing to these developments of multimedia of technology, students much more advance their listening ability and different culture as well. Students can enrich their knowledge by visiting different web sites or apply to different materials which are based on technological devices such as; computer Radio, TV, CD player, Computers, Audio Cassettes, Power point videos, The internet, Electronic Dictionary, Mobile devices, social networks, Skype and DVDs. Those devices that we mentioned above are going to help to students to be more active in classes and take part in discussions and communications.

Developing Teaching Effectiveness

Multimedia technology-based teaching improves teaching substance, accomplishes the better classes and provides to learners much more the "student- centered" classes. Owing to big classes, it is hard to have speaking classes with learners. The traditional teaching method most of the time delivered by instructors, which is known as teacher-centered learning as well, and the sources provided or given to students are limited owing to traditional courses. On the contrary to all these, multimedia technology improves all the time, proves more vivid, visual, authentic atmosphere for language learners.

Improving contact between instructor and learners

Multimedia teaching stresses the role of students, and improves the significance of "interaction" between teachers and students. One of the best advantages of multimedia teaching is to educate and advance learners' capability to language skills, especially, listening and speaking skills. Multimedia technology in framework formation makes a decent stage for the interchange between educators and learners.

Forming Framework for Language Teaching

Multimedia based teaching makes a framework for language teaching. This process forms the class dynamic and fascinating. There are features of technological tools which have their own features such as, distinguishability and dynamism. As we are having classes by using technological tools, especially, multimedia devices for language teaching, echoes and images could be established together, which enriches the enterprise of both educators and learners. As using multimedia software, which provides to students to see pictures, sounds and images to color and improve the content of lessons. Multimedia devices could be used by learners to comprehend the content of classes attentively and easily.

Learning

Teaching depends on the willingness of the learning. In order to teach better, it is essential to comprehend how one can learn. In this case, we need to find out that how mankind picks up and then we could plan teaching platforms for active learning. Furthermore, for active learning as teachers we need to identify about concepts of learning which are vital in learning. Before we teach, we should have clue regarding the theories of learning as well.

Internet-Based Learning

Things have been improved rapidly regarding learning in recent years; web-based learning has become popular nowadays. Via internet, one could keep up with new technological innovation and even could study by coining on line educational programs, at the same time, this called as technology- based or distance learning as well. A plenty of fundamental language skills could be advanced due to the web-based system. As we know that; there are four fundamental skills in language learning which are speaking, listening, reading and writing. One can get limitless materials on these skills by visiting appropriate web sites. There are enough tools to communicate in internet such as e-mail, blogs, chat rooms and educational web sites. These devices ease the way of learning by using internet both for educators and learners. Learners normally get positive atmosphere regarding web-based learning devices, when devices are; Well-prepared, designed attractively and easy to learn. When the device is used as maintenance, but as replaced of teachers.

The Role of Technological Tools in Effective Teaching and Learning English Language

Skype

Skype is a social program that provides to learners have both visual and sound functions that can be used on device called laptops, which have cameras on them. So learners are able to talk with their teachers. There are a lot of similar programs on internet that can be used in the same way, such as tango, messenger, and face book and so on.

Through these tools, learners can communicate with native speakers of English language and evaluate their pronunciation with the correct one. Learners can deal with different people who are native from different places for a very short time and with less expenditures , especially by

getting in touch with university professors and lectures, learners can develop their speaking comprehension skills too. These skills can be advanced by using this relevance.

Portable Devices

The world is changing rapidly, as well as technology by which, we are doing our routine daily works. Developing of technology is fast. Portable tools learning are one of those technologies which have been used for a very short time. Portable devices allow learners to expose to the target language any time.

IPod

IPod is one of the portable media tools which allow users to create, arrange, send, and utilize media; furthermore, users can allocate texts, images, audio or video with their partners and instructors. Listening skills in language learning can be developed by using podcasting and iPod.

Conclusion

We do not only learn or teach in the classroom; but also learn wherever we are. Learning is continuing constantly. Therefore, technological tools need to be continuously used by learners and instructors. So as to make an available contact among language students and educators, Internet networks and portable tools are beneficial approaches in English language learning. As computer database providers, designers, and bilingual persons increasingly impulse the new developments regarding this aria, English language teachers might be able to use the fundamental devices of internet. It could be stated that, academics or investigators make sufficient researches on web based language learning, hence fort h, they ought to create collaborative language classes and hearten tutors to build their own class works by using webs and as a result, instructors should be able to use technological tools in their classes, and be aware of every single innovation regarding technology.

References

Bates, AW (2005) Technology, e-learning and distance education. London: Routledge

Bax, S (2003) CALL – Past, present and future. System 31/1: 13–28

Bax, S (2011) Normalisation revisited: The effective use of technology in language education. IJCALLT 1/2: 1–15.

Ertmer and Ottenbreit-Leftwich, 2010, Ertmer et al. 2011), although this is a rapidly changing picture as new generations of pupils who have grown up in a digital world come into classes

Ertmer, PA, Newby, TJ, Liu, W, Tomory, A, Yu, JH and Lee, YM (2011) Students' confidence and perceived value for participating in cross-cultural wiki-based collaborations. Educational technology research and development 59/2: 213–228.

Ertmer, P and Ottenbreit-Leftwich, A (2010) Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. Journal of Research on Technology in Education 42/3: 255–284.

Salaberry, MR (2001) The use of technology for second language learning and teaching: A retrospective. The Modern Language Journal 85/1: 39–56.

Warschauer, M (2003). Demystifying the digital divide. Scientific American,289/August:42–47.

Vavoula, G.N., Sharples, M., and Rudman, P.D. (2002). Developing the 'Future Technology Workshop' method. In Bekker, M.M., Markopoulos, P., Kersten-Tsikalkina, M. (eds.) Proceedings of the International Workshop on Interaction Design and Children, Aug 28-29, Eindhoven, The Netherlands, pp 65-72

Vavoula, G.N., and Sharples, M. (2002). Requirements for the Design of Lifelong Learning Organisers. Sharples, M., and Vavoula, G. (eds.), MLearn 2002: Proceedings of the European Workshop on Mobile and Contextual Learning, Jun 20-21, Birmingham, UK, pp 23-26.

Wild, M (1996) Technology refusal: Rationalising the failure of student and beginning teachers to use computers. British Journal of Educational Technology 272: 134–143.

Water Cleaning

Doğan Özdemir

Ishik University, Erbil, Iraq, Email: dogan.ozdemir@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Our planet is suffering under pressure of plenty ecological problems. There are a lot of big problems, but the main is that of household solid wastes. The number of solid wastes is growing constantly. In a day one earth's inhabitant produces 2-4 kilograms of rubbish, this means that the daily average on planet is 8-16 millions tones. Hence in a year we get the number of 3-6 milliards of tones of household wastes.

Keywords: Ecology, Solid Wastes, Rubbish.

Introduction

Solid waste presents not just losses of natural resources, but also springs of pollutions and acute diseases, not only for humans, but for all living things of the ecosphere too.

The Republic of Moldova is not an exception, so it beares this problem as all the countries do. In our country this problem consists of:

1) Pollution of soil and underground waters by municipal solid waste.

2) Throwing down of household rubbish especially in rural regions.

3) Uncountable lacks in infrastructure of household wastes collection, or even its absence in some localities.

4) Lack of necessary quantity or recycling stations.

The only efficient method to reduce the wastes volume is the recycling of used materials, what means introducing them into new production circles.

Therefore, in our project, we provide a concrete plan with a topical solution for overcoming the present situation in our republic.

Description of Problem

Nowadays in Republic of Moldova there are 1700 legal garbage dumps from which just 301 correspond to standards. Total surface of garbage depositaries area constitutes to 1144 ha, where are located approximately 29,4 mil. m^3 of wastes, or 6.8 m^3/inhabitant. Those are statistics which do not count the garbage which collects illegally in forbidden places. Results of this are evident: awful smell, infection

vectors attracted by rubbish (rats, gnats, flies etc.) and sewage channels blocked with wastes. This situation established because the mayoralties are in shortage of money and even don't own sufficient amount of transport and fuel for garbage evacuation, hence in a lot of localities appear spontaneous and illegal garbage dumps.

The majority of landfills from Moldova are not any more capable to accumulate wastes, but their exploitation reaches or overcomes admissible ecological standards. But other garbage dumps cannot be built, because of lack in financial sources and available territories. Although our country is not so big, but making an implementation plan to cover the whole republic is very hard, and sometimes impossible. That's why for our project we had chosen one region of Moldova, Strasheni.

The district of Strasheni is located in the very center of R.M. 25km straight away from Chishinau. The district includes 27 mayoraties with 37 viliages and 2 towns in which there are approximatly 80 000 people living. Strasheni is one of most polluted areas in Moldova. You can notice garbage everywhere: on the streets, at shops, on trees, and especially in ravines. The mayoralty carries out some actions for cleaning the district, but after a while the garbage appears again. What is the reason?

Dust gathering in regional centre Strasheni is made 3 times per week. The problem is that in the town has established only 52 refuse bins which could serve only 15 blocks of flats, in the best case. Only 85% of the population of the district exports the garbage independently, but unfortunately not all of it gets to the landfill.

On the territory of the district there are a lot of water resources like: r.Bic; r. Ichel; r. Işnovăţ. Bic flows into Gidighici, one of the greatest water reservoirs of Moldova, from which the city of Chisinau partially fills up its water resources. Together with sewage in the rivers penetrates toxic results of decomposition of rubbish, and non degradable garbage: plastic, polyethylene, glass.

How you probably observed, Moldova, but especially the district of Strasheni, faced a great garbage crisis and for its suppression we need to know our enemy's structure. So let's discuss about the garbage composition and its hazard. It is clear that no so much people sked them selves which is composition of garbage. If to think deeply, it is evident, who is interested in his garbge bin's content? This fact makes up the biggest problem of humanity, the indiffernce, we never think of what's really important. So let's correct our mistakes, and take a look inside our litter bin!

In general the garbage consists of: food waste- 28-45%, paper and cardboard- 20-30%, wood- 1,5-4%, black metal - 1,5-4%, colur metal - 0,2-0,3%, textile 4-7%, glass-3-7%, leather, rubber- 1-4%, rock's, highly glazed plottery- 1-3%, plastic-8-11%, dust- 7-18%. If a wise man would look at the upper statistics, he would say that 70% of rubbish can be recicled. It sounds to be true!

Then one question is appearing: "why in developed countries in best case are recycled 15% of wastes, but in poor countries (Third World's countries) nobody even talks about recycling? There are a lot of reasons of such lacks in wastes recycling industry : absence of investitions and government's suport, citizen's indifference, but the biggest one is the intermixing of municipial solid waste. Rubbish represent serious menace for the environment, if it isn't stored, kept and eliminated coresponding to standards.

As an example we can take some things that we throw away. Iron cans are made of zinc, tin and iron which are poisonous for many organisms. Batteries for instance are very poisonous consisting of zinc, coal, alkali and manganoxide (this substances are extremely harmful).

Thus we get closer to the most widespread, harmful and difficult collected pollutant - plastic.

Because it:

1) Slows down gas exchange in soil and allocates toxic substances.

2) Its mass fraction in municipal solid waste is of 4-6 %.

3) Is the most durable material (average speed of decomposition of 250 years).

4) Requires significant quantities of resources, primarily fossil fuels, 4% of the world's annual oil production is used as a feedstock for plastics production.

Plastics production also involves the use of potentially harmful chemicals, which are added as stabilizers. Many of these have an impact on human health, for example: phthalates, which are used in the manufacture of toys for young children and there has been a concern that phthalates may be released when these toys are sucked (come into contact with saliva). That's why in our project we are going to pay the greatest attention on the plastics and it's recycling. The world's annual consumption of plastic materials has increased from around 5 million tones in the 1950s to nearly 100 million tones today. We produce and use 20 times more plastic today than we did 50 years ago!

There are about 50 different types of plastics, with hundreds of different varieties. All types of plastic are recyclable. To make sorting and thus recycling easier, there were developed a standard marking code. These types and their most common uses are on our table you can observe it anytime. By means of our technology from all of these plastics we can get by recycling qualitative roofing material and tile.

Objectives

1) Ecological education of the population.

2) 100% informing all population of the district about necesity of regular centalized waste gathering and the importance of the garbage separation in each house.

3) Liquidation of old incorectly constructed and administrated landfills .

4) Creation of a new dump which will correspond to all ecological standards

5) Instalation on the district's territory of 460 special garbage separating refuse bins .

6) Adjustment of the constant, centralized gathering and waste exporting sistem.

7) Creating of plastic recycling factory, which will produce qualitative and cheap roofing materials.

8) Exporting other recyclable wastes (glass, paper, metall) to the factories as raw materials.

9) Improving of living standards of population.

Strategy of Project

Our project will begin, as it is necessary to any action, from a theoretical part, by means of propaganda at schools and at public meetings, by workers of ecological service and volunteers. Volunteers will be students of 9-12. We and ecological department will provide trainings with them after which they, during 3 months, will work with population. The second part consists of leaflets sticking and distribution, or mailing them. We also will get connected to this business whenever possible. The main goal of the propagation part will be ecological education of the population, which will help them to realize the necessity of separate gathering of garbage under all ecological standards, and attraction of local investors.

***** For attraction of investors, we plan to release the new recycling factory from taxes for 3 years that will allow the investors to return back faster primary expenses (this privilege certainly should be achieved by the mayoralty of Strasheni).

***** Keeping to our project townspeople will have a new duty to sort the trash and in exchange for it they will be released from taxes for exporting the trash. But those who are not observing rules will be punished by administrative penalties.

Only after heavy informational work and finding of the investor it is possible to start directly a practical part of the project.

We plan implementation of our practical part by following steps:

1) The present dump will be back filled, as it does not correspond to ecological requirements. Will be created 2 new dumps which will match international ecological requirements.

2) On the territory of district will be established totally 460 complete sets. Each complete set consists of two containers. One of them will be divided into 4 cells, for glass, plastic, metal and paper. In second, simple container rest of garbage will be thrown: food rests, wood, etc.

3) With support of population's transport units, trash from the streets will be collected and exported to the new landfills.

4) For gathering of garbage from the sorting containers will be bought 9 specialized garbage gathering cars and 3 old will be converted. Trash from simple containers will be collected by 14 tractors which are owned by mayoralties. 52 people are required.

5) The garbage from sorting containers glass, metal, paper will be exported to the factories in Chishinau and Soroca for usage as prime material, but plastic will be taken by our factory, where tile will be produced.

6) Will be landed an ex boiler-house with total surface of 110 m2 where will be placed the equipment for plastic recycling in tile, and other building materials placed.

7) The equipment allows us to produce 100-110 m2 of production whether it is tile or thin slab.

Into the equipment set for producing tile enter 15 compounds their cost makes 180000 leis

Advantages of technology:

1) As raw materials can be used almost any kind of plastic.

2) Plastic does not demand preliminary cl

cleaning of dirt , labels, the rests of sauces and shampoos etc., do not stir producing process.

3) Low cost of production.

Approximate price of 1 m^2 of tile 43.65 lei/m^2;
The sale price makes 100-150 lei/m^2

4) Small amount of the personnel.

12 workers (two changes of 6 persons): for tile formation are necessary 3 persons, for unloading and loading of plastic - 3 persons.

5) High durability. Polymer-sand material is very strong. Service life of tile is not lesser than 150 years.

7) Polymer-sandy materials are almost twice easier than their concrete and clay contenders! It essentially reduces pressure on the building.

8) Polymer-sandy materials are resistant to difference of temperatures, and also keep all properties in a range from-65 to +200 ºC.

Budget

1) Germane buttressed garbage trucks – 9 trucks * 90000lei = 810000 leis

2) Sets of refuse bins – 460 sets * 200lei = 92000 leis

3) Landing of 2 bulldozers and 2 trucks for building the new garbage dump, and demolishing the old one = 305000 leis

4) Plastic recycling factory 180000 leis

5) Paying human resources (Installing the recycling system, volunteers, garbage collectors) = 80000 leis

Timeline

Project implementation will be much more productive if it will be affected in between 15 of march and 25 of April 2009. Because in this period climatic conditions will not affect the work and population will not be occupied with agricultural works.

Works will occur parralel, after 3 months of propaganda effectuated by volunteers:

1)During the period of 15 -30 of march - 2009 the old garbage dump will be distroyed.

2)15 march – 5 april - two new certified garbage dumps will be digged.

3)15 march – 25 april - garbage collection from illegal garbage dumps.

4)1-20 april – instalation of paired garbage bins.

5) 10 march – 20 april – reconstruction of the ex boiler- house, and installing of the equipment for plastic recicling.

6) 20 april – 5 may – instructive works with the further workers of the recycling station.

Advantages

1) Reduction of underground water and soil pollution.
2) It will help to rise the rate of water quality in river Bic and in Ghidighici lake.
3) This project will serve as a good example for other localities and will lead to the improving of the state's ecological situation.
4) There will be assured protection of natural areas from pollution.
5) Centralized accumulation of rubbish and transporting of it to the new garbage dump, that will corespond to all ecological standards.
6) Improving the living standards in the Strasheni district.
7) Our production is 100% recyclable. We will pay107% from tile's price to customers when they will return it back. (For exemple you installed our roofing materials, but after some time you want to change it, you contact us , we will take it back and moreover we'll pay 10% of money that you spent. It's a great deal, better than throwing down the till into garbage bins.)
8) For emplementing the project , few time and efforts are necessary.

Conclusion

At ancient times, the locality of Strasheni was very famous throughout all of Moldova because of its big beautiful forests, clean rivers and picturesque landscapes. But nowadays the situation is completely different. So the main conclusion is that our project is easy to implement, it is relatively cheap, takes less time and gives a lot of advantages. By means of our project we'll try to change the situation, so there will be a chance to se the district of Strasheni as clean as it was at the times of Stefan the great.

References

1) "Ecologia si protectia mediului" Angela Alexeiciuc, Nadejda Velisco

2) "Probleme globale ale omenirii" Brown Leonid

3) "Resurse funcciare si acvatice" from since conference

4) Report of the State Ecological Inspectorate for 2004.

5) Statistical Yearbook of the Republic of Moldova, 2005. National Statistical Bureau

6) Report "Environmental Situation in the Republic of Moldova" for 2006

7) www.brzanplast.ru

8) www.energy-saving-technology.com

9) www.cherepitza.boom.ru

10) www.wasteonline.org.uk

11) www.nc.startribune.com

12) www.wikipedia.org

The Facilitating Role of ESP Courses for Computer Engineering Purposes

Ekaterine Pipia

International Black Sea University, Tbilisi, Georgia, Email: ekapipia@ibsu.edu.ge

Behcet Celik

Ishik University, Erbil, Iraq, E-mail: behcet.celik@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: The role of ESP courses to provide learners their specific needs in foreign language has been well recognized. ESP courses focus on the needs of the learners; therefore, they can help with achieving special requirements that are relevant to learners. This study aims to define ESP through putting forward its contributions to learners. And the main goal of this study is to put forth the use of ESP in computer Engineering.

Key Words: English for Specific Purposes, Need, Needs Analysis, Specific knowledge

Introduction

English for Specific Purposes (ESP) has played a prominent role in EFL teaching since the early 1960s. ESP is “essentially a training operation which seeks to provide learners with a restricted competence to enable them to cope with certain clearly defined texts” (Widdowson, 1983, p.6). Similarly, Hutchinson and Waters (1987) define ESP as "an approach to language teaching in which all decisions as to content and method are based on the learner's reason for learning" (p. 19). ESP is based on the idea that all language teaching should be designed to the language needs of learners (Johns & Machado, 20001). In ESP courses the needs of the learners are given priority, learners will stand a better chance of enhancing their knowledge in the target language in their fields. Wright’s (1992) definition of ESP is “language learning which has its focus on all aspects of language pertaining to a particular field of human activity, while taking into account the time constraints imposed by learners” (adapted from Ibrahim, 2010, p. 201).

ESP is as Robinson (1991) puts it “goal-directed”, and the principal focus of ESP is on the needs of the learners, and it enables the learners to communicate effectively in their professional work (Bojovic, 2006). It allows learners to enrich their vocabulary knowledge related to their areas. ESP will motivate learners to succeed more in their areas, and consequently will lead to achievement in the career. ESP provides learners necessary skills they need in the foreign language to function effectively in their professional work.

ESP has become popular due to special requirements, technical vocabulary, text, communication or interaction knowledge (Harding, 2007). Graddol (1998) is of the opinion that traditional English teaching does not help learners with improving their competitiveness. Traditional English teaching focuses on development of basic language skills, and aims to enhance language proficiency of learners. Therefore, employment needs of learners cannot be met through traditional English teaching. Learners need to know English for specific purposes to become qualified employers.

Characteristics of ESP and EGP

Traditional English and ESP often differ as language is presented to learners for different purposes. Widdowson (1983) states important features of English for specific purpose (ESP) and English for general purpose (EGP) as:

EGP:

1. the focus is often on education;
2. as the learners' future needs are impossible to predict, the course content is more difficult to select;
3. due to the above point it is important for the content in the syllabus to have a high surrender value.

ESP:

1. the focus is on training;
2. as English is intended to be used in specific vocational contexts, the selection of the appropriate content is easier;
3. it is important for the content in the syllabus to have a high surrender value, most relevant to the vocational context;
4. the aim may be to create a restricted English competence.

The Principal Features of ESP

Compared to general English ESP focuses on specific needs of the learners. ESP gives more attention to specific linguistic knowledge and communication skills necessary to achieve specific purposes for a specific profession (Orr, 1998). Similarly, Lowe (2009) stresses the significance of specific learning needs in ESP. In ESP courses learners have more opportunities to improve their language level, as language is presented to them according to their specific needs.

Hutchinson and Waters (1987) argue that the development of ESP has been influenced by three factors:

- Attention to learners' need
- New ideas about language
- New ideas about learning

Hutchison and Waters (1987) argue that ESP differs from traditional English in that learners are aware of their needs in ESP courses. Since language learning is based on learners' needs in ESP courses, language learning process can be carried out through developing new ideas and strategies. So as to understand the contribution of ESP courses to language learning, it is useful to bear in mind the following features.

Strevens (1988, p.1-2) defines ESP by making a distinction between its absolute and variable characteristics as:

a) Absolute characteristics:
- designed to meet specified needs of the learner;
- related in content (i.e. in its themes and topics) to particular disciplines, occupations and activities;
- centred on the language appropriate to those activities in syntax, lexis, discourse, semantics, etc., and analysis of this discourse;
- in contrast with General English.

b) Variable characteristics:
- restricted as to the language skills to be learned (e.g. reading only)
- not taught according to any pre-ordained methodology.

Dudley-Evans, (1998, pp. 4-5) through developing the definition of Strevens mentioned above, defines characteristics of ESP as:

I. Absolute Characteristics
- ESP is defined to meet specific needs of the learner;
- ESP makes use of the underlying methodology and activities of the discipline it serves;
- ESP is centred on the language (grammar, lexis, and register), skills, discourse and genres appropriate to these activities.

II. Variable Characteristics

- ESP may be related to or designed for specific disciplines;
- ESP may use, in specific teaching situations, a different methodology from that of general English;
- ESP is likely to be designed for adult learners, either at a tertiary level institution or in a professional work situation. It could, however, be for learners at secondary school level;
- ESP is generally designed for intermediate or advanced students;
- Most ESP courses assume some basic knowledge of the language system, but it can be used with beginners

In order to perform some professional tasks, the use of needs analysis is helpful in ESP in that it determines which language skills will help learners to develop their language proficiency. As Dudley-Evans & St John (1998, p.121) mention "needs analysis is the process of establishing the *What* and *how* of a course". Therefore, the needs of learners in a specific field are determined by needs analysis. There is link between needs analysis and ESP. Robinson (1991, p.7) stresses the connection as "needs analysis is generally regarded as critical to ESP".

Long (2005) stresses the use of needs analysis in ESP courses, and argues that needs analysis will provide professional and personal information about learners. Once background information about their learning experiences, and attitudes towards foreign language, ideas about their language proficiency, needs in the target language is obtained, it will be easy to design an ESP course for them.

The Use of ESP in Computer Engineering

Gaur (2008), states that traditional English language teaching will not be useful for the learners who need English for specific reasons. It is inevitable that learners of English in the computer engineering field

must have a good command of spoken language, written language, and technical terminology. ESP courses in this field should be designed to meet job requirements. Splitt (1993) suggests that leaners need to develop their communication skills to work with other people effectively. Learners' fluency will help them share their new ideas with their colleagues. Those who have the ability to communicate well are able to produce positive results, since they will work with the team with ease. Language proficiency in terms of writing and speaking hold an important place in ESP courses, because they will help learners achieve their workplace requirements. Riemer (2002) emphasizes the importance of communication in workplaces, as they will contribute to decision making and teamwork positively. Riemer concludes that "knowledge and technical knowhow are clearly important, but these must be presented with an excellent standard of communication skills particularly oral" (2002, p.94).

If a well-designed ESP course book has been decided upon, learners will have great opportunity to develop their language proficiency; in particular, their specific needs in their fields. Foreign language learners of computer engineering will stand a better chance of improving their level of English through ESP courses. Rather than enhancing their general English knowledge, it is more useful to provide them specific English to meet their job requirements.

Despite the strengths of ESP in Computer Engineering, there are some difficulties. According to my own experiences ESP course books do not always meet the needs of learners. If the course book doesn't meet the level of the learners it can result loss of interaction between learners and tutors which could become a significant weakness. Even if they are designed for ESP courses, they still hide General English course behind their title. But as ESP teachers we should always keep in mind that "Teachers can therefore be assured that course books from reputable publishers will serve them well, if properly selected and used. I used the word serve advisedly because course books are good servants but poor masters" (Cunningsworth, 1984, p.1). For professional development language proficiency is indispensable. Comprehension of technical terms will lead to coming up with new ideas, and presenting the ideas fluently will bring about accomplishment.

Conclusion

Traditional language teaching does not focus on a specific field because the content is very comprehensive. Learners are unable to study their specific needs in traditional English courses. As ESP gives attention to a specific field rather than educating learners in the target language in general, learners have an opportunity to improve their language level in a specific field. In addition to high level of oral skills, computer engineering students need to understand terms relevant to their field. ESP courses are able to provide learners with the skills they need in computer Engineering.

References

Bojovic,M. (2006). Teaching Foreign Language for Specific Purposes: Teacher Development. Application of Tecaher Education in Europe. 31st Annual ATEE Conference, 2006

Dudley-Evans, T., & St John, M. (1998). Developments in ESP: A multi-disciplinary approach. Cambridge: Cambridge University Press.

Gaur, R. (2008). Developing an Interdisciplinary Approach in ELT: The case of India. TESL EJ. 12(3).

Harding, K. (2007). English for Specific Purposes. Oxford University Press.

Hutchinson, T., & Waters, A. (1987). English for Specific Purposes: A learning-centered approach. Cambridge: Cambridge University Press.

Ibrahim, A., I. (2010). ESP at the Tertiary Level: Current Situation, Application and Expectation. English Language Teaching, 3 (1), 200-204

Johns, A., & Machado, D.P. (2001). Teaching Grammar. In M. Celce-Murcia (ed.), Teaching English as a Second or Foreign Language (3rd edn., pp. 43-52). Boston, MA: Thomson/ Heinle.

Long, M.H. (Ed.). (2005). Second Language Needs Analysis. Cambridge. Cambridge University Press.

Lowe, I. (2009). Principles of ESP course Design. Retrieved from <http://www.scientificlanguage.com/swp/coursedesign.pdf

Orr, T. (1998). ESP for Japanese Universities. A Guide for Intelligent Reform. The Language Teacher Online. Retrieved from <http://jalt-publications.org/tlt/files

Riemer, M.J. (2002). English and Communication Skills for the Global Engineer. Global Journal of Engineering Education. 6(1), 91-100

Robinson, P. (1991). ESP Today: a Practitioner's Guide. Hemel Hempstead: Prentice Hall International.

Splitt, F.G. (1993). The Industrial Need of the Engineer in the 21st Century: An update. ASEE 71st Annual Fall Conference. Boston, MA.

Strevens, P. (1988). ESP after twenty years: A re-appraisal. In M. Tickoo (Ed.), ESP: State of the Art (pp. 1-13). Singapore: SEAMEO Regional Centre.

Widdowson, H.G. (1983). Learning Purpose and Language Use. Oxford University Press, Cambridge

Wright, C. (1992). http://www.camlang.com/art001.cfm#1. In Ibrahim, A.I. (2010). ESP at the Tertiary Level: Current Situation, Application and Expectation. English Language Teaching, Vol. 3 (1), 200-204

Women Labour Force in the Economy of Kurdistan Region

Snoor Faqe

Ishik University, Erbil, Iraq, E-mail: snoor.faqe@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Introduction

Labour economics has always been an important branch of economic study through out of economic history. labour economics deals with the study of the nature and determinants of pay and employment.. What this research is focusing on is women labour force, the area of research is Kurdistan region of Iraq. The period of investigation is 2008 and 2011. During this period, women participation in the economy is expected to have changed as the economy has significantly developed.

Research Importance

The research is trying to reach a conclusion that we should maximize women labour force by adopting different techniques in order to make a balance in our labour market and in order to build up a stronger economy in Kurdistan region especially for that Kurdistan is expectant to be an independent country, and the top conditions for a developed country is a developed economy.

Research Aim

The aim of this studying is to analyze and discuss the prevalent trend in thought and opinion of a modern case that is women as a labor force in the economy, regarding work and wage and the reason behind the research selection to the topic. The research also aims to show the importance of existence of same opportunities and wage equality to same jobs done by men and women.

Research Problem

Women has always been a part of the total labour force in reality, but some special cultural and legal factors have been the reason behind that women has not been formally considered as a labour force like men are, this is because of that many women are working and making money inside the house and they are not in the labour market and some women are working in an age that does not match the international definition of labour age.

Methodology of Research

Since quantitative methodology of research is the use of sampling techniques whose findings are expressed numerically, amenable to mathematics and statics, its objectives are to measure the incidence of numerous views and opinions in research's available sources example, the data source is structured techniques such as government surveys or telephone interviews, the data analyze is statistical, usually in the form of tabs and its outcome is used to recommend a concluding course to be taken in action, therefore Qualitative method is the method that the research depends on and adopts. Qualitative techniques are extremely useful for the research subject that is too complex to be answered by a simple yes or no hypothesis, and that gives a non-statistical data analyze.

Qualitative research differs from quantitative research in that the latter is characterized by the use of large samples, standardized measures, and highly structured interview instruments to collect data for hypothesis testing

Since women in general and as a labour force is an issue mixed up with other issues, yet the complete data are not structured well. And whole information is not organized in a cautious way, therefore semi structured data and structured data are available in the research, as a point of qualitative method there exist no artificial or earlier used experiments in the research and the utilized method picks up the interaction between perspectives and situation to see how they bear on each other and to find out the changes before and after taking the influencing factors into consideration.

The outcomes are exploratory and/or investigative that are described by words and generated from empirical data. Developing an preliminary understanding and sound base for additional decision making. Consequently there is a closeness of fit between the outcomes and the data. This qualitative research is designed to reach finalizing results and proving or disproving the hypothesis.

Research Hypothesis

The idea of a hypothesis is that there is no pre-determined outcome. For a hypothesis to be termed a scientific hypothesis, it has to be something that can be supported or refuted through carefully crafted experimentation or observation. Upon analysis of the results, a hypothesis can be rejected or modified, but it can never be proven to be correct 100 percent of the time.

This research has a testing hypothesis that can be tested, meaning that it can measure both what is being done (variables) and the outcome is, which is *"Women's participation in the economy of Kurdistan Region has increased positively in 2011"*. This hypothesis is either proved or disproved though in fact it is better to mention whether it is "supported" or "verified"

Data Source

The main sources of the data is secondary data published by the following organizations and government departments

+ Ministry of labour.

+ Board of statistics

It is expected that the data published by the above sources may have shortcomings in the scope and details of information covered. A secondary aim of this research is to highlight those limitations and make recommendation of how to overcome them.

1.LABOUR MARKET

1.1 Labour Market Definition

"Labour market is a collective term that includes all workers, employed or unemployed, who have been or might be hired into paid positions. Labor markets are described as strong or weak depending on the availability of workers to fill positions. In addition to the general labor market, there are also labor markets for specific regions and industries." (www.investorwords.com)

While in other words we can say that labour market is the nominal market in which workers find work, employers find willing labours, and wage rates are determined.

Labor markets may be local or national (even international) in their scope and are made up of smaller, interacting labor markets for different qualifications, skills, and geographical locations. They depend on exchange of information between employers and job seekers about wage rates, conditions of employment, level of competition, and job location"(www.businessdictionary.com). In a simpler frame we can say that labour market includes the relationship between existing opportunities of job and the individuals that are likely to take a chance in this opportunity taking the wage, location, skills and qualifications into consideration.

1.2. Labour Demand and Labour Supply

1.2.1 Labour Demand

Labour demand and labour supply are defined in different directions, depending on different views and different conditions. Labour demand is the demand of producers or inventors to the labour supply that is able to join economical activities with their physical or mental power.

Labour demand is also meant to be in a particular job "The need for employees and workers in a particular job market such as construction or manufacturing" (www.businessdictionary.com). We can also say that labour demand is a derived demand from goods and services," essentially the demand for labour is a derived demand because no firm demands labour for its own sake. Labour is one of the factors of production which firms combine and organize in order to generate output. Consumers demand goods and services which producers seek to supply profitably. Hence producers demand labour to help produce goods and services to meet the requirements of consumers" (Stephen W. Smith:1994: 34).

1.2.2 Labour Supply

Labour supply includes the "population of working ages, males aged 16-64, females aged 16-59" (Stephen W. Smith 1994: 35) that is the " willingness and ability to work specific amounts of time at alternative wage rates in a given time period, ceteris paribus" (Bradley R. Schiller: 2007: 178).

And the labour force is including "all persons over age 16 who are either working for pay or actively seeking paid employment" (Bradley R. Schiller: 2007: 181). We can say that labour supply is "Availability of suitable human resources in a particular labor market" (www.businessdictionary.com).

According to the dictionary of economics labour supply is known as "Supply of effort, the total numbers of hours of work that the population has been willing to supply has a function of: (a) Size of population, (b) proportion of population able and willing to work, and (c) Number of hours worked by each individual" (N.C Jain Saakshi: 2005: 165).

Labour supply which is called labour force as a second name is defined as: -"The total number of people employed or seeking employment in a country or region. Also called work force" (www.investorwords.com) The labour supply includes different labor resources: "Human resources, all efforts of mind and muscle, which are ingredients in production process. They range from unskilled common labor to the highest levels of professional skills" (Ansel, Charles, Paul: 2002: 424).

The "total labour force is the economically active", economically active: "people in employment, including the armed forces, unemployed people who are identified by censuses and surveys as seeking work in a reference week, people participating in the government's employment and training schemes and full-time students who are working or seeking work and are not prevented starting work by the need to complete their education from (Stephen W. Smith: 1994: 33). In addition labour supply is not only related to number, as it is believed "Labor force is a matter of quality as well as quantity"

1.3 Trade Unions

Trade unions are the labour unions and labour organizers that come together to perform economical activities. Labour unions also called labour organizations is "An organization of wage earners or salaried employees for mutual aid and protection and for dealingcoll ectively with employers; trade union." (dictionary.reference.com) and labour organizers are the ones who enlist workers to join a union.

"Trade unions: A trade union is an organization made up of members (a membership-based organization) and its membership must be made up mainly of workers. One of a trade union's main aims is to protect and advance the interests of its members in the workplace.

Most trade unions are independent of any employer. However, trade unions try to develop close working relationships with employers. This can sometimes take the form of a partnership agreement between the employer and the trade union which identifies their common interests and objectives"(www.nidirect.gov.uk).

1.4 Mobility of Labour

1.4.1 Definition of Labour Mobility

"Extent to which the workers are able or willing to move between different jobs, occupations, and geographical areas. It is called horizontal mobility if it does not result in a change in the worker's grading or status, and vertical mobility if it does. Skilled workers have low occupational mobility but high geographical mobility; low-skilled or unskilled workers have high degrees of both types of mobility. Low labor-mobility causes structural unemployment, and governments try to avoid it by worker retraining schemes and by encouraging establishment of new industries in the affected areas" (www.businessdictionary.com).

1.4.2 Types of Mobility " (McConnell, Brue: 2006: 275-276).

1. Job change/no change in occupation or residence

2. Occupational change/no change in residence

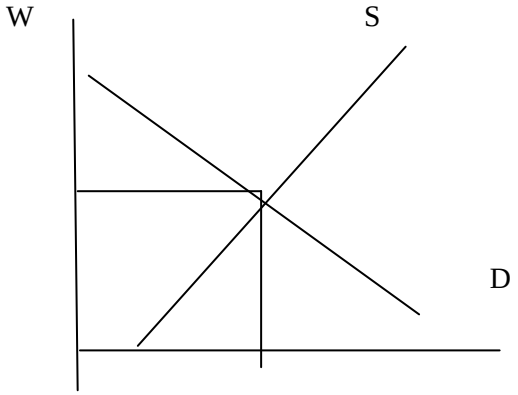
3. Geographical change/no change in occupation

4. Geographic change/change in occupation

1.5 The Interaction between Labour Demand And Labour Supply

"The interaction of the forces of labor supply and demand takes place in labor markets. The concept of a labor "market" is sometimes criticized because it is sometimes thought to be irrelevant to the real world" (Belton M. Fleisher: 1970: 155-156). We can imagine the labour market nominally, the way it is. When equilibrium takes place in labour markets, we will have thousands of employees at a particular wage rate.

"A common definition of equilibrium is that it exists when the amount of labor hours family members wish to sell is just equal to the amount business firms desire to purchase. This occurs, of course, where the demand curve and supply curve intersect" (Belton M. Fleisher: 1970: 155-156). As shown in Figure 2.1



The point where demand and supply curves intersect is the equilibrium point, at any higher wage rate there will be excess supply, whereas at any lower wage rate, there will be excess demand.

1.6 Man Power and Its Policy

Man power refers to the quantity of labour from each of men and women," the amount of labour, both male and female, available in a country at a particular time"(N.C Jain Saakshi 2005: 178-179)

And according to business dictionary man power is in:

"1. General: Total supply of personnel available or engaged for a specific job or task. 2. Economics: Total labor force of a nation, including both men and women. If there are more people than available jobs, it is called manpower surplus; if available people are fewer than jobs, it is called manpower deficit" (www.businessdictionary.com).

"There are two main forms of man power policy. The first accepts the existing characteristics of supply and demand and aims for better 'matches' between workers and jobs by improving placement efforts and by counselling workers looking for jobs and employers looking for workers. Programmers of this kind may also be able to include schemes for increasing mobility of workers. The second form tries to influence the pattern of the supply of labour by upgrading skills and abilities. There also exists a third form, which tries to influence the composition of demand by establishing measures to increase the number of employment opportunities, especially by opening up good jobs for disadvantaged workers" (N.C Jain Saakshi: 2005: 178-179).

1.7 Productivity and Economical Working Hours

Productivity is "An economic measure of output per unit of input. Inputs include labor and capital, while output is typically measured in revenues and other GDP components such as business inventories. Productivity measures may be examined collectively (across the whole economy) or viewed industry by industry to examine trends in labor growth, wage levels and technological improvement"(www.investopedia.com).

In labour economics productivity is believed to be "the relation between physical input and physical output" (Chamberlain & Cullen: 1971: 301). "Volume of output per unit of capital measures productive efficiency of the stock of producer goods. In this form, it is exactly parallel to the notion of labor productivity. It amounts to the productivity of physical capital being equivalent to the output/capital ratio" (Holesovsky: 1977: 293).

The scholars of economy believe that there is a close relationship between productivity and working hours "The term of labor productivity means only that productivity is being measured in terms of man-hours of labor", "In fact, anything that affects the amount of output and anything that affects the man-hours used will have impact on productivity. Obviously, the quality and the number of the tools which workers use will influence the amount of time they must spend in producing goods" (Chamberlain & Cullen: 1971: 302).

There are many ways that help increasing productivity, any business firm or project can adopt these tips to maximize their productivity.

"1. Accountability
2. Follow up
3. Manage the work force but avoid micromanagement
4. Encourage, motivate, reward and recognize
5. Reach out to employees by seeking them out
6. Demand realistic targets
7. Team work
8. Ensure that people enjoy their work
9. Break the monotony and rotate
10. Courses and improvement options
11. Spend less time on meetings and more on action
12. Tools and equipment to raise productivity"(www. tweakyourbiz.com)

2.FACTORS INFLUENCING WOMEN IN CONTRIBUTING ECONOMICAL ACTIVITIES

2.1 Social, Civil and Cultural Factors.

2.1.1 Social Factors

Environment is one of the two factors that influence human behaviour; every economic individual is a member in the society and hence is a social individual.

Social factors are the affecting factors that manipulate women in joining economical activities, the more improved and developed a country with social conditions is, the more its labour market will have females as a work force and the more equality will be maintained at the labour market.

2.1.2 Civil Factors

Civilization is one of the most important points that can oppose the inequality between males and females; civilization is having a close positive relation within the society in the economical prospect. More civilized society individuals tend to connect more and more females and join them to the labour market.

2.1.3 Cultural Factors

The traditions, habits and beliefs of the society are assumed as the factors that are more likely to avoid total changes. Though culture is not a matter to be given up but this never means that a culture can be a fixed law. More women become victims as they are refused in labour markets because of cultural factors, just like believing only men must be or can be the source of income of the whole family.

"Cultural and social attitudes about women's lack of competence, assertiveness and ability to lead clearly play an important role in shaping the behaviour and practices towards female academics on behalf of their male colleagues, heads of departments and deans" (Nadje, Muzhda, Hataw, Dlaram, Kawther: 5).

2.2 Religion Factors

"Generally religion is used as an instrument in defence of patriarchy. It discriminates against women. Christian and Islamic religion law give central place to paternalistic interpretation to women's appropriate roles and socio-political arrangement of the society .It places a lot of restrictions on the rights of women. The Christian religion also relegates women to the background. It preaches that the woman's role should be reproduction and domestic chores. It preaches women subordination and gives women little role in the church. To the traditional African religion, the woman exists at the pleasure of the man. It is this religion that is the basis of the African culture and the basis of gender construction" (Onyinye Belinda Ndubuisi).

According to Islam there are two points of view, one doesn't support women work and the other supports, the one that doesn't support make the verse 33:33, their rationale. (And stay in your houses, and do not display yourselves like that of the times of ignorance)(Interpretation of the meaning of the noble Quran)

On the other hand this view is criticized by scholars of divine and this ideology is refuted "the verse concerns the officially permitted going out of women from home, a way in which a woman organizes politeness and good manners, not going out in the way women from the ignorance age went out"(Muhammad Shakr: 2010: 180) If Islam was forbidding women from work then this verses first part would not be completed by the second part, the second part is itself supporting and teaching the way of going out.

This point of view is strengthened by the Quran verses that spot no difference between men and women while discussing work and reward. (Never will I allow to be lost the work of any of you, whether male or female) (interpretation of the meaning of the noble Quran)

And "Whoever works righteousness, whether male or female, while is a true believer verily, to him We will give a good life, and We shall pay them certainly a reward in proportion to the best of what they used to do"(interpretation of the meaning of the noble Quran)

We conclude that working is a supported article in life, there is no difference between men and women. As there have been women, in Islam, that have had different jobs, in an age that the majority of working class were men.

2.3 Legal Factors

According to the universal declaration of human rights everyone has the right to work without any difference as it's mentioned in the declaration's twenty third numbered articles:

"1. Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment.

2. Everyone, without any discrimination, has the right to equal pay for equal work.

3. Everyone who works has the right to just and favourable remuneration ensuring for himself and his family an existence worthy of human dignity and supplemented, if necessary, by other means of social protection.

4. Everyone has the right to form and to join trade unions for the protection of his interests" (Universal declaration of human rights: 1948: article 23).

And the standard of living is used to have no difference between men and women as it is mentioned in twenty fifth article's first part"

1. Everyone has the right to a standard of living adequate for the health and well being of himself and his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control"(Universal declaration of human rights: 1948: article 25)

And according to the constitution of Kurdistan region there must exist no difference between men and women, as it is mentioned in twenty first article;

> Women are equal with men and discrimination against women is "
> prohibited. The Regional Government guarantees them all the civil and political rights mentioned in this constitution as well as in those international treaties and conventions ratified by the Iraqi state.
> Obstacles which hinder their equality in cultural, social, economic and political lives shall be removed."(Constitution of Kurdistan region: article 21).

And according to, Convention on the Elimination of all forms of discrimination against women, in the eleventh articles first part; it is declared that equality must be maintained between men and women in employment opportunities.

"1. States Parties shall take all appropriate measures to eliminate discrimination against women in the field of employment in order to ensure, on a basis of equality of men and women, the same rights, in particular:

(a)The right to work as an inalienable right of all human beings;

(b)The right to the same employment opportunities, including the application of the same criteria for selection in matters of employment;

(c)The right of free choice of profession and employment, the right to promotion, job security and all benefits and conditions of service and the right to receive vocational training and retraining, including apprenticeships, advanced vocational training and recurrent training;

(d)The right of equal remuneration, including benefits, and to equal treatment in respect of work of equal value, as well as equality of treatment in the evaluation of the quality of work;

(e)The right to social security, particularly in cases of retirement, unemployment, sickness, invalidity and old age and other incapacity to work, as well as the right to paid leave;

(f)The right to protection of health and to safety in working conditions, including the safeguarding of the function of reproduction" (United Nations General Assembly: 1981).

This issue is strengthened as the second part of eleventh article concentrate on preventing violence against women and making a balance between marriage and work;

"2. In order to prevent discrimination against women on the grounds of marriage or maternity and to ensure their effective right to work, State Parties shall take appropriate measures:

(a)To prohibit, subject to the imposition of sanctions, dismissal on the ground of pregnancy or of maternity leave and discrimination in dismissals on the basis of marital status;

(b)To introduce maternity leave with pay or with comparable social benefits without loss of former employment, seniority or social allowances;

(c)To encourage the provision of the necessary supporting social services to enable parents to combine family obligations with work responsibilities and participation in public life, in particular through promoting the establishment and development of a network of child-care facilities;

(d)To provide special protection to women during pregnancy in types of work proved to be harmful to them" (United Nations General Assembly: 1981).

2.4 Psychological and Subjective Factors

There exist numerous psychological and subjective factors that keep away women from contributing labour market, these factors are supposed to be under women control, in another words women, can neglect them, on their own.

When women, as female gendered, in most developing countries are married and take the function of motherhood, of many kids, as a result they tend to lose family plan, they must make choice between family and work, in another hand the limited period of women working hours ability make the working firms depend on men more than women.

Sometimes women are interested in or (supposed to) work in geographically close work areas to their home, and that is how they must sacrifice to the opportunities far-off.

Another psychological factor is the sensitivity and emotionality of women reading work with respect to men; women are more likely to accept barriers of work, by allowing simple obstacles and restrictions as a priority to avoid joining the labour market.

2.5 Advertisement Factors

"Advertising is a major element of a company's marketing plan. It involves the development and delivery of paid advertisements through mass media, which attempt to persuade customers to behave in a certain way. Objectives of ads vary, but the overall intent is to attract and retain loyal customers" (Neil Kokemuller). Nowadays advertisement is an affective factor that persuades population in general, to accept the main aim behind it, advertising and introducing the labour market added up with a fitting awareness of the society is a main motive for letting more members to join the (nominal) labour market.

Focusing the direction of advertisement and concentrating on the importance of women role in contributing the economical activities of the society, is a well-built plan to alert and move women toward a better economy.

3.WOMEN AS A LABOUR FORCE

3.1 Women as a Labour Force Through History

3.1.1 Women's Jobs in the Middle Ages

"In the Middle Ages women worked as hard as men. They were needed on the farms. Women hoed and weeded, helped with ploughing (by driving oxen) and tied the sheaves at harvest time. They also spun wool and they did cooking and cleaning. Women washed clothes, baked bread, milked cows, fed animals, brewed beer and collected firewood .Some women became nuns but they too had to work hard" (Tim Lambert).

3.1.2 Women's Jobs in the 16th Century and 17th Century

"In the 16th and 17th centuries the professions (teacher, lawyer, and doctor) were closed to women. However some women had jobs. Some of them worked spinning cloth. Women were also tailoresses, milliners, dyers, shoemakers and embroiderers. There were also washerwomen. Some women worked in food preparation such as brewers, bakers or confectioners. Women also sold foodstuffs in the streets. A very common job for women was domestic servant. Other women were midwives and apothecaries. In 1555 Catchcold Tower in Southampton was repaired. Women were paid 4 pence a day for pushing wheelbarrows full of stones. Men were paid 6 pence a day. However most women were housewives and they were kept very busy. Most men could not run a farm or a business without their wife's help" (Tim Lambert).

With respect to these all, in sixteenth and seventeenth century women faced other duties too they "Had to cook, wash the family's clothes and clean the house. A farmer's wife also milked cows, fed animals and grew herbs and vegetables. She often kept bees. She also took goods to market to sell. The housewife was also supposed to have some knowledge of medicine and be able to treat her family's illnesses. If she could not they would go to a wise woman. Only the wealthy could afford a doctor. Poor and middle class wives were kept very busy but rich women were not idle either. In a big house they had to organize and supervise the servants. Also if her husband was away the woman usually ran the estate. Very often a merchant's wife did his accounts and if was travelling she looked after the business. Often when a merchant wrote his will he left his business to his wife - because she would be able to run it" (Tim Lambert).

3.1.3 Women's Jobs in the 18th Century

"During the 18th century women were gradually squeezed out of certain jobs such as barber-surgeon. Increasingly a well off woman's place was in the home. Girls from well off families went to school but it

was felt important for them to learn 'accomplishments' like embroidery and music rather than academic subjects" (Tim Lambert).

"In 1825 The first union for women only formed: The United Tailoresses of New York" (*New York Teacher:2009*)

3.1.4 Women's Jobs in the 19th Century

"In the 19th century the Industrial Revolution transformed life in Britain. It changed from a country where most people lived in the countryside and worked in farming to one where most people lived in towns and worked in industry. In that century women did gain more rights and some women became famous novelists. In the 19th century at least 80% of the population was working class. In order to be considered middle class you had to have at least one servant. Most servants were female. (Male servants were more expensive because men were paid much higher wages). Throughout the century 'service' was a major employer of women. For working class women life was an endless round of hard work and drudgery. As soon as they were old enough they worked on farms and in factories. Even when they married and had children housework was very hard without electricity or modern cleaning agents. In the 19th century wealthy women were kept busy running the household and organizing the servants. Well to do women often also did charitable work" (Tim Lambert).

3.1.5 Women's Jobs in the 20th Century

"The rights and status of women greatly improved in the 20th century.

In 1917 the WRNS (Women's Royal Naval Service) was formed. So was the WRAF (Women's Royal Air Force). In 1938 the Auxiliary Territorial Service, the female branch of the British army was formed.

Nevertheless in the early 20th century it was unusual for married women to work (except in wartime). However in the 1950s and 1960s it became common for them to do so - at least part-time. By the end of the century it was normal for married women to have their own careers. In 1970 differences in pay and conditions between men and women were made illegal. In 1973 women were admitted to the stock exchange. From 1975 it was made illegal to sack women for becoming pregnant. Also in 1975 the Sex Discrimination Act made it illegal to discriminate against women in employment, education and training. In 1984 a new law stated that equal pay must be given for work of equal value. In the late 20th century the number of women in managerial and other highly paid jobs greatly increased" (Tim Lambert).

"After the Civil War, which saw the deaths of more than 600,000 men and the maiming of countless others, it became necessary for women to enter the work force in increasing numbers. Some journalists and labor leaders called for the creation of a Women's Bureau to oversee conditions of female labor"(Shirley Leckie).

3.1.6 Women's Jobs in the 21st Century

"21st century is the century for change. The Planet Earth is ready for 'The Shift of the Ages'. In this New Age, love and compassion will rule the roost, and the woman with her natural attributes of compassion will sow the seeds of global transformation. These changes have already begun, and soon they will gain an unprecedented momentum. The time is ripe for women of all races, castes, class, and nationalities to come together to be the harbinger of this change" (Hitra Jha).

The knowledge economy is the effectual branch of economy that is lead by human capital," putting on training is part of the process of investing in human capital. Training sessions are not so prevalent in the Kurdistan region, but the situation is worse for women" (Nyaz N. Noori: 2012: 123).

By product, training sessions are the labour market improving means if they are based on improving the human capital, Kurdistan can make the difference in its labour market by adopting the labour friendly means, focusing its direction on the maintenance of equal opportunity for men and women.

Susan Berzinge believes that "'Essentially there are three classes of women here in Kurdistan. Women who are highly educated and who are in professional jobs; women who work in agriculture or factories who are paid low and work very hard and whose wages do not always go into their own pocket, but into the pockets of men; and then there are the traditional workers and artisans who have a lot of skills in traditional industries and handicrafts which we really need to preserve" (Susan Barzinge).

3.2 Fields That Woman Participate as a Labour Force in Kurdistan Region

Fortunately, nowadays women participate in different jobs at different sectors, such as; minister, parliament member, head of the parties, general manager, dean of colleges, university lecturers and officers. With respect to all these there exist a lot of women that are working actively but not formally in the labour market, such as the house activities like sewing and making accessories.

Kurdistan's labour market includes lots of foreign workers from Bangladesh, Thailand, Iran, Turkey, from outside the region, such as Mosul, Southern Iraq. Although the international definition says that the labour force includes all able persons between the age of 16 and 65 (with differences between women and men) the reality in Kurdistan as in many developing countries, many people are put into work at a much earlier age than 16. This is visible in Kurdistan. The same is true for the upper limit of working age. People in Kurdistan work beyond 65. In many cases, until they die, i.e. they never retire.

That is the reason why we cannot have a true index that could be a liable source to work on, this activities are not taken into account as they are outside the labour market and as they are not matching with the international definition of labour, and hence we cannot analyse the surplus or shortage in labour, in my opinion we may have a surplus in non-skilled and semi-skilled labour but we have an obvious shortage in skilled workers, that is related to the wage differences.

"Fluctuations in economic conditions also affect labor force participation. These effects are likely to be largest among demographic groups that contain a relatively high proportion of individuals who are loosely attached to the labor force. Economists view the response of labor force participation to the changes in the level of economic activity as being the net result of two opposing effects" (Francine, Marianne, Anne: 2002: 110).

"Legislation has played an important role in bringing in more liberty and equality to women. For example, until recently, laws permitting polygamy were frowned upon, as they undermine female equality. In 2008, Kurdistan Parliament passed a law which, to all intents and purposes, bans polygamy. The potential for growth in female entrepreneurship is high in Kurdistan, as it is still developing and growing. This is just starting to dawn here, unlike developed countries where female entrepreneurship is more prevalent. In the global arena, issues pertaining to more women's rights and movements usually start at the U.S. and spread across the globe, including Kurdistan. Small business entrepreneurial activity is increasing, especially the sprouting of lucrative hair salons that are in increasingly high demand. This is happening in a region where liberated women are becoming increasingly fashion-conscious." [(1)] "Developed countries have more or less reached a saturation point in terms of the number of educated working women with careers. Kurdistan being a "rapidly" developing country, with certain legislation, it can turn its female population into a powerful economic force. The forecast is a bright sunny future for the Kurdish working woman" (Swara Kadir).

3.3 Gender Inequality

"In the literature, there are mainly two words to describe differences between men and women: Gender and sex. The word 'gender' is a metaphor connecting 'non-biological phenomena with a bodily experience of biological differentiation'. The term 'sex' refers more to biological difference between men and women" (Nyaz N. Noori: 2012: 21). In the market, there are direct and indirect discriminations to the wage gaps," Direct market discrimination occurs when different rental prices (wage rates) are paid by employers for the same unit of human capital owned by different persons (groups). In this sense, the wage-gap residual is an upper limit of the direct effects of market discrimination. Indirect effects occur in that the existence of market discrimination discourages the degree of market orientation in the expected allocation of time and diminishes incentives to investment in market-oriented human capital. Hence, the lesser job investments and greater depreciation of female market earning power may to some extent be affected by expectations of discrimination (Jacob Mincer and Solomon: 1974: 103-104).

"It is true that the traditional sexual division of labour puts women into the house and men outside, but it cannot totally keep women at home. There remain factors that push women out of homework in favour of being paid workers. However, the problem is that even within the labour market, the areas are also divided between them. In this procedure, the norms restrict women's movement in the labour force by defining the identify of jobs. Women should not work as a taxi driver because it's a men's job. In addition, women should not work at night but only during the day" (Nyaz N. Noori, 2012: 21).

"Unlimited contributions and sacrifices made by a woman - in her multiple roles as mother, sister, wife and daughter, have continued in spite of the utter negligence, injustice, inequality and exploitation 'bestowed' on her in return by the male dominated society! Is not her tolerance, endurance, generosity and altruist love equivalent to what could be attributed as a divine virtue? In Acharya Sharma's views - "it is because of womanhood that humanity, beauty and grace of human life and the serenity of the sentiments of love, service and compassion have survived on this earth. One cannot dream of viable progress with peace and happiness without women's participation on fair grounds of equality" (Ikkisavin Sadi: Nari Sadi).

In a political theme, "Despite making up half the global population, women hold only 15.6 percent of elected parliamentary seats in the world"(Molly Edmonds) In Kurdistan, "after 1991 and the formulation of Kurdistan regional government with stepping toward the organizations, women, with men, stepped into another civilized step, to achieve their rights. Luckily nowadays we see that women have obvious positions in most of the elements like, minister, parliament member, head of the parties, general manager, dean of colleges, university lecturers and officers, that run their duties in the best way" (Dr. Muhammad Shakr and Abbas Ali: 2013: 25, 26-27)

The wage difference is an effective reason in leading to inequality, but it can be balanced, in Britain and United States of America. "Another factor that has been cited as a cause of the post 1974 growth in female unemployment is the coming into force in 1975 of 1970 equal pay act. Female wages rose relative to male wages and micro economic theory suggests that this would cause both an increase in the number of females wishing to work and a drop in the number that firms wish to employ" (A.T. Mallier and M.J. Rosser: 1987: 153).

3.4 The Role Of Women Tasks Organizations

"In Kurdistan, the political parties and political movements of the upper hand in the establishment of associations and women's union, which has long raised slogans in line with the global trend in the field of women's rights, and in this context was founded in (1946) in the period of the Republic of Kurdistan Democratic (Mahabad) Women's Association of Kurdistan; and that initiative and encouragement of the Democratic Party of Kurdistan in Iran, the first association of women of Kurdistan, in the year (1952) founded the Democratic Party of Kurdistan in Iraq Women's Union of Kurdistan (Afretan)" (www.pointnumber.com).

"Owing to the economic, political and social transformations, Kurdish women have made great progress. Today, Kurdish women are members of parliament, ministers, teachers, engineers, lawyers, labourers and other professional bodies. The KWU has established a sewing factory to create jobs for women in Erbil. The Union also operates a social and health care centre to extent basic essential services to poor families. Other projects include the opening of a recreation facility and playground with the assistance of International NGO's to engage children with physical activities after school" (http://www.kdp.se).

"In this poll, conducted with full impartial and precise process;, which included (500) Women of all ages, classes, religions, sects and nationalities (Kurdish, Turkmen, Kuldo Assyrians, Arabians and others), in (5) provinces (Erbil, Sulaimaniya, Kirkuk, Dohuk, Mosul)" (www.pointnumber.com).

4.(EMPRICAL SECTION) DATA COLLECTION AND WORD ANALYSE FOR WOMEN LABOUR FORCE IN THE ECONOMY OF KURDISTAN REGIOIN

4.1 Introduction

This chapter emphasises on women labour force in the economy of Kurdistan region, in fact women in the region are classified into different classifications and the rate of unemployed females is decreasing in the investigation period of research, Fortunately there doesn't exist wage differences or forcing women in the reality of Kurdistan region comparing to other developed countries as it's illustrated "women work and

pay tax like men, they do same jobs as men, they do as hard works that doesn't match with their ability and power. They work in building and painting, drive big carriages, put up with heavy cartons, they work in car constructing and hundreds of other places, that doesn't match their power and that is inequality, but they perform, with all these they attain less wage than males, so equal in work and unequal in wage" (Jaafer Gwani, 2012: 81). Every data put in this chapter is achieved from ministry of labour and 'population and labour force Statistics, survey of employment and unemployment' surveys done by ministry of planning in 2008 and 2011.

4.2 Employment

4.2.1 Table 1, labour force in Kurdistan region in private sector during (1965-2013)

City	Total	Male	Female	Percentage of female participation	Percentage of male participation
Suleymaniyeh	24756	21042	3714	15%	85%
Duhok	4999	4561	438	9%	91%
Hawler	17632	15494	2138	12%	88%

Source; Ministry of labour and social issues, general directorate of labour and social insurance.

Table one illustrates the percentage of male and female participation in labour force in Kurdistan region, the table focuses only on private sector and every activity types are taken into account from the formation of security office up to 2012. From table one it's obvious that in each of Suleymaniyeh, Duhok and Hawler the male participation in the labour force of private sector is more with respect to female participation ratio.

The female participation ratio is 15 percent in Suleymaniyeh, which is the highest ratio, consisting of 3714 females in total 24756, compared with Duhok, which is only 9 percent, 438 females among 4999, and Hawler that is 12 percent, which means 2138 females in total of 17632.

4.2.2 Table 2, percentage of female employees age 15+ by governorate and kind of sector for 2008

Governorates	Private sector	Public sector	Others
Duhok	50.68	49.32	0
Erbil	59.26	40.74	0
Suleymaniyeh	90.95	8.80	0
Total	90.85	8.96	0

Source: Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2008

Table two illustrates the percentage of female participation in each of private and public sectors, according to the information resulting from survey of employment and unemployment, females in private sector take place most in Suleymaniyeh which is 90.95; Erbil is the second governorate that holds the maximum females working in private sector activities after Suleymaniyeh which is 59.26 and Duhok has the minimum private sectors activities which is 50.68. About public sector females in Duhok take the maximum space, Erbil in the second neat and Suleymaniyeh in the third which is inversely proportional to the private sector.

Depending on table two, in 2008 the private sector hold more female activities than public sector, the rate in private sector is 90.85 while it is only 8.96 in public sector.

4.2.3 Table 3, percentage of female employees age 15+ by governorate and kind of sector for 2011

Kurdistan region	Female rate	Private sector	Public sector	Others
Total	100	20.5	77.6	1.9

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2011

Table three, which is similar to table two, shows the female participation ratio in private and public sectors of 2011, the survey results are in aggregate form and not classified to the governorates.

What is important and helpful in differentiating between 2008 and 2011 is the addition of other sectors such as mixed sector, foreign sector and cooperative sector, the rate of other sectors has been increased from zero in 2008 to 1.9 in 2011.

In contrary, for the year 2011 females are concentrated more in public sector regarding to the private sector. The rate in public sector approaches to 78 while the rate in private sector is approximately 21. This means that the working opportunities and the liability in the public sector for the year 2011 were much greater than those in the private sector. Another reason can be that the private sector put more barriers on the employees as a result of more development in the region.

4.2.4 Table 4, Distribution of female working classes 15+ according to environment, sector and studying degree by percentage. For the year 2008

Studying degree	Urban population				Rural population			
	Public sector	Private sector	Others	Total	Public sector	Private sector	Others	Total
Illiterate, Reading and writing	41.2	51.8	7.1	100	19.7	73.9	6.4	100
High school and less	84.4	15.1	0.5	100	55.5	40.8	3.6	100
Bachelor and more	97	2.9	0.2	100	99.1	0.9	0	100
Others	85.6	14.4	0	100	64.9	9.6	25.4	100
Total	84.3	14.4	1.3	100	32.7	61.5	5.8	100

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2008.

Table four demonstrates the female activities in urban and rural areas for the year 2008, where the educational status is taken into consideration too. Reading the data in the educational degrees point of view shows that more illiterate and only reading and writing females are working on the public sector rather than in private sector. 41.2 percent illiterate and only reading and writing females work in the public sector of urban areas while only 19.7 of them work in the public sector of rural areas. In rural areas illiterate and only reading and writing females work more in private sector rather than in public sector, their rate in private sector is 73.9 while it is 51.8 in public sector, this might be because of less barriers put for rural activities of private sector. In converse, the more educated females; bachelor or higher and others occupy greater areas in public sector rather than in private sector. This is also true for high schools and less. According to this table the more educated females occupy more space in public sector, this results from liability of public sector more than in private sector.

Bachelor and higher educated females' rate of urban areas in public sector is 97 while it is 2.9 in private sector and 0.2 in other sectors. For rural areas the female participation ratio in public sector is 99.1 while it is only 0.9 in private sector and zero percentage in other sectors, due to the lack of other kinds of sectors in rural areas.

Governorate	Housing job	Household dwelling	dwelling Not of household	Factory or workshop	Farm	Construction and building	Shop or market or kiosk	Animated in many places	Street	Others
Duhok	81.82	6.06	0	0.76	9.09	0	0	0.76	0.76	0.76
Erbil	82.50	3.50	1	1	5	1	3.5	0	0	2.5
Suleymaniyeh	71.63	8.65	0	0	12.5	1.92	2.4	1.44	0.96	0.48
Total	75.68	8.71	0.55	1.23	6.58	0.73	5.12	0.53	0.43	0.44

4.2.5 Table 5, distribution of female employees age 15+ by work of place, governorate and area, by percentage 2008.

This table also shows that other sectors in rural areas hold zero percent of bachelor and higher educated females, and while 6.4 illiterate and only reading and writing work in other sectors, 3.6 high schools and less work in other sectors where as other educational conditioned females rate in other sectors is 25.4. For urban areas other educational conditioned females' rate is zero in other sectors, 0.2 percent for bachelor and higher, 0.5 for high schools and less and 7.1 percent for illiterate and only reading and writing females.

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2008 .Table five demonstrates the working classes of women in 2008 for different work of place, according to this table there exist women that work in each; housing, household dwelling, dwelling not of household, factory or workshop, farm, construction and building, shop or market or kiosk, animated in many places, street and other places.

According to this table the rate of female participation ratio in 2008 is in it is maximum end in housing jobs, which are 75.68, in comparison with each of household dwelling which is 8.71, farm which is 6.58, shop or market or kiosk which is 5.12, factory or workshop which is 1.23. The rate is minimizing in next five work places, only 0.73 women in Kurdistan work in construction and building, 0.55 works in dwelling not of household, 0.53 of them are animated in many places, 0.44 works in other places and only 0.43 works in the street.

Housing job are in higher rates in Erbil and Duhok compared to Suleymaniyeh, but farm activities are higher in suleymaniyeh compared to Erbil and Duhok, zero percent women are assumed to be animated in many places in Erbil for the year 2008, while 0.76 percent in Duhok and 1.44 percent in Suleymaniyeh are animated in many places.

4.2.6 Table 6, distribution of female employees age 15+ by studying degree by percentage 2011.

Illiterate, Reading and writing	High school and less	Bachelor and more	Others	Total
5.1	11.3	70.5	8.1	12.3

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2011

Table six shows female employees according to educational degree for the year 2011, the highest rate of employed women are among the Bachelor and more educated women which is 70.5. As a finale this is resulting from the developed plan of labour, the more educated females have more chance to be employed, the appearance and growth of the new organizations and projects were also another reason to the increase of demand for labour, more developed and intensive projects need more educated labourers.

Then high school and less graduated women are employed in a higher rate which is 11.3 and in the third hold are the other types of educated women which represent 8.1 percent. 5.1 is a high rate for women that are employed and are illiterate and either reading or writing alone.

4.2.7 Table 7, distribution of not economically active females by governorate by percentage for the year 2008

Governorate	Inactive rate
Duhok	3.37
Erbil	4.25
Suleymaniyeh	6.1

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2008

According to this table women that are not economically active have the minimum percentage in suleymaniyeh which is only 6.1, the percentage of inactive women that are in the labour market in Duhok is 3.37 and Erbil's inactive women rate is 4.25, where the total of inactive employees in the labour market for each governorate according to the same data source is as follows,

Duhok; 3.45, Erbil; 4.42, Suleymaniyeh; 6.2

4.2.8 Table 8, distribution of not economically active females by governorate and educational degree by percentage for the year 2011

Illiterate, Reading and writing	93.9
High school and less	86.5
Bachelor and more	23.6
Others	91.1
Total	86

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2011

This table is to illustrate the economically inactive rate of women labourers according to their educational degree, coming across the table it is noticeable that the highest inactivity rate among women are those that have the lowest educational degree, the rate of illiterate and only reading and writing 93.9, and the minimum inactivity rate are among those who hold bachelor and more which is 23.3.

The percentage of not economically active of women employees that are from high school and less is 86.5, and the percentage of not economically active of women employees that are from the other educational divisions is 91.1.

4.2.9 Table 9, Female economic activity rate in urban areas by governorate for the year 2008

Governorate	Economic activity rate
Duhok	15.4
Erbil	14.09
Suleymaniyeh	20.71
Total	15.84

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2008

Table nine demonstrates economic activity rate in urban areas by governorate for the year 2008, according to this table the economic activity rate is in its highest rate in Suleymaniyeh which is 20.71 percentage, the economic activity rate in Duhok is 15.4 which is in the second sequence and the economic activity rate in Erbil is in the third sequence and equals 14.09.

The total activity rate of women in urban areas of Kurdistan region is 15.84 whereas the average activity rate of women in Kurdistan region for 2008 is 14.6 including rural and in the region areas too.

4.2.10 Table 10, Female economic activity rate in urban areas for the year 2011

Age	Economic activity rate
15-24	8.8
25-34	19.9
35-44	22.9
45+	10.4
Total	14.6

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2011

Table ten is to point up the female economic activity rate in urban areas by age for the year 2011; unfortunately the survey has not took the ages according to working ages that should reflect the international definition for labour the ceiling age of work is 65 but the results of forty five plus are taken into account all together. 15-24 which starts from the lowest working age to the graduating age occupies the minimum percentage of economically active females in the labour market which is 8.8, in my opinion this is due to the basis that women enter the labour market in a low range in this age until they are graduated, this might be resulting from the factors that influence women in contributing economical activities or the available sectors that women can work without a degree or enough experience.

The forty five and plus aged women that are economically active is 10.4 percentage. The other two classes which are 25-34 and 35-44 have the percentage of 19.9 and 22.9.

4.3 Unemployment

4.3.1 Table 11. Unemployment rate by governorate and gender for the year 2008

Governorate	Unemployed males	Unemployed females
Duhok	13.29	39.72
Erbil	7.49	36.03
Suleymaniyeh	7.91	27.41
Total	14.33	19.64

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2008

In this unemployment section according to table eleven the unemployment in Kurdistan region is confirmed according to the governorates and genders for the year 2008, looking up to the total rate of unemployed labourers in Kurdistan region we will see that the rate of unemployed females is greater than the rate of unemployed males, the rate of unemployed females is 19.64 where the rate of unemployed males is 14.33, but this higher rate of unemployed females is not too much if number of each males and females working in the labour market is taken into consideration. In a general point of view the rate of unemployed women is more than the rate of unemployed men in each of the three governorates of Kurdistan region. In Duhok the rate of unemployed males is 13.29 while the rate of unemployed females is 39.72, in Erbil the rate of unemployed males is 7.49 while the rate of unemployed females is 36.03 and in Suleymaniyeh the rate of unemployed males is 7.91 while the rate of unemployed females is 27.41.

4.3.2 Table 12. Unemployment rate by governorate and gender for the year 2011

Governorate	Unemployed males	Unemployed females
Duhok	6.1	8.4
Erbil	2.7	9.6
Suleymaniyeh	5.4	16.9
Total	4.6	12.6

Data source, Ministry of planning, population and labour force Statistics, survey of employment and unemployment 2011

According to table twelve the unemployment in Kurdistan region is confirmed according to the governorates and genders for the year 2011, just like 2008 the total rate of unemployed females is greater than the total rate of unemployed males in its total form and while each of the governorates are taken into description alone. In Duhok the rate of unemployed males is 6.1while the rate of unemployed females is 8.4, in Erbil the rate of unemployed males is 2.7 while the rate of unemployed females is 9.6 and in Suleymaniyeh the rate of unemployed males is 5.4 while the rate of unemployed females is 12.6. And the total rate of unemployed males in Kurdistan region is 4.6 while the rate of unemployed females is 12.6.

These changes seem to be normal if the population ready to join the labour market is taken into account because the number of males is greater than the number of females so are the available and suitable working opportunities. Therefore depending on the above two tables the rate of unemployment has decreased comparing 2008 and 2011 as follows;

The total rate of unemployed males is decreased from 14.33 to 4.6 and the total rate of unemployed females is decreased from 19.64 to 12.6.

In Duhok; the rate of unemployed males is decreased from 13.29 to 6.1 and the rate of unemployed females is decreased from 39.72 to 8.4.

In Erbil; the rate of unemployed males is decreased from 7.49 to 2.7 and the rate of unemployed females is decreased from 36.03 to 9.6.

In Suleymaniyeh; the rate of unemployed males is decreased from 7.91 to 5.4 and the rate of unemployed females is decreased from 27.41 to 16.9.

This is due to the opportunities from different sectors in another hand the economical conditions that lead to the supply of more labourers either because of making a balance between price changes and income or because of more guidance and more positive future expectations.

Conclusion

1. Taking the total participation in the labour market into account, it's obvious that the female participation ratio is less than male participation ratio.

2. In 2008 female participated labour market in private sector more than in public sector but, in 2011 the rates of female participation ratio in the public sector exceed the rate in private sector.

3. The less educated females are working on the public sector more than in private sector and more educated females occupy more space in public sector, this is resulting from less barriers put on the kind of division of private sector that women can occupy a space in. In 2011 the educated (graduated) females compose the maximum rate of employment.

4. It is noticeable that the highest inactivity rates among women are those that have the lowest educational degree.

5. 15-24 which starts from the lowest working age to the graduating age, occupies the minimum percentage of economically active females in the labour market.

6. The rate of unemployed female have decreased from 2008 to 2011, and this is supporting the hypothesis of research which is *"Women's participation in the economy of Kurdistan Region has increased positively in 2011"*.

Suggestions

1. The government should give more guidance about the nominal labour market and must make a balance between male and female labour forces, maintaining equality in wage and reward.

2. Building similarity between the private and public sectors is necessitate so as each male or female can have his/her own opportunity to be employed in the proper place with similar working hours and similar wage.

3. The educational degree must be taken into consideration while employing the employees, so as the uneducated employees will not be a reason in minimizing the economical activity rate of the labour market.

4. The activities performed by women outside the labour market and international age of labour should be assumed among the labour market formally and should have reward.

5. A house built for talented females to work in according to their skills, can both attract them to join the labour market and get the country in touch with maximizing the domestic products.

6. The female farm activities must be restructured so as the activities will not fade without occupying any space in changing the agricultural sector development.

7. Industrial and manufacturing sectors are still too weak, the more importance given to these sectors and the more expenditure done to improve them, the more improved the economy will be maintained with more developed human resources.

References

The Noble Quran

3:195 An-Nisa 195
33:33 AL-Ahzab 33
97 16:97 An-Nahl

Books

A.T. Mallier and M.J. Rosser, Women and the economy, MacMillan.1987
Ansel, Charles, Paul. Economics of social issues, fifth edition, McGraw- Hill. 2002
Belton M. Fleisher, Labor economics theory and evidence, prentice hall .1970
Bradley R. Schiller, Essentials of economics, sixth edition, Mc Graw. Hill.2007
Chamberlain & Cullen, The labor sector, McGraw-Hill 1971
Holesovsky, Economic Systems Analysis And Comparisn, McGraw-Hill .1977
Francine, Marianne, Anne, The economics of women, men and work, fourth addition, prentice hall.2002
Jaafer Gwani, Ten questions regarding women's rights in Islam, Soto graphic, first addition, 2012
McConnell, Brue, Macpherson, contemporary labor economics, seventh addition, McGraw Hill. 2006
Muhammad Shakr and Abbas Ali, Some Points About Women Conditions in Kurdistan Region, first edition, 2013
N.C Jain Saakshi, Dictionary of economics, A.I.T.B.S.2005
Stephen W. Smith, Labour economics, Routledge .1994

Theses

Muhammad Shakr, attitudes of Al-Sharia and law on aggression against women (a comparative study), PhD thesis, dedicated to the college of Islamic sciences, for the degree of PhD in Sharia, university of Salahaddin, January 2010
Nyaz N. Noori, Faces of economic inequality in the Iraqi Kurdisatan(2004-2010): The role of regulation, PhD thesis, dedicated to the college of social sciences and international studies, for the degree of PhD in economics, university of Exeter, September 2012

Parliament Researches

Nadje, Muzhda, Hataw, Dlaram, Kawther, Female Iraqi academics in Iraqi Kurdistan: Roles, challenges & capacities,

Internet

Onyinye Belinda Ndubuisi (The Impact of Culture, Religion and Tradition on Women in Nigeria)

http://wgc.womensglobalconnection.org/conf06proceedings/Ndubuisi%20O.B.--%20Impact%20of%20Culture.pdf CITI; 15th.march.2013
Tim Lambert, A HISTORY OF WOMEN'S WORK, http://www.localhistories.org/womensjobs.html CITI; 15th.march.2013
Neil Kokemuller, http://yourbusiness.azcentral.com/role-advertisement-business-4948.html CITI; 15th.march.2013
New York Teacher, Women's Labor History Timeline: 1765 - Present Day, - *March 3, 2009* http://www.nysut.org/newyorkteacher_12304.htm CITI; 15th.march.2013
Shirley Leckie, women in the workplace - a history, http://www.thelaborsite.com/women1.cfm CITI; 15th.march.2013
Chitra Jha, Women in the 21st Century, http://creative.sulekha.com/women-in-the-21st-century_333374_blog CITI; 15th.march.2013
Susan Barzinge, Women in Iraqi Kurdistan - demanding their rights at work and at home, http://www.tuc.org.uk/international/tuc-17949-f0.cfm CITI; 18th.march.2013
Swara Kadir, Kurdish women will transform the economy, The Kurdish Globe http://www.kurdishglobe.net/display-article.html?id=04C91116C2459391F81ECF7DC4C0C888 CITI; 18th.march.2013
Jacob Mincer and Solomon W. Polechack, 'family investments in human capital', Mar-Apr. 1974, p.S 103-10 http://www.nber.org/chapters/c3685.pdf CITI; 20th.march.2013
Ikkisavin Sadi: Nari Sadi, Twenty First Century: A Century of Women http://www.akhandjyoti.org/?Literature/Vangmaya/Vol-62.2 CITI; 15th.march.2013
Molly Edmonds, 10 examples pf gender inequality around the world, http://dsc.discovery.com/tv-shows/curiosity/topics/examples-gender-inequality-around-world.htm CITI; 24th.march.2013
Point organization, Women's unions between women's rights and duties of partnership. http://www.pointnumber.com/eng/Default.aspx?page=survey&id=74 CITI; 15th.march.2013
Kwu, http://www.kdp.se/?do=women CITI; 15th.march.2013
Convention on the Elimination of all forms of discrimination against women, http://www.hrcr.org/docs/CEDAW/cedaw5.html, UNITED NATIONS GENERAL ASSEMBLY, 18 December 1979, 3 September 1981 CITI; 22nd. December.2012
Universal declaration of human rights, issued December 10th, 1948, http://www.ohchr.org/EN/UDHR/Documents/UDHR_Translations/eng.pdf CITI; 22nd.
Constitution of Kurdistan region, article 21 http://www.pennstatelawreview.org/articles/114/114%20Penn%20St.%20L.%20Rev.%20707.pdf CITI; 23rd. December.2012
Labour market and labour supply, http://www.investorwords.com CITI; 15th. August.2012.
http://www.investorwords.com/16502/labor_market.html#ixzz2L31ImWtI
http://www.investorwords.com/2707/labor_force.html#ixzz2L3CUO3Xf
Labour market, labour demand, labour supply, labour mobility, manpower.
http://www.businessdictionary.com CITI; 15th. August.2012.
http://www.businessdictionary.com/definition/labor-market.html#ixzz2L386ntRJ
http://www.businessdictionary.com/definition/labor-demand.html#ixzz2L3DQiZTZ
http://www.businessdictionary.com/definition/labor-supply.html#ixzz2L3Q4TSrG
http://www.businessdictionary.com/definition/mobility-of-labor.html#ixzz2J0RBacT4
http://www.businessdictionary.com/definition/manpower.html#ixzz2EfyQetGI
Trade unions, http://www.nidirect.gov.uk CITI; 15th. September.2012
Productivity and economic working hours, http://www.investopedia.com CITI; 15th. August.2012
Increasing productivity, http://tweakyourbiz.com CITI; 15th. September.2012
Trade unions, http://dictionary.reference.com CITI; 15th. August.2012.

The Method of Selection of Parameters' Values in the Problem of Determining the Quality Level in Manufacturing, Business and Education

Ahmet Demir

Ishik University, Erbil, Iraq, E-mail: ahmet.demir@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: The requirements for production and learning process quality are different in various manufacturing, business and educational organizations. A new approach to fit these requirements and evaluate the closeness of realistic (actual) quality of production or learning processes (based on quality indicators of output or scores of examination tests) is proposed in the paper. The technique uses the strictly defined approximation procedures and allows users automatically evaluate of closeness of actual quality level when changing quality requirements. In case of significant difference between actual and pattern distributions a new approach (using neural network of 'Generalized Regression Neural Network' type) of determining the minimum values of the factors that will bring the actual distribution to the pattern one is proposed in the paper.

Key Words: Manufacturing Processes Quality, Business Processes Quality, Learning Process Quality, Percentile Function, Non-Parametric Approximation, Generalized Lambda Distribution, Generalized Regression Neural Network

1. Introduction

Let's assume that we are given the next requirement for the learning process quality: "weak" (failed) students can be thought those ones whose grades are less than 60 and the percentage of them should be 30%; "ordinary" (of acceptable level) students are those ones whose grades are between 61 and 95 grades, the percentage of them should be 65%; in latter range so called "middle" level students are those whose percentage is no more than 50% of total number of students (including failed ones) and 20% of "ordinary" student; say, the grade of these "middle" students turns out to be 80 (or any other value), so the grade 80 can be considered as a median of grades distribution; "excellent" students are those ones whose grades are above 95% and the percentage of them is 5%. Obviously, the pattern distribution cannot be approximated by the normal distribution.

However, in all known for us papers such distributions were approximated by either the normal distribution or by some another well-known distributions (beta distribution, gamma distribution, Weibull distribution, etc.) (Rohwer G., 2012; Schwarz J.,2011; Milnikova I.,2012). But in case of applying normal distribution the adequacy and precision of results strongly depends on the degree of "skewness" and often may not be acceptable. In case of applying other distributions (beta distribution, gamma distribution, Weibull distribution, etc.) the problem of estimating adequate distribution parameters arises. In many

cases analytical expression cannot be obtained in close form. Besides, when requirements for quality changes, the corresponding shapes of PDF and CDF functions also change. As a result, it is necessary to use frequently complicated procedures of distribution parameters estimation.

The similar task is commonly met in the area of product quality control (Manzini R., 2010). Suppose that the quality requirement to the product quality is as follows. The percentage of deviation from required level of some quality parameter must be no more than ±5% in 95 % of the output of the product; in this case the quality of the product is regarded as "excellent". To be regarded as "acceptable" the product quality must be as follows: deviation from required level of the quality parameter is ±6%-20% in 3% of the output of the product. The product quality is regarded as "unacceptable" (or defective) if there is the deviation of more than 20% (so the percentage of defective production must be no more than 2%). As one can see, the distribution is also skewed and the problem of choosing the right type of distribution occurs here.

It is not clear in advance which type of distribution should be used in this case. The above distributions (reflecting quality requirements) are called hereinafter "pattern" distributions (functions). It is desirable that distribution of grades of actual exams would be as close to the pattern distribution as possible. The question of closeness degree is a problem (and is considered further in the paper). Moreover, the pattern distribution presents quality requirement for total learning process (which must take into account results of all relevant tests). That is, grades of many subjects (obtained by a group of students in tests held during one of more courses) must match the pattern distribution in order that the group would be regarded as successful and meeting the requirements of learning quality. Of course, it is possible to compare grades of each actual test with the pattern distribution and then summarize the results. But this approach is associated with a large amount of additional and repeated calculations.

Taking into account all the above-mentioned, a new general method of using a unified non-parametric (Erceg-Hurn D., 2008) estimation of relevant grades distributions and further application of its results to the evaluation process of learning quality was developed in the paper (Demir Ahmet, Rodonaia Irakli and Milnikova Irina, 2014). It is important to point out that the method does not require the execution of rather complicated procedures of estimating distribution parameters (mean, standard deviation, third and fourth moments)). The method can be applied to fit grades of various multiple tests and compare them with pattern distribution by using the same unified techniques and algorithms. The approach provides forming of overall quality criterion for all test scores and method of comparing it with pattern quality requirement.

To provide fitting the wide variety of distribution shapes and to describe data by using a single functional form the approach used in the paper implements the Generalized Lambda Distribution (GLD) (Karian Z.A, 2011).The method specifies four parameter values for each case, instead of giving the basic data (which is what the empirical distribution essentially does) for each case. The one functional form allows us to group cases that are similar, as opposed to being overburdened with a mass of numbers or graphs. The generalized lambda distribution family with parameters λ_1, λ_2, λ_3, λ_4, GLD (λ_1, λ_2, λ_3, λ_4), is most easily specified in

$$Q(y) = Q(y;\lambda_1,\lambda_2,\lambda_3,\lambda_4) = \lambda_1 + \frac{y^{\lambda_3} - (1-y)^{\lambda_4}}{\lambda_2} \tag{1}$$

where $0 \le y \le 1$. The parameters λ_1 and λ_2 are, respectively, location and scale parameters, while λ_3 and λ_4 determine the skewness and kurtosis of the GLD (λ_1, λ_2, λ_3, λ_4). It is relatively easy to find the probability density function from the percentile function of the GLD (Karian Z.A, 2011). For the GLD (λ_1, λ_2, λ_3, λ_4), the probability density function is:

$$f(x) = \frac{\lambda_2}{\lambda_3 y^{\lambda_3 - 1} + \lambda_4 (1-y)^{\lambda_4 - 1}} \tag{2}$$

at $x = Q(y)$.

As we have seen above, very often the quality requirement are given in the form of required percentiles (percent of failed, ordinary, middle and excellent students, percent of deviation of some product's quality parameters from their nominal values and so on). The percentile-based approach (Karian Z.A, 2011) fits a GLD(λ_1, λ_2, λ_3, λ_4) distribution to a given dataset by specifying four percentile-based sample statistics and equating them to their corresponding GLD (λ_1, λ_2, λ_3, λ_4) statistics. The resulting equations are then solved for λ_1, λ_2, λ_3, λ_4, with the constraint that the resulting GLD be a valid distribution. This method requires usage of the complex tables of various values of parameters λ_3 and λ_4 . To automate the fitting process the algorithm P-KS (Fournier B. Rupin N., Bigerelle M., Najjar D.,and Iost A., , 2011) was used in the paper (Demir Ahmet, Rodonaia Irakli and Milnikova Irina, 2014). The strategy is to find the set of parameters (λ_1, λ_2, λ_3, λ_4) that give the lowest value of the Kolmogorov-Smirnov estimator EKS :

$$E_{ks} = \max\left|\hat{F}_n - F(x)\right| \tag{3}$$

where $\hat{F}_n$ is the empirical cumulative distribution function (ECDF).

As it was stated above, the pattern distribution is given in the form of some percent. For the example of the section we have the following data (expressed in the form of Matlab statements):

x= [0, 60, 80, 95,100];

y= [0, 0.30, 0.50, 0.95, 1];

In order to form the pattern distribution (with which the actual tests grades should be compared) we need to fit a curve to the given data. The fitted curve will be used to generate data values in intermediate points (other than the original data points) -interpolation points. To provide the smoothness and maximum accuracy of generated data in interpolation points the technique of the shape-preserving cubic splines is used.

The plot of the ECDF for pattern distribution looks like (Fig.1). The corresponding PDF function can be obtained similarly and is shown in Fig. 2.

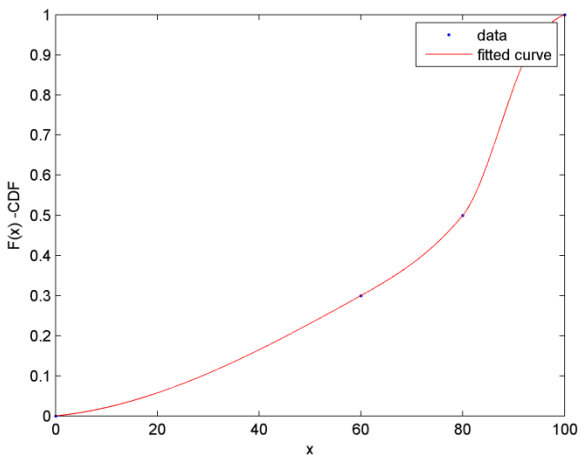


Fig. 1. ECDF for pattern distribution

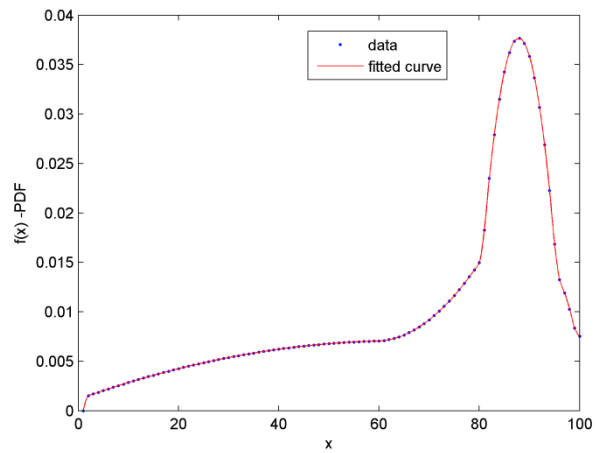


Fig.2. PDF function for pattern distribution

As one can see, the shape of the PDF is non-standard and it is difficult to guess which theoretical distribution can successfully fit it.

Now we can estimate (using relevant Matlab statements) values of the pattern distribution in interpolation points, that is, we can estimate the values of various percentiles (namely, 10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th, 90th percentiles) of the pattern distribution to be compared with actual tests grades' percentiles. As we stated above, the GLD Percentile-Based Approach to Fitting Distributions intensively uses operations with percentile functions PF (inverse cumulative distribution functions ICDF). We can compute a nonparametric estimate of the inverse CDF. In fact, the inverse CDF estimate is just the CDF estimate with the axes swapped. Here we again use the Piecewise Cubic Hermite Interpolant Polinomial (PCHIP) to estimate values of ICDF (Fig.3).

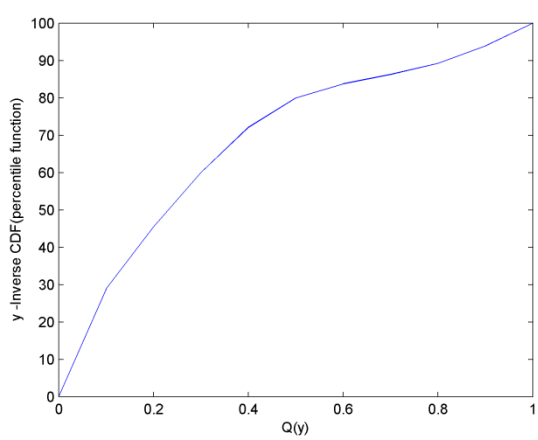


Fig. 3. PCHIP to estimate values of ICDF

Having values of PF we can compute now the values of $\hat{\rho}_1, \hat{\rho}_2, \hat{\rho}_3, \hat{\rho}_4$. Having computed these values, we now run the procedure P-KS. The solution with the best KS criteria for all possible combinations of pairs (λ_3, λ_4) and associated with them pairs of (λ_1, λ_2) is selected. As it was explained above, knowing λ_1, λ_2, λ_3, λ_4 and using formulas (1) and (2) , we can build the PDF curve: we take a grid of y values (such as .01, .02, .03, . . ., .99, that give us the 1%, 2%, 3%, . . ., 99% points), find x at each of those points from (1), and find f(x) at that x from (2). Then, we plot the pairs (x, f(x)) and link them with a smooth curve. Now, by using a modification of the *desirability* (Max Kuhn, 2012) function, we have to create single integrated PDF curve (which represent PDF curves of all actual tests). For our goals it is enough just to create a single integrated PDF curve by using the arithmetical mean. Suppose that there are PDF curves of R actual tests (given in interpolation points i, namely, i mean points of 10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th, 90th percentiles, see explanation above), denoted $F_r(x_i)$, ($r = 1 \ldots\ldots R$). They are combined to achieve an overall PDF curve D:

$$D(i) = \frac{\sum_{1}^{R} (F_r(x_i)}{R}, \tag{4}$$

The integrated PDF curve should be compared with the pattern PDF curve obtained above. To determine the closeness (or distinction) of distribution functions (and, thereby, determine the quality of learning process) we'll use Kullback–Leibler Divergence (Perez-Cruz F. ,2008) Let D and P be two PDFs, defined on $\Re^n$, where n is the dimension of the observed vectors x. The Kullback-Leibler divergence (KL divergence) between D and P is defined as:

$$KL(D \| P) = \int_{\Re^n} D(x) \log \frac{D(x)}{P(x)} dx \tag{5}$$

Here D(x) is an integrated PDF, obtained in (4), and P(x) is a pattern PDF.

The problem of obtaining good upper and lower bounds for the relative entropy attracts considerable interest in information theory .In the paper (Demir Ahmet, Rodonaia Irakli and Milnikova Irina, 2014) we used the following estimation of upper bounds (Gofman A., Kelbert M., 2012):

$$KL(D \| P) \le \min\left[\sum_{1}^{n} \frac{D(x_i)^2}{P(x_i)} - 1, \sum_{1}^{n} \sqrt{\frac{D(x_i)}{P(x_i)}} \left| D(x_i) - P(x_i) \right| \right] \tag{6}$$

If the KL metric, computed in (5), is more then value, obtained in (6), we assume that the quality of educational or manufacturing processes does not match the required standards . In this case, relevant actions to improve quality must be undertaken. Concrete actions, based on the methodology, described in the paper, are subject of the next section

2. General Part

Let us assume that comparison of integrated pattern and actual distribution gave us unsatisfactory result: the value (5) is more than the value defined in (6). This means that the quality of learning process is poor

and we have to reveal courses and groups that caused this undesired result. Hence, we have to develop a method which can determine courses (or course) whose quality (performance) does not match requirement of the pattern distribution. Besides, we'll examine ways of improving learning quality in these courses.

First of all, we'll consider actual exams. For the simplicity, we consider 5 groups, each containing 20 students (totally 100 students). So, we consider 100 points (grades) obtained in exams for 2 different courses. Moreover, for each exam we consider several factors which can have affect on the quality (that is , on grades obtained). Of course, we assume that such factors are available and can be determined on the basis of interviews of students (filling corresponding questionnaires). Again, for the simplicity we consider the following four factors (in general, number of factors is not crucial for the method developed and any number of factors can be considered):

1. Total midterm evaluation (the vector 'tme') of the student, that is, grades obtained by a student for laboratory works, practical works, quizzes, midterm exam(s) during the current semester; the possible values of this parameter are in the range is: 20÷60; the values of the parameter are filled in the questionnaire by a teacher.
2. Average number of hours (per week) (the vector 'home_works_hours') that each student has spent on home assignments or home work during the current semester; the possible values are in the range 0.1÷5 hours; the values of the parameter are filled in the questionnaire by a student.
3. Average grades (the vector 'aver_prerequizites') that each student has obtained for all prerequisites of the current subject (the vector 'aver_prerequizites'); the possible values are in the range 51÷100; the values of the parameter are filled in the questionnaire by a teacher.
4. The difficulty level of the exam (the vector 'exam_difficulty'):
   1 = No study required

   2 = Light revision required

   3 = A reasonable effort required

   4 = Some real study required

   5 = A significant effort requires
   The values of the parameter are filled in the questionnaire by a teacher.

Let us consider the first factor (parameter). We have the following (sorted) distribution of grades obtained by a student for laboratory works, practical works, quizzes, midterm exam(s):

20	21	23	23	25	25	26	26	26	27	28	29	30	30	31	30	30	31	31	32	32	32
32	33	33	33	30	34	34	35	34	35	36	36	37	37	36	37	37	37	37	38	38	38
37	38	38	38	38	38	39	39	39	40	40	41	41	42	42	41	42	42	43	43	44	44
45	45	45	45	46	45	46	46	47	47	47	48	49	49	49	49	50	51	51	51	52	52
54	53	54	54	55	55	55	56	56	57	59	58										

The second factor- the average number of hours (per week) that each student has spent on home assignments or home work during the current semester:

0.49	0.51	0.65	0.65	0.78	0.78	0.86	0.86	0.88	0.9	0.96	1.1	1.1	1.1	1.2
1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.7	1.7	1.7
1.8	1.8	1.8	2	2	2.1	2.2	2.2	2.2	2.2	2.4	2.4	2.5	2.5	2.5	2.5
2.5	2.5	2.6	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.9	2.9	3.1
3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.4	3.4	3.4	3.4
3.5	3.5	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.8	3.8	3.8	3.8	4.1
4.2	4.5	4.8	4.8	4.9											

The third factor - average grades that each student has obtained for all prerequisites of the current subject:

51	51	51	52	52	52	53	54	53	56	57	57	57	57	58	58	59	59	59	58	59	59
60	60	61	61	62	63	62	63	63	67	64	65	64	65	66	65	68	67	67	68	68	68
69	68	69	69	70	69	70	70	71	72	72	72	72	74	74	75	75	75	75	74	76	76
76	77	76	77	77	78	76	79	79	80	80	81	80	81	82	83	82	83	85	84	84	85
85	87	86	87	87	88	88	89	90	95	95	97										

The fourth factor - difficulty level of the exam; for all students difficulty level is 3 (medium level).

We have also a set (sorted) of grades obtained by students for one of the actual exams:

12	12	17	18	21	22	23	24	24	24	26	27	28	28	28	30	30	31	31	33
33	34	35	36	37	39	40	40	41	41	43	45	46	46	46	46	46	48	50	50
51	53	54	55	55	55	55	56	56	57	57	57	58	62	63	64	64	65	66	66
66	67	67	67	70	71	72	73	73	74	75	77	77	77	78	78	79	80	80	80
81	81	82	82	82	83	83	84	86	87	88	88	89	89	90	90	92	97	99	99

As one can see, the distribution of grades is as follows: about 50% of students have grades less or equal 60, about 30% of students have grades between 61 and 80, about 18% of students gave grades between 81 and 95, and 2% of students have grades between 96 and 100. This distribution of grades, of course, does not match the pattern (required) distribution

Now we have to perform the following task: to find the dependence of the grades on these factors (parameters) and then try to determine the minimum values of the factors that will bring the actual distribution to the pattern one. That is, percents of students received corresponding grades must match the values required by the pattern distribution. For example, percent of students who received grades less

or equal 60 must be 40%, percent of students who received grades between 61 and 80 must be 20%, percent of students who received grades between 81 and 95 must be 30%, and percent of students who received grades between 96 and 100 must be 10%. The percentage of actual grades (see above) is quite different.

To perform this task there are many difficulties. The character of the dependence of the percent distribution of students received certain marks on these parameters is absolutely unclear. Moreover, the dependencies in our case are likely *non-linear*. Consequently, it is impossible to determine in advance the type of regression dependence, which is necessary to carry out the regression analysis. Based on the above, the most adequate approach is the use of the neural networks. Using this approach it is possible theoretically reasonable and objective research and identification of the *hidden* nature of the above dependence. Neural networks - a powerful modeling tool, allowing to reproduce extremely complex dependencies. Neural networks are non-linear in nature. In addition, neural networks can cope with the "curse of dimensionality", which does not allow to simulate non-linear dependencies in the case of a large number of variables. Then, after the determination of this relationship, one can use it to determine the needed values of the parameter. This is the purpose of the proposed approach.

The idea of artificial neural networks is based on the design of the human brain. The human brain is constituted by information-processing units (so called neurons) that are connected by synapses, and it forms the kernel of the human nervous system. It is capable of processing input signals that are derived from the environment and of providing appropriate output signals (e.g. certain actions). The advantages of the human information processing system are complexity, nonlinearity and parallelism. An artificial neural network resembles the human brain in many respects. It is constituted by neurons which are connected by synapses, it has ability of mapping input signals onto output signals and to adapt to certain tasks during a training phase. The output produced by a neural network is called *response surface*.

To build neural network model for our task we'll use the *Generalized Regression Neural Network (GRNN*). It is known the GRNN is a much efficient method for fitting or approximating the complex dependencies. Generalized Regression Neural Networks (GRNN) is a special case of *Radial Basis Networks* (*RBN*) (Probabilistic and General Regression Neural Networks, 2013; Probabilistic and General Regression Neural Networks, 2013). Here a *radial basis function* (RBF) (also called a *kernel* function) is used to predict value of the dependent variable in some point by taking into account the values of dependent variable in neighbor points. The RBF is applied to the distance to compute the weight (influence) for each point. The radial basis function is so named because the radius distance is the argument to the function.

$$\text{Weight} = \text{RBF}(\text{distance})$$

Different types of radial basis functions could be used, but the most common is the Gaussian function. If there is more than one predictor variable, then the RBF function has as many dimensions as there are variables. The best predicted value for the current point (for which the prediction is being performed) is found by summing the values of the other points weighted by the RBF function.

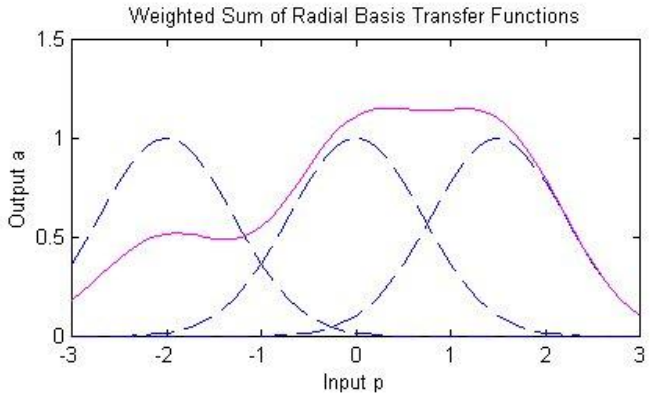


Fig. 4. Weighted Sum of Radial Basis Transfer Functions

The peak of the radial basis function is always centered on the point it is weighting. The sigma value (σ) of the function determines the spread of the RBF function; that is, how quickly the function declines as the distance increased from the point. With larger sigma values and more spread, distant points have a greater influence. If the sigma values are too large, then the model will not be able to closely fit the function. If the sigma values are too small, the model will overfit the data because each training point will have too much influence. Unlike standard feedforward networks, GRNN estimation is always able to converge to a global solution and won't be trapped by a local minimum.

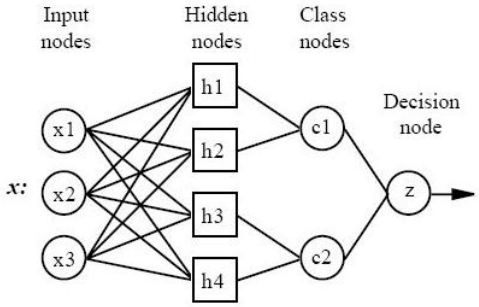


Fig.5 The diagram of GRNN network

In the paper we have used programmatic statements and the graphical user interface "nntool" of the MATLAB's toolbox "Neural Networks". To use the toolbox we have created the independent training set (the 4x100 array 'independent_training_set') on the basis of these factors (parameters): total midterm evaluation, average number of hours (per week) , average grades, difficulty level of the exam. We also have created the dependent training set (1x100 vector 'dependent_training_set') on the basis of the grades obtained by students for one of the actual exams.

We started by calling the command "nntool" of the MATLAB toolbox "Neural Networks". Next we import two datasets: 'independent_training_set' and 'dependent_training_set'. Then we created the neural network of the 'generalized regression neural network' type. Here we assign the spread constant the value 0.7. We use a spread slightly lower than 1, the distance between input values, in order, to get a

function that fits individual data points fairly closely. A smaller spread would fit data better but be less smooth. The network looks like:

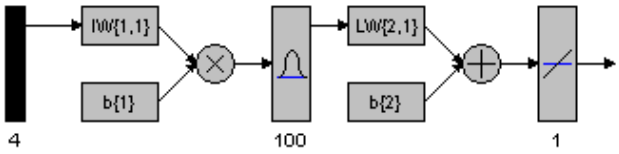


Fig. 6. The network of 'generalized regression neural network' type

The advantage of the GGRN networks is that the training process is carried out in parallel with creation of the network. So, we can immediately use (simulate) the network for the new data.

To fulfill our goal (to determine the minimum values of the factors that will bring the actual distribution to the pattern one) we can try to change the values of one of the factors (or all factors). The change may consist in increasing or decreasing of the factor (depending on whether the percentage of actual grades is more or less than the percentage of the pattern one). For the percentage of failed students (those who obtained less than 60 grades) the changes are as follows: if the actual percentage is more than pattern one, the algorithm has to increase the values of three first factors (total midterm evaluation of the student, average number of hours that each student has spent on home assignments, average grades that each student has obtained for all prerequisites of the current subject) and, maybe, to reduce the difficulty level of the exam (in case if changes of first three factors did not help). The order of factors (priorities) that must be changed is determined by the administration. One option is the priority is as follows:

1. total midterm evaluation of the student
2. average number of hours that each student has spent on home assignments
3. average grades that each student has obtained for all prerequisites of the current subject
4. difficulty level of the exam

Another option is when all factors have the same priorities.

For other percentages (percentages of students have grades between 61 and 80, percentages of students gave grades between 81 and 95, and percentages of students have grades between 96 and 100) the rule is as follows: if the actual percentage is less than pattern one, the algorithm has to increase the values of three first factors maybe, to reduce the difficulty level of the exam (in case if changes of first three factors did not help). If the actual percentage is more than pattern one, then maybe it id necessary to increase the difficulty level (since the recommendation of decrease values of first three factors is not acceptable from a pedagogical point of view).

Here it is necessary to emphasize the following point: changing the values of factors is intended to determine the values which may be useful in future, that is, the updated values of factors can be taken into account and recommended for preparation to future exams. For example, if the average prerequisite grades for failed students, found by the proposed procedure, is, say, 68, then the administration may issue the decree that students who have the average prerequisite less than 68, cannot be admitted to the

exam, otherwise the probability of pattern (required) requirements' violations increases and, thereby, the quality of the educational process deteriorates. Besides, it is assumed that ability of students to learn (and which are fixed by grades obtained in the exams) will be unchanged in future. The main goal of the proposed approach is to meet the requirements of the quality of learning process developed by the university's administration.

In accordance with the above mentioned we can continue by creation a new training set, for example, for total midterm evaluation factor. The step of change is: (maximum value –minimum value)/10, or (59-20)/10=3.9. The rounded value is 4. The updated values of the factor is:

24 25 27 27 29 29 30 30 30 31 32 33 34 34 35 34 34 35 35 36 36
36 36 37 37 37 34 38 38 39 38 39 40 40 41 41 40 41 41 41 41 42 42
42 41 42 42 42 42 42 43 43 43 44 44 45 45 46 46 45 46 46 47 47 48
48 49 49 49 49 50 49 50 50 51 51 51 52 53 53 53 53 54 55 55 55 56
56 58 57 58 58 59 59 59 60 60 60 60 60

Now we again call the GRNN model and submit updated training set. The result (updated values of grades) are:

18 21 22 23 24 24 26 28 26 28 32 33 33 33 35 34 36 36 36 36 36
36 40 41 42 42 41 46 46 46 46 54 46 47 46 47 54 48 56 54 54 57
57 57 57 57 60 60 64 60 64 64 64 67 67 67 67 75 75 72 75 75 77
77 77 77 77 78 77 78 80 80 77 80 80 80 80 82 82 82 82 83 84 86 86
86 86 87 89 89 89 90 90 90 90 90 92 99 99 99

As one can see, the percentage of failed is reduced and now is 46% .

The further action depends on the distribution of priorities among the factors. If all factors have the same priorities then the next action is changing the values of the next factors (here this is average number of hours that each student has spent on home assignments). If the current factor has higher priority, then the its values is increased by the step (equal to 4), the updated independent training set again is submitted to the network, the updated grades are again analyzed and so on. Only if the end of the range of factor's possible values is reached and the desired result is not obtained (that is, no reduction of the percentage of failed students to 40% is obtained), we continue with updating values of the next factor.

Let us assume that all factors have the same priority. In this case we proceed with the next factor. So, we have to change (increase) the values of the second factor - average number of hours that each student has spent on home assignments. The step of change is: (maximum value –minimum value)/10=0.4441. The updated independent training set is again submitted to the network, simulate it and obtain the result:

18 21 23 23 24 24 26 28 26 28 32 33 33 33 35 34 36 36 36 36 36
36 40 41 42 42 41 46 46 46 46 54 46 47 46 48 54 48 56 54 54 57
57 57 57 57 61 61 64 61 64 64 64 67 67 67 67 75 75 73 76 76 77

77 77 77 77 78 77 78 80 80 77 80 80 80 80 82 82 82 83 83 84 86 86 86 86 87 89 89 89 90 90 90 90 90 92 99 99 99

As one can see, no reduction of failed students' percentage was obtained: this value remains 46%.

Hence , we continue with the next factor - average grades that each student has obtained for all prerequisites of the current subject. We change values of this factor by the appropriate step, again submit updated set to the network, simulate the network, obtain the grades. Now we obtained the reduced percentage of failed students: 42%.

As the required (pattern) value 40% is not reached, we return to the first factor, update it, submit to the network, simulate it and obtain the new result: percentage of failed student is 39%. Hence, we obtain the desired result and it corresponds to the following minimum values of the factors:

Minimum value of the total midterm evaluation =28

Mimimum average number of hours that each student has spent on home assignments=0.93 hours

Minimum average grades that each student has obtained for all prerequisites = 60

Difficulty level of the exam = 3

The combination of values of these factors provides required quality of the learning process in the part of percentage of failed students. The values of the factor can be taken into account when preparing future exams. As for the other percentages, the search of appropriate values is been performed (with some difference that are describe above).

However, as one can see, this process (using the panel of "nntool" manually) is quite tedious. Therefore, the fully automated module has been developed for the paper. The MATLAB program constructions were used. Some basic statements of the module are given below.

```
spread = 0.7;

grnn1= newgrnn(independent_training_set, dependent_training_set,spread);

grnn1_outputs=sim(grnn1, independent_training_set);

% below the statement increasing the value of the first factor –total midterm evaluation – by 4 is shown

independent_training_set(1,:)= independent_training_set(1,:) +4;

grnn1_outputs=sim(grnn1, independent_training_set);

----------------------------------

and so on.
```

3. Conclusion

The problem of evaluation of manufacturing, business and learning processes is defined in the paper. The need to use non-parametrical approximation methods is demonstrated. A new approach to evaluate the closeness of realistic (actual) quality of production or learning processes to the pattern requirements is proposed in the paper. In case of significant difference between actual and pattern distributions a new approach of determining the minimum values of the factors that will bring the actual distribution to the pattern one. The Generalized Regression Neural Network (GRNN) is used in the proposed approach. This approach might be used in manufacturing, Business and Educational fields.

References

Demir Ahmet, Irakli Rodonaia, Irina Milnikova. On one approach to evaluation of quality level in manufacturing, business and education. Conferences MCSI 2014 and AMCSE 2014, Varna, Bulgaria, September 13-15, 2014

Erceg-Hurn D. M., Mirosevich V. M. Modern Robust Statistical Methods, University of Western Australia, American Psychologist, 2008, Vol. 63, No. 7, 591–601

Fournier B. , Rupin N., Bigerelle M., Najjar D., and Iost A.. "Fitting a Generalized Lambda Distribution uing a percentile-KS (P-KS) Adequcy Criterion", in (1) Pages 279-309, ISBN: 78-1-58488-711-9

Gofman A.,.Kelbert M. Un upper bound for Kullback-Leibler divergence with a small number of outliers. Moscow Economics National Research University,2012

Karian Z.A.,. Dudewicz E.J. Handbook of Fitting Statistical Distributions with R, CRC Press, 2011

Manzini R. A. Regattieri H.,Pham E., Ferrari. Maintenance for Industrial , © Springer 2010

Mark Hudson Beale, Martin T. Hagan, Howard B. Demuth. Neural Network Toolbox. User's Guide. The MathWorks, Inc., 3 Apple Hill Drive, Natick, MA, 2014

Max Kuhn . The desirability Package., max.kuhn@p_zer.com., January 7, 2012

Milnikova I. Elaboration of statistical quality control models in education process, PhD thesis, Georgian technical University, Tbilisi, 2012

Perez-Cruz F. Kullback-Leibler Divergence Estimation of Continuous Distributions,Department of Electrical Engineering, Princeton University, New Jersey, 2008

Probabilistic and General Regression Neural Networks. DTREG -Software For Predictive Modeling and Forecasting, User's guide , 2013

Rohwer G. Statistical Methods in Sociological Research of Education, Ruhr University Publish,, Germany, 2012.

Schwarz J. Sampling, Regression, Experimental Design and Analysis for Environmental Scientists,Biologists, and Resource Managers, Simon Fraser University, 2011

Nutrients Regime in the Urban Waters

Mehmet Ozdemir

Ishik University, Erbil, Iraq, E-mail: mehmet.ozdemir@ishik.edu.iq

Received: October 5, 2014 Accepted: December 12, 2014 Online Published: December 25, 2014

Abstract: Deterioration of water quality due to the pollution with nutrients is one of the most serious issues in Moldova. Analysis in many countries of the world shows that nitrogen and phosphorus circulate in environment and reach water ecosystems, causing eutrophication (alge-bloome) of water ecosystems situated far from the place of introducing of fertilizers particularly in urban landscapes. This study aims to demonstrate whether urban landscapes become a source for water pollution.

Key Words: Nitrogen, Phosphorus, Eutrophication, Environment, Ecosystem

Introduction

Nitrogen and phosphorus are one of the most important elements in the creation of organic substances (proteins, lipids, nucleic acid, etc). Their average concentration in the natural waters is – 0,3-0,7 mg/l in oligotrophic waters, in mezotrophic- 0,7 – 1,3 and in eutotrophic 0,8 – 2,0 mg/l for N and 0,005 – 0,200 mg/l (in unpolluted waters) for P. They are one of the most biofilic elements in living organisms, playing important role in the different biochemical processes. These elements are also widely used in different types of mineral and organic fertilizers introduced under agricultural crops. So as, Moldova is an agricultural country (80% of the territory is covered by agricultural lands), with intensive agricultural practice, these elements are playing an important role in its economy and in the changes of the state of environment.

Deterioration of water quality due to the pollution with nutrients is one of the most acute issues in Moldova. Environmental Action Plan of Moldova presumes actions on the reducing of the impact of pollution environment with nutrients. That is why National institute of Ecology of Moldova is elaborating complex of measures aimed on the rational use of water recourses including urban areas.

Experience accumulated in many countries of the world shows that nitrogen and phosphorus circulate in environment and reach water ecosystems, causing eutrophication (alge- bloome) of water ecosystems situated far from the place of introducing of fertilizers.

This phenomena becomes much worth in the urban landscapes, where discharges of the wastewaters in environment and run off originated from different sources (tragic, recreation, rubbish and municipal wastes) in the towns add additional amounts of nutrients. Thus, urban landscapes can become a serious source of pollution of water ecosystems, reduce biodiversity and create unfavorable conditions for different water users.

This problem is very acute and for town Chisinau, capital of Moldova, which is surrounded by agricultural lands, with high level of mineral and organic fertilizers use. Recently, National Institute of Ecology of Moldova is carrying out a study aimed on the development of the complex scheme for rational water resource management of urban water resources and the present study was conducted in the frame of this activity.

Two lakes are situated in different parts of the town with different sources and types of feeding and pollution were selected for the case study. First lake is situated in the parking and recreation part of town. Mainstream entering into the lake drainage agricultural area with intensive fertilizers use (250 kg of N and P per hectare at the end of 80 and 50 – actually), enterprise for detergents, village with 10000 inhabitants, without centralized sewer system and wild rubbish deposits along the stream. Second one, has not tributaries influenced by agriculture, and is surrounded by park and living area with multi-storied living blocks with centralized sewer system. Main source of water for this lake is underground and shallow water aquifers.

Main results of the study were discussed with the specialists from National Institute of Ecology and Department for Environmental Protection of Moldova and were included in the final report for the complex water scheme of water use in the town.

Methodology of the Study

Recent study was made using standard field and laboratory methodology and equipment. Field trips were held on the lakes, described above. Lakes were sampled by using bathometer, which allowed receiving water samples from the depth 1; 2; 3 and 4 meters. The last level characterizes water volume near bottom, where physic chemical conditions (pH, temperature, oxygen demand and concentration etc,) strongly change. All sample were put into the clean glass battles, which were also washed by sample water before taking sample.

Oxygen, pH and temperature of the water were measured directly during the field trips by using portative oxygen-, pH and temperature meters equipment. All collected sample were analyzed in the same day in the laboratory conditions. Laboratory studies were made by using photo- calorimetric equipment and methodology. All samples were filtered and then analyzed. Ions of NO3 were analyzed with sodium (natrium) salicylate, with further evaporation, dilution with distilled water and colouring final solution with 7H NaOH. Then the liquid part was colorimetered.

Ions of NO2 were analyzed with GRISS reactive. This chemical was used for receiving of the colored solution, which color density was also colorimetered by using photo colorimeter.

Ions of NH4 were analyzed with NESSLER reactive. The density of its colored solution was also measured with the same equipment.

The photo calorimetric methodology was also used and for analyzing of the ions of PO4. Its colored water solution was received by using of the SnCl2.

Each sample for each ingredient was analyzed 3 times and average concentration was calculated from 3 meanings by using standard statistical procedure.

All analyses were made in the filtered water solutions, conform standard methodology for filtration.

The results of the analyses were stored in the database format. All graphics and tables were created in Microsoft Office and Excel.

Results and Discussions

Obtained data show that amount of phosphorus is slightly decreasing with the depth. In the same time its concentration is declining and due to the increasing of the temperature of the water. These phenomena can be legated with the consuming of this element by water organisms the same time concentration of NO3 practically does not change. The concentration of another form of nitrogen NH4 is reducing in correspondence with the temperature growing. So as, ammonia is more acceptable for the initial stage of mineral feeding of water organisms in the spring season, the concentration of this form of nitrogen is also decreasing. Another form of nitrogen – NO3 cannot be utilized due to the low concentration of phosphorus, which is used for biological energy consumption.

Conform scientific data the most optimal ratio between N and P is 10: 1. In our cases total amount of mineral nitrogen is around 3-4 mg/l, while for phosphorus it varies from 0,001 to 0,003 mg/l. Thus, ratio between this elements in studied lakes varies around 1000: 1. It allows to say, that very insignificant part of nitrogen can be used for the development of organic substances in water ecosystems.

Concentration of the NO3 form practically does not change in water ecosystems in studied lakes. Increased amounts of this ingredient were determined in the lake which tributaries drainage rural area, with private households without sewer system and agricultural area with intensive agricultural practice and fertilizers use.

Concentration of NH4 in the studied water ecosystems also indicate on much higher pollution of the lake, which has tributaries from agricultural lands and village with private households without sewer system. The difference between these two lakes by ammonia concentration is more significant 10: 1in the period with low temperature and till 2: 1 in the period of increased temperature. In the same time this ratio for NO3 is 2: 1. These phenomena, probably, can be explained by the fresh organic pollution originated from organic wastes from rural area. The lower ration for NH4 was found in the lake, which is fed by underground water and surrounded by multi-storied houses with centralized sewer system can be explained by less direct discharges of wastes (no emissions and wild rubbish deposits were observed during the field trips).

Increasing of concentration of NO3 was observed in the lake with tributaries from agricultural fields and rural area. These phenomena can be explained by growing of the pH meaning, which normally increases near bottom level. It varied in this lake from 7,5 near the surface and other levels, while near the bottom, where oxygen concentration significantly reduces and is not enough for oxidation of organic substances, accumulated in sediments. Conform estimations of humus concentration in the sediments of the lakes, made by National Institute of Ecology of Moldova in 1992, it is on the level of 5-6 % (while in soils – 2-

3%). Higher humus concentration, in the sediments, in comparison with soils, demands significant amounts of oxygen for decomposition of organic compounds.

That is why, we can presume lower oxygen concentration in the near bottom water level, in comparison with the previous ones and increasing of the pH. Such processes can presume poor destruction of organic compounds and its accumulation.

Distribution of NO2 ions shows its increase in the water period of time, when speed of physic-chemical reactions is strongly growing (Le-Shatelie postulate). So as, this form of nitrogen is transition form between NH4 and NO3 and vice-versa, we can presume that this increasing is connected with much more intensive transforming of the ammonia form into NO2 form and further to NO3.

Conclusion

On the base of the study, held in April- May 1997 in different types of lakes (different sources of pollution, sources of water etc.) in the town of Kishinev (Chisinau), capital of Moldova next conclusions can be made:

1. Consuming of nitrogen for creating of the organic substances is limited by the low concentration of phosphorus. Ratio between N and P is 1000: 1 during whole period of study. This ratio is relatively constant in independence of the sum of concentration of different forms of nitrogen and phosphorus.
2. Decreasing of the ratio between concentration of ammonia and nitrate forms of nitrogen as function of temperature indicates on the utilization of the ammonia forms primary to the nitrate ones.
3. Agricultural and rural areas populated with private households, not connected to the centralized sewer system are important source of pollution of urban water ecosystem with nutrients via tributaries. Analyses showed much higher concentrations of studied ingredients in the streams of this lake.
4. Recent state of environment in the surrounding of the studied lakes shows that mesh organic pollution comes from the rural populated area without centralized sewer system. Underground feeding lake has much lower concentration of ammonia, which can indicate on poor pollution of groundwater with NH4. Its concentration in shallow waters is much lower than in the lake 1.

Recommendations for Actions

1. One the base of the results obtained from the recent study future proposals can be made for improvement of the state water resources in urban landscape.
2. So as, main limit factor for the further eutrophication in the studied lakes is phosphorus concentration, it is necessary to elaborate, measure aimed on the phosphorus, emission reduction (first of all use detergents with low P- content, removal of unauthorized rubbish deposits of municipal wastes, sanation of urban territory etc.

3. To intensify scientific activity in the field of influence of phosphorus and ratio of these element with nitrogen on the state of water ecosystems and to precise relevant standards for nitrogen.

References

Hydro chemical vocabulary, Rostov, 1986
Dubassari water body, Kishinev, 1980.
Toxicological characteristics of different rations of nutrients in situ experiments, Kishinev, 1994.
State of Environment in Moldova, Kishinev, 1995.
Strategic Action Plan for environmental protection for the Danube River Basin, Vienna, 1994.