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Highlights

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Energy Consumption, Carbon Dioxide Emissions and Economic Growth in Ethiopia

By Endeg Tekalegn Wolde, Wendaferahu Mulugeta &
Muhdin Muhammed Hussen

Jimma University, Ethiopia

Abstract- This study has attempted to investigate the relationship between, energy consumption, CO_2 emissions and economic growth in Ethiopia, using time series data from 1970/71 to 2010/11. The finding indicates variables of interests are integrated of the same order I (1). Co-integration test approves existence of one co-integrating equation among the variables. The causality test result shows energy consumption causes Economic Growth in Ethiopia. Based on the outcome shocks to energy consumption have a negative impact on economic growth. The contributions of energy consumption to CO_2 emissions were insignificant and economic growth is positively related to CO_2 emissions. To secure the sustenance of CO_2 emissions free economic growth in Ethiopia, cost effective, carbon free, and efficient utilization of renewable energy consumption based on the country comparative advantage that consider alternative use of resources are advisable like Hydro and Geothermal.

Keywords: *energy consumption, CO_2 emission, economic growth, VAR.*

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Energy Consumption, Carbon Dioxide Emissions and Economic Growth in Ethiopia

Endeg Tekalegn Wolde [α], Wendaferahu Mulugeta [σ] & Muhdin Muhammed Hussen [ρ]

Abstract- This study has attempted to investigate the relationship between, energy consumption, CO_2 emissions and economic growth in Ethiopia, using time series data from 1970/71 to 2010/11. The finding indicates variables of interests are integrated of the same order I (1). Co-integration test approves existence of one co-integrating equation among the variables. The causality test result shows energy consumption causes Economic Growth in Ethiopia. Based on the outcome shocks to energy consumption have a negative impact on economic growth. The contributions of energy consumption to CO_2 emissions were insignificant and economic growth is positively related to CO_2 emissions. To secure the sustenance of CO_2 emissions free economic growth in Ethiopia, cost effective, carbon free, and efficient utilization of renewable energy consumption based on the country comparative advantage that consider alternative use of resources are advisable like Hydro and Geothermal.

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I. Introduction

The long term trend of economic growth over the last 200 years shows continuous increment over time. To produce such output combinations of physical, natural, social and human capital were used as input. If we compare the growth of CO_2 emissions and the growth of energy use, both on per capita basis CO_2 emission grew more slowly than energy consumption from 1970 to 1990. Since 2000, the variables are going parallel, indicating no further CO_2emissions savings given the greater use of coal again. Wind and solar contributions are not large enough to make an appreciable difference in CO_2 levels (Alex *et al.,* 2010).

According to the global carbon budget CO_2 emissions is the main cause of environmental degradation. Over the period of 1959 to 2011, 87 percent of all human-produced carbon dioxide emissions come from the burning of fossil fuels used in different sector in the economy. The burning of fossil fuels includes coal, natural gas and oil. While from the clearing of forests and other land use changes in agricultural sector accounts 9%. And as well as from some industrial process such as cement manufacturing is 4% (IEA, 2013).

The interactions among economic growth, energy consumptions and CO_2 emissions have great policy implications for the environment. Economic growth needs different amount and types of resources including energy consumptions. Even if CO_2 emissions intensity vary for different resource processing and sources of energy as explained above, the consumptions of energy and other resource processing for the sake of economic growth inevitably contribute for CO_2 emissions to the environment. Carbon sequestration services provided by soil and forest is one of natural capital including raw materials extract from the earth. Natural capitals unique elements are some have finite limits, irreversible change, its impact extends across many generations, due to critical threshold sudden and dramatic change may occurs. Environment is one of natural capital which need to be used sustainably and efficiently in order to secure growth in the long run with the fate of the coming generations (Alex *et al*., 2010).

Thus, empirically the African continent while sheltering 15% of the world population, accounts for only 3% of world energy consumption, and the average energy consumption of an African is six times less than that recorded in the world. Contrary to this, USA constitutes 5 percent of the world's population but consume 24 percent of the world's energy. On average, one American consumes as much energy as 2 Japanese, 6 Mexicans, 13 Chinese, 31 Indians, 128 Bangladeshis, 307 Tanzanians and 370 Ethiopians. Sub Saharan Africa account for 9 percent of world population generate 2.5 percent of world economic activity. The region consumes 2.7% of world commercial primary energy. The region has 2% of world proven oil reserves, 3% of world proven gas reserves and 6% of world proven coal reserves. There is a large hydropower potential, even able to export for other region in excess of local need (UNEP, 2006).

As compared to other African country Ethiopia share 2.4 percent of total gross domestic product, and, 6.9 percent of total agricultural gross domestic product on average over 2003 to 2011. Over the same period within Eastern Africa the country shares 18.8 percent of total gross domestic product and 29.2 percent of

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agricultural gross domestic product. In Ethiopia, the agricultural sector absorbs 85 percent of the total employment and contributes 46.3 percent of gross domestic product. It is followed by the service sector which account for 10 percent of total employment and contributes 43 percent of gross domestic product, and the industry account 5 percent of employment and 10.7 of gross domestic product and in terms of population the country was the second populous country in Africa (World Bank, 2013).

According to Ministry of Mines and Energy of Ethiopia on average per capita electricity consumption is 28KWH. Beside this, it show the existence of great exploitable potential in natural Gas, coal, wind, solar, geothermal (MW) 5000-7000, hydro (MW) 45000. Considering this the clean renewable green energy (CRGE) strategy projects that the contribution of agriculture will diminish from 42% to 29%, indicating migration of jobs from the agriculture sector to industry and services, this expect to reduce rural environmental burden. In the same analysis the growth and transformation plan of Ethiopia (GTP) explicitly recognizes that environment is a vital and important pillar of sustainable development, and implementation of environmental laws is part of building the green economy (MoFED. 2010).

The empirical findings on the variables relationship also show mixed result and differ from country to county: Abesha (2009) studied Domestic Energy Consumption and Deforestation in Hareri region Assessment of Students' Awareness and Views in Ethiopia. And finds the views about environmental problems resulted from unsustainable dependence of biomass energy and Air pollution, is a serious environmental problem in developed nation, was considered by more than half of students. Finally he recommends the need of awareness creation in the subject area.

Mehari (2011) had assessed Granger causality relationship between economic growth and energy consumption in Ethiopia and finds unidirectional causality from economic growth to energy consumption. Finally, in its variance decomposition analysis comparisons of labor and capital with energy indicates that energy was no more than a minor contributing factor to output growth.

This study extend the previous research to investigate not only whether energy consumption and economic growth have a significant impact but also its implication on the CO_2 emissions. According to the Intergovernmental Panel on Climate Change (2001) Ethiopia is one of the country most likely to suffer extremely from the adverse effect of climate change (Environmental protection authority, 2012). Necessity of understanding the relationship and reacting accordingly to overcome such types of warning, Existence of controversy among variables relationship both in theory and empirical finding and its importance for policy implication, is the main rationale motivated this study.

II. Literature Review

a) Global Economic Growth, Energy Consumption and Green Gas Emissions in the World

The long term trend of economic output shows continuous increment over time. This leads rising level of employment, income, and promote both private and public investment in vast sectors. Natural capital includes raw materials extract from the earth, carbon sequestration services provided by soil and forest. Its unique elements are some have finite limits, irreversible change, its impact extends across many generations, due to critical threshold sudden and dramatic change may occurs. So, it needs to be used sustainably and efficiently in order to secure growth in the long run. In the some way energy consumption and carbon dioxide emission were increased in the world so roughly the last 200 years. This rise in energy consumption is primarily from increased fossil fuel consumption demand (Green Energy act, 2009).

While, in Africa including Ethiopia the economy still dominated by agriculture and energy consumption pattern dominated by primary energy source (EIA, 2012). According to Netherlands environmental assessment agency: - since, 2000, an estimated total of 420 billion tonnes CO_2 was cumulatively emitted due to human activities including deforestation. Scientific literature suggests that limiting average global temperature rise to 2 °C above pre-industrial levels – the target internationally adopted in UN climate negotiations – is possible if cumulative emissions in the 2000–2050 period do not exceed 1,000 to 1,500 billion tonnes CO_2. If the current global increase in CO2 emissions continues, cumulative emissions will surpass this total within the next two decades (Jos *et al*., 2012)

b) Economic Growth, Energy Consumption and Greenhouse Gas Emissions in Ethiopia

According to accomplish transition from a subsistence economy to an agro-industrial economy during 1930–1990 Ethiopia needed an infrastructure to exploit resources, a material base to improve living conditions, and better health, education, communications and other services. Though, fail to achieve as planed target due to the administrative and technical capabilities to implement a national development plan, staffing problems because they neglected to identify the resources and to establish the organizational structures necessary to facilitate large scale economic development (Alemayehu, 2005).

According to Ethiopian economic update II Over the past decade, Ethiopia has achieved high economic growth, averaging 10.7 percent per year. The economy continued to expand at a rapid pace of 8.5 percent in 2011/12 and rank the country 12th fastest growing

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economy in the World. Agriculture, industry, and services grew by 4.9 percent, 13.6 percent, and 11.1 percent, respectively. The expansion of the services and agricultural sectors explain most of this growth 57 and 26 percent respectively, while the contribution of industry was relatively modest to 16.7 percent (World Bank, 2013).

The major source of the electricity supplied in the Ethiopia is from hydropower, which contributes about 84% (668 MW) of the total supply. This amount is, however, less than 2% of the economically affordable power capacity of the total potential of water resource. On the contrary, most towns, villages and rural areas generally lack any access to electricity. Presently only 33% of the population is said to have access to electricity. In 2009 the electric energy consumption per capita is estimated to be 44 kWh, which is one of the lowest consumption among the least developing countries (Ministry of Mines and Energy, 2009).

On the other hand Fossil fuel energy consumption which comprises coal, oil, petroleum, and natural gas products measured at 5.72 % of total energy consumption in Ethiopia for 2011. The value for Energy use (kg of oil equivalent) per $1,000 of GDP (constant 2005 PPP) in Ethiopia was 429.36 as of 2010 and over the past 29 years, the value for this indicator has fluctuated between 697.30 in 1992 and 418.79 in 2006.The value for Energy use (kt of oil equivalent) in Ethiopia was 33,202 as of 2010 over the past 39 years this indicator reached a maximum value of 33,202 in 2010 and a minimum value of 8,607 in 1971 (IEA, 2012). The greenhouse gas emission from energy sector is also important contributor to the total national emission. According to the 2004 inventory, it was accounted for more than 50% of the total GHGs emission and was twice of the 1994 values. Among these sub sectors, the transport and the domestic take the largest contribution which accounts about 68% and 16.1% respectively in 2004. The combustion of fossil fuels mainly in the transportation sector was responsible for 88 % of the total CO_2 in 1994 (B & M Development Consultant PLC, 2006).

According to International Energy Statistics, 2012 The value for CO_2 emissions (kt) in Ethiopia was 7,887.72 as of 2009 and over the past 49 years this indicator reached a maximum value of 7,887.72 in 2009 and a minimum value of 341.03 in 1961. The latest value for CO_2 emissions (kg per 2000 US$ of GDP) in Ethiopia was 0.48 as of 2009. Over the past 28 years, the value for this indicator has fluctuated between 0.72 in 2000 and 0.29 in 1982. In term of CO_2 metric tons per capita it fluctuates from .01589222 in 1960 to .07456479 in 2010 (IEA, 2012).

c) *Empirical findings on: Energy Consumption, Carbon Dioxide emission and Economic Growth relationship*

The empirical findings results on the variables are vary from country to country: even though scholars way of analysis techniques, data issues and model of their estimations are different. The studies by Mohammed, *et al.,*(2012) for 12 Middle East and North African Countries over the period 1981–2005 using co integration techniques show that in the long-run energy consumption has a positive significant impact on CO_2 emissions. And real GDP exhibits a quadratic relationship with CO_2 emissions for the region as a whole. However, although the estimated long-run coefficients of income and its square satisfy the EKC hypothesis in most studied countries, the turning points are very low in some cases and very high in other cases, hence providing poor evidence in support of the EKC hypothesis.

Nicholas, M. (2011) in south Africa using ARDL finds distinct unidirectional causal flow from economic growth to carbon emissions and energy consumption Granger-causes both carbon emissions and economic growth. More importantly the finding indicates carbon emission constitutes an impediment to sustainable economic growth in the country. In India by Tiwari, A. (2011) and in china Harry, B.(2012) using Co integration and vector error correction their result indicates the variables are related in the long run and shows inefficient use of energy leads environmental pressure tend to rise faster than economic growth. In Chine the results also reveal bi-directional causality between coal consumption and pollutant emission both in the short and long run it indicates the difficulty to pursue a greenhouse gas abatement policy through reducing coal consumption in the country.

Sakib, *et al., (*2012) for Bangladesh, and, Mahammed, S., and Shahjahan, K., (2013) in Australia employed Johansen co integration using a multivariate framework and their empirical findings indicate bi-directional causal link between energy consumption and economic growth for Australia and the energy use can lead to CO_2 for Bangladesh. The study points out that there is no causal relationship between Economic Growth and CO_2, for the two countries.

In supports of the neutrality hypothesis, for Denmark using annual data from 1972-2012 by Viktoras, K.(2013) to examine causal relationship between variables employing Granger causality test in VAR framework Results strongly support a unidirectional causality coming from renewable energy consumption to CO_2 emissions. Its result also indicates that there is no statistically causality between the economic growth and renewable energy consumption, between economic growth and CO_2 emissions, and implies that energy conservation policies should not have a significant impact on economic growth.

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III. Method and Procedure

a) Types and sources of the data

For the empirical analysis Real GDP per Capita represented by ry, and urbanization by (urb) from 1970/71 up to 2010/11 were collected from MoFED (2012). Kilogram of oil equivalent per capita for energy consumption represented by ec and carbon dioxide emissions is measured in metric tons per capita represented by CO_2 for the same period was collected from World Development Indicators of the official website of World Bank 2014. The choice of the starting period was constrained by the availability of data on Kilogram of oil equivalent per capita for energy consumption. While over the same period urbanization measured by urban population growth considered as controlled variable. All the data were transferred in to logarithmic form to reduce the problem of heteroskedasticity. As log transformation compresses the scale in which the variables are measured.

b) Model Specifications

The Vector Auto regression (VAR) models were first proposed by Sims (1980) who argued that "it should be feasible to estimate large macro models as unrestricted reduced forms, while treating all variables as endogenous". This help to analyze multiple relationship between variables in an accurate and simple way without specifying which variables are endogenous or exogenous (Verbeek, 2004).Based on this a VAR system for this study were establish in one of the following form;

$$Vt = \sum_{i=1}^{k} \delta i Vt - 1 + \eta t \ldots\ldots\ldots\ldots \quad (1)$$

Where V_t = (Y, C, E) and $\eta_t = (\eta_Y, \eta_C, \eta_E)$, $\delta_i - \delta_k$ are three by three matrices of coefficients and η is a vector of error terms.

c) Estimation Techniques

The estimation technique is based on secondary data analysis of Johnson co-integration analysis framework. Which includes lag length selection, unit root test, and co-integration test, identification of long run model, causality test and diagnostic test of validity. All the analysis in the study were conducted using STATA 11 version software

d) Unit Root Test

Stationary is required so as avoid spuriousness of the regression results. A variable is said to be stationary if it's mean, variance and auto-covariance remains the same no matter at what point we measure them. The null hypothesis of non-stationary is tested against alternative hypothesis of stationary. To test the unit root property of the variables, the paper employed Augmented Dickey Fuller test. The Augmented Dickey-Fuller regression model has a form:

$$\Delta y_t = \alpha + \beta t + \delta y t - 1 + \sum_{i=1}^{p} \gamma i \Delta y t - i + \varepsilon t, \text{ intercept and time trend item...} \quad (2)$$

$$\Delta y_t = \alpha + \delta y t - 1 + \sum_{i=1}^{p} \gamma i \Delta y t - i + \varepsilon t, \text{ intercept and no time trend item ....} \quad (3)$$

$$\Delta y_t = y t - 1 + \sum_{i=1}^{p} \gamma i \Delta y t - i + \varepsilon t, \text{ no intercept and no time trend items.....} \quad (4)$$

Where t is the time index, α is an intercept constant, β is the coefficient on a time trend, δ is the coefficient presenting process root, ε is an independently, identically distributed residual term, yt is the variable of interest (Y, E, C). The aim of test is to see whether the coefficient δ equals zero, which would imply that process is non-stationary (Pantula, 1989).

e) Co-integration test

One of the most widely used approaches to test for co integration is VAR based Johansen co-integration test. Unlike Engle-Granger test which permits only one co integrating relationship, Johansen co-integration test, allows for more than one co-integrating relationship to be tested in one or more equations. Of coerce the concept of co-integration can be described as a systematic co-movement among the selected time series over the long-run. If each non-stationary variables, but a linear combination of them could be stationary then it can be said that the series are co integrated. So, it is necessary to test for co-integration if we want to provide meaningful results. If the co-integrating relationship is found then in order to account for non-stationary variables VECM model has to be estimated in the following way, following (Cheung, and Lai, 1993).

$$\Delta y_t = \alpha + \sum_{i=1}^{p} \alpha\, i \Delta y t - i + \sum_{j=1}^{p} \beta j x t - j + \emptyset e_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where Δ is the deference operator, p is the number of lags, α and β are parameters to be estimated, ε is serially uncorrected error term, and e_{t-1} is the error correction term (ECM).

f) Causality test

According to Granger (1969) causality examine to what extent a change from past values of a variable affect the subsequent changes of the other variable. We can say that there is Granger causality between two variables X_t and Y_t if a forecast Y_t taken from a set of information that includes the past variability of X_t is better than a forecast that ignores the past variability X_t, keeping other thing remain constant.

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$$Y_t = \sum_{j=1}^{n} \alpha 1 Xt - 1 + \sum_{j=1}^{n} \beta j Yt -_j + u_{1t} \quad (6)$$

$$X_t = \sum_{j=1}^{n} \lambda i Xt - 1 + \sum_{j=1}^{n} \sigma j Y_{t-j} + u_{2t} \quad (7)$$

Unidirectional causality from X_t to Y_t is indicated if the estimated coefficients on the lagged X_t in (6) are statistically different from zero as a group and the set of estimated coefficients on the lagged Y_t in (7) is not statistically different from zero. Unidirectional causality from Y_t to $X_t$is indicated if the estimated coefficients on the lagged Y_t in (7) are statistically different from zero as a group and the set of estimated coefficients on the lagged X_t in (6) is not statistically different from zero. Feedback is indicated when the set of X_t and Y_t coefficients are statistically different from zero in both regression equations (6) and (7).Independence occurs when the set of X_t and Y_t coefficients are not statistically significant in both regression equations (6) and (7).

IV. Results and Discussion

In this part we can discuss the outcomes of the data analysis. The discussion was start from lag length selections. Then, unit root test, cointegrations test, estimations of VAR, diagnostic test and causality test. As indicated in the table 4.1., below the lag length selection criteria strongly advise us to include two lag in the estimations of the variables for the study.

Table 4.1 : Lag length selections

lag	AIC	HQIC	SBIC
0	-5.72448	-5.66327	-5.55386
1	-12.0727	-11.7666	-11.2196
2	-12.8475*	-12.2965*	-11.3119*

Source: STATA 11 result

Where as in the test of unit root test result, all the variables are non-stationary at level with constant and without constant both at 1% and 5%.On the other hand, all the variables are stationary after taking their first difference as indicated below on the table 4.2.A. and 4.2.B. respectively.

Table 4.2. A : Results of a unit root tests based on ADF at level

Variables	Without constant			With constant		
	Test statistics	1% critical value	5% critical value	Test statistics	1% critical value	5% critical value
LEC	-1.007	-2.638	-1.950	-2.331	-4.251	-3.544
LCO2	-0.294	-2.638	-1.950	-2.784	-4.251	-3.544
LRY	1.022	-2.638	-1.950	0.244	-4.251	-3.544
LURB	-0.439	-2.639	-1.950	-2.945	-4.260	-3.548

Source: STATA 11 result

Table 4.2.B : Results of a unit root tests based on ADF at first difference

	Without constant			With constant		
	Test statistics	1% critical value	5% critical value	Test statistics	1% critical value	5% critical value
LEC	-1.007	-2.638	-1.950	-2.331	-4.251	-3.544
LCO2	-0.294	-2.638	-1.950	-2.784	-4.251	-3.544
LRY	1.022	-2.638	-1.950	0.244	-4.251	-3.544
LURB	-0.439	-2.639	-1.950	-2.945	-4.260	-3.548

** And ** indicates the rejection of the null hypothesis at 1% and 5% level of significance, respectively Source: STATA 11 result*

The VAR model with two lags, as suggested by AIC, HQIC and SBIC on the table 4.1., is considered to test long run co movement. We compare the trace statistics and max statistics with the critical values and stop only when the null hypothesis is not rejected for the first time.

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Table 4.3.A : Johnson Co-integrations Test Trace Statistics

Rank _Ho	Ha	Eigen value	Trace statistic	5% critical	decision
0		-	61.6255	47.21	
1		0.59352	26.5165*	29.68	accept
2		0.38226	7.7304	15.41	
3		0.17861	0.0566	3.76	
4		0.00145	-	-	

Source: STATA 11 Result

Table 4.3.B : Johnson Co-integrations Test Max Statistics

Rank_Ho	Ha	Eigen value	Max statistic	5% critical	decision
0		-	35.1091	27.07	
1		0.59352	18.7861	20.97	accept
2		0.38226	7.6738	14.07	
3		0.17861	0.0566	3.76	
4		0.00145	-	-	-

Source: STATA 11 result

In the Johansen co integration test result both trace statistics and max-Eigen statistics indicates that there is one co integrating vector. The statistics was not reject the null hypothesis at one rank. The finding is confirming existence of long run association among energy consumption, CO_2 emission, and economic growth in the country.

LCO2 = 2.16 - 1.81LEC + 0.89LRY + 1.19LURB

(0.185) (0.028) (0.002)

Vector diagnostic test: Vector AR testchi^2(25) = 25.48237(0.4356)

Vector normality test: chi^2(10) = 0.592(0.74362)

Hetro testchi^2 = 307.8802(0.3646)

The insignificant relation between energy consumption and CO_2 emissions indicated in the long run relationship shows that, the contributions of Ethiopia to CO_2 emissions from the consumptions of modern energy like coal consumption indifferent sectors were eminent. According to the global carbon budget, from 1959-2011, 87 percent of all human-produced carbon dioxide emissions come from the burning of fossil fuels like coal, natural gas and oil, while from the clearing of forests and other land use changes 9% and as well as from some industrial process such as cement manufacturing 4% (IEA, 2013). In case of Ethiopia, Energy consumption in the country is dominated by sort of hydro and biomass. Biomass sourcing over 80% of the country's energy and Fossil fuel energy consumption which is a major source of CO_2 emission comprises coal, oil, petroleum, and natural gas products measured at 5.72 % of total energy consumption in Ethiopia for 2011.

Whereas, the positive and significant relation between economic growth and CO_2 indicates economic growth was inevitably increases carbon dioxide emissions in the country. The possible reason for this argument is the early stage economic growth hypothesis of Environmental Kuznets Curve. The hypothesis states that, at the early stage economic growth is at the cost of environment that come from land use, land process and expansions of agricultural activities. This activities can increases emissions emits to the environment (Panayotou, 2003).

The significant and positive sign of Urbanization with CO_2 emissions shows an increment in urban population increasesCO_2 emission to the environment. This might be due to increases in consumptions of: coal, oil, petroleum, and natural gas with increased urban populations. For the validity of the model, vector diagnostics tests confirmed no problem of serial autocorrelation in the error terms in the model, error term was normality distributed and have constant variance.

The vector error correction model captures both the long run and short run relationship. The short run dynamics shows speed of adjustment, variables plays important role in the adjustment process. The error correction term, measures the deviations of the series from the long run relationship.

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Table 4.4 : Short run dynamics				
Variables	coefficient	Std. error	p-value	
Constant	.0137954	.1204968	0.909	
DLEC_1	-4.036318	1.191125	0.001	
DLEC_2	3.605454	1.344326	0.007	
DLURB_1	.7609294	1.511107	0.000	
DLURB_2	.4935843	.2891729	0.125	
DCO2_1	-.4287555	.3567761	0.009	
DCO2_2	-.4060967	.090207	0.167	
DLRY_1	.8984152	.2431941	0.000	
DLRY_2	.1458625	.2641395	0.581	
EMC_1	-.3295002	.0514678	0.000	
R^2 = 0.8292 *VEC diagnostic test* *AR test Chi^2(25) = 19.58049(0.76848)* *Normality test chi(^) 2 = .507(0.77599)* *Hetro test chi^(22) = 28.36542(.639)*				

Source: STATA 11

In the process of adjustments, first period of economic growth, carbon dioxide emissions and urbanizations, and all period lagged values of energy consumptions are significant. On the estimated VECM model, the error correction term in the equation is statistical significant at 1% significance level. The negative sign indicates convergence to the equilibrium. This coefficient indicates speed of adjustment is 32%.

Table 4.5 : Granger Causality test result				
Equations	Excluded	Chi^2	Df	prob> Chi^2
lco2	Lry	9.3831	2	0.009
lco2	Lurb	11.71	2	0.003
lry	Lec	8.8158	2	0.012
lurb	Lec	11.579	2	0.003

Source: STATA 11

All variables under Equations are dependent, and the excluded variables are independent or source of causality. Decision rule, null hypothesis is rejected when probability value is less than 5%. As shown on the above table 4.5, as a regular economic phenomenon there is causality from energy consumption to economic growth and urbanization. The argument could be in line with an increases in energy consumptions in different sector can inevitably stimulate the economy. And, an increases in energy consumption also stimulate different activities and expand investments in urban area, this can attract many workers and expand urban population. The other causality is, from economic growth and urbanizations to carbon dioxide emissions. Economic growth and urbanizations, can increases CO_2 emissions to the environment due to an increases in economic activities and an increases in energy consumptions by urban residents for different activities respectively.

V. Conclusion and Recommendations

This study was aimed to examine, the relationships between energy consumption, carbon dioxide emission and economic growth in Ethiopia. The unit root test result indicates all the variables are non-stationary at level whereas, they become stationary after taking their first difference. It shows that, the variables under consideration are integrated of the same order one I (1). Co-integration analysis was conducted using Johansen co-integration testing approach with lag two as suggested by lag length selection criteria. The obtained results suggest that there is one co-integrating relationships among variables. From the short-run result, it found a correctly signed and statistically significant coefficient of ECM (-1). The negative sign indicates convergence to equilibrium whereas the coefficient shows speed of adjustment in case of a shock.

The study points out that, there is insignificant relation between energy consumption and CO_2emissions as indicated in the long run relationship. It shows that, the contributions of Ethiopia to CO_2 emissions from the consumptions of modern energy like coal consumption in different sectors were eminent. Whereas, the positive and significant relation between economic growth and CO_2 indicates, economic growth was inevitably increases carbon dioxide emissions in the

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country. The significant and positive sign of Urbanization with CO_2 emissions shows an increment in urban population increases CO_2 emission to the environment. And, there is causality from energy consumption to economic growth and urbanization. As well as, from economic growth and urbanizations to carbon dioxide emissions. To minimize CO_2 emissions that comes from, economic growth and urbanizations in Ethiopia, cost effective, carbon free, and efficient utilization of renewable energy consumption based on the country comparative advantage that consider alternative use of resources are advisable like: -Hydro and Geothermal.

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Doing Business in and with China: The Challenges are Great, but so are the Opportunities

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Abstract- Doing business in and with China has become much easier than it was decades ago. But doing business does not guarantee that everyone will make money. China has embarked an unprecedented economic growth since its economic reforms (1978) three decades ago, rising to become the world's second largest economy today and will become largest by 2020. A new path under the 12th Five-Year plan (2011-2015) towards sustainable and balanced development, alongside a focus on boosting domestic consumption is opening new opportunities in china for continued industrial innovation and business expansion. China still holds a number of challenging areas for foreign investors. Beside the cultural and language challenge, business men might be faced foreign exchange restrictions, anti-trust laws, intellectual property rights and diversified people in all over china.

Keywords: *economic growth, economic reforms, innovation and business expansion, challenges, opportunities.*

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Doing Business in and with China: The Challenges are Great, but so are the Opportunities

Md. Sharfuddin Rashed [α] & Nesha Ashraf Un [σ]

Abstract- Doing business in and with China has become much easier than it was decades ago. But doing business does not guarantee that everyone will make money. China has embarked an unprecedented economic growth since its economic reforms (1978) three decades ago, rising to become the world's second largest economy today and will become largest by 2020. A new path under the 12th Five-Year plan (2011-2015) towards sustainable and balanced development, alongside a focus on boosting domestic consumption is opening new opportunities in china for continued industrial innovation and business expansion. China still holds a number of challenging areas for foreign investors. Beside the cultural and language challenge, business men might be faced foreign exchange restrictions, anti-trust laws, intellectual property rights and diversified people in all over china. In order to overcome many challenges, there are different forms of business might be opened by foreign investors in China like equity joint ventures, cooperative joint venture, wholly foreign owned enterprises, joint stock companies, foreign enterprises, branches of foreign enterprises and so on.

Keywords: economic growth, economic reforms, innovation and business expansion, challenges, opportunities.

I. About China

China (Zhonghua Renmin Gongheguo), a country in the East Asia, is the third world largest country with an area of 9.6 million square kilometers (-after Russia and Canada) and the largest by population (-almost 140 billion). The Peoples Republic of China is bounded on the north by the Republic of Mongolia and Russia; on the north east by Russia and North Korea; on the east by the Yellow Sea and the East China Sea; on the South by China Sea, Vietnam, Laos, Myanmar (formerly known as Burma), India, Bhutan, and Nepal; on the West by Pakistan, Afghanistan, and Tajikistan and on the Northwest by Kyrgyzstan and Kazakhstan ("Nation of China", 2010). This country is divided into three geographic regions: the mountains to the west, the various deserts and basins in the northeast and the low lying valleys and plains in the east. Most of China, however, consists of mountains and plateaus such as the Tibetan Plateau which leads into the Himalayan Mountains and the Mount Everest.

China is a country of diversified people that mixture of 56 ethnic groups. About 91.6% are of Han Chinese ("China", 2012). Zhonghuo, the Chinese name for the country, means "central land". Most of the people in China belief that their country is the geographical center of the earth and carries the only true civilization (McFarlan, 2012). This history reflects several important aspects of China:

The role of the state: China has a long tradition of strong central government; with military power being critical. China was held/built by the gun (McFarlan, 2012). It is impossible to underestimate the role of the state in all activities. The role of the state has led to tremendous bureaucracy.

A sense of superiority: China doesn't see itself as a newcomer to the global stage. It sees itself as the center of the world and superior to other countries.

Relationships: China is a relationship society, far more than a law society (McFarlan, 2012). In particular, due to the prominent role of government, long-term relationships with government are critical.

II. Business Culture in China

Chinese society is heavily influenced by the traditional values associated with Confucianism which promotes a strict system of norms and propriety. These values determine how a person should act within a community, with hierarchy a central theme. In addition, there is little separation between business and private life in China (Irwin, 2012). The concepts of 'guanxi' and 'mianzi' are central to Chinese society and, thus, heavily influence business life. Guanxi is a deeply system of relationships, personal connections, contacts and networks. Mianzi refers to the concept of 'face'-broadly defined as pride or self respect, and preservation of the self respects of others. Mianzi is related to prestige and one's position in a hierarchy. Practices such as gift giving, token cash gifts (e.g. red envelopes) at special occasions (e.g. the Spring Festival or the birth of a child) and invitations to family events are prevalent in today's business environment and serve the important function of 'giving face' or honoring a potential business partner. In China, meetings start with the shaking of hands and a slight nod of the head. Be sure not to be overly vigorous when shaking hands as the Chinese will interpret this as aggressive. The Chinese are not keen on physical contact especially when doing business. The only

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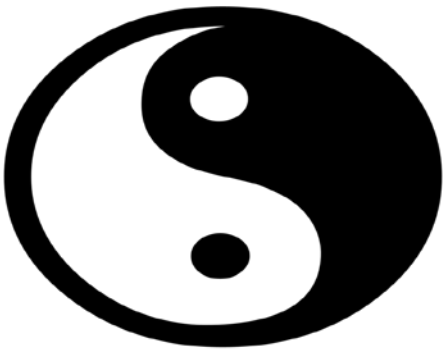
circumstance in which it may take place is when a host is guiding a guest. Body language and movement are both areas you should be conscious of when doing business in China. Business cards are exchanged on an initial meeting. Make sure one side of the card has been translated and try and print the Chinese letters using gold ink as this is an auspicious color. Relationships in China are very formal. This is not because the Chinese are humorless but rather jokes may be lost in translation and hence be redundant. Meetings must be made in advance. Punctuality is vital when doing business in China. The Chinese are renowned for being tough negotiators. One must be willing to show compromise and ensure their negotiators feel they have gained major concessions. Above all, patient and there will be no way to show anger or frustration with Chinese counter parts ("Doing Business in China", 2015).

One of the most important cultural symbols to understand, there is a great deal of mystery about 'Yin' and 'Yang' and how the two of them work together. Even people who speak the same language often misunderstand each other ("Chinese Business Culture", 2015).



The concept of 'yin-yang' (often called "the yin and the yang") is a Chinese philosophical idea used to explain how opposite forces are interconnected and interdependent upon each other. In other words, black could not exist without white, dark without light, cold without heat, etc. The connection between yin yang and Taoism, however, is undeniable. Tao deals with the flow of the universe, or the force behind natural order that keeps all things balanced and in order. It is considered to be a source of existence and "non-existence (Zacharias, 2002).

III. Difference in Business Culture between China and West

Hofstede (1980) identified four dimensions of culture based value system: power distance, individualism/collectivism, masculinity/femininity, and uncertainty avoidance. In another research, Bond and Hofstede (1989) identified a fifth dimension called long-term/short-term orientation. The five dimensions of Hofstede framework which explain the cultural differences in shown below (Hofstede, 1993):

Cultural Dimension	China	Definition
Power Distance	High	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally.
Individualism	Low	Focuses on the degree to which the society reinforces individual or collective, achievement and inters personal relationships.
Masculinity	High	The degree to which society reinforces or does not reinforce the traditional masculine work role model of male achievement, control, and power.
Uncertainty Avoidance	Low	The level of tolerance for uncertainty and ambiguity within the society.
Long term orientation	High	Focuses on the degree to which society embraces persistence, has a sense of shame, orders relationships by status and observe this order.

In Chinese business culture, the collectivist way of thinking still prevails, even in sectors experimenting with free enterprise. This is in contrast to the individualistic culture that predominates in the West. An understanding of accepted Chinese customary behavior and etiquette will ease business negotiations and the furthering of collaborative business ventures between Chinese and non-Chinese business partners. Although most cultural groups have their own communication styles, the differences of communication styles between the Asian and the Western worlds are most distinct. Chinese have strong task orientation that prevents them

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from understanding the importance of developing rapport and earning trust from others. It is most common to get poor listening skills lead to misunderstandings that blows the deal or escalates conflict. They are clueless on the important customs and courtesies that mean lot of individuals can't make a positive first impression or engage in small talk (Guo, 2013).

It's important to realize that one of the more subtle aspects of culture and business etiquette has to do the way one thinks about how the world. The following table presents some of the differences between how the Chinese and the Western individuals think about culture and values ("Chinese Business Culture", 2015).

Cultural Value	West (America and most European Countries)	East (China and Asian Countries)
Type of Logic	Linear (More causal relationships and direct associations between A and B)	Spiral (more roundabout and subtle)
Expression of Agreement and Disagreement	More argumentative, willing to express disagreement verbally	More difficult to say no even if one means no, disagreement expressed nonverbally
Communication of Information	More meaning is in the explicit, verbal message. Use of direct language	Meaning is often implied or must be inferred Use of indirect language patterns
Expression of Honesty	More overt, one is more likely to ask the person to "speak their mind" or "get it out on the table"	Subtle, nonverbal
Expression of Self	"I"-oriented Sender-oriented	"We"-oriented Receiver-sensitive
Thinking Orientation	More rule based or based on application of abstract principles such as regulations or laws	Tends to take context and the specific situation into account in rule interpretation
The Individual	Has to have rights and greater need for autonomy and individual achievement	Group duty preservation of harmony
Nature of the Business Relationship	Less important, tend to substitute relationship for written agreement, superficial, easy to form, not long lasting	Most important business cannot occur until relationship if sound, written agreement secondary to quan xi, hard to form, long lasting
Conflict Resolution	Trial or confrontation, use of lawyers and courts	More mediation though trusted third parties
Time Sense During Meetings	Be on time and end on time.	Appointments less driven by exact start and end times
Conflict results	Perception of two states: win or lose	Win-Win To lose is to win Lose in order to win

IV. Business Opportunities in China

Economic reforms (1978) in China have led to an unprecedented change in the nature of the business environment and the opportunities available for foreign investors and privately owned companies. China officially joined the World trade Organization (WTO) in November 2001, and foreign investment and trade has further grown rapidly as a result. China, a $10 trillion economy growing at 7% annually (Tsoi and Zheng 2012), is a never before seen force reshaping the global economy and rising to become the World's second largest economy after United States. Some even predict that it will transcend the United States as the World's largest economy by 2020 (Tsoi and Zheng 2012). A new path under the 12th Five-Year plan (2011-2015) towards sustainable and balanced development, alongside a focus on boosting domestic consumption is opening new opportunities in China for continued industrial innovation and business expansion (Lam, 2012).

China is a center of business hub. A large and capable workforce are available because almost China having 20% of the world's population (McFarlan, 2012). Among the factors contributing to China's growth depends not only on population is large,but also the literacy rate (the literacy rate is 93% compared to 61% in India) and hard working attitudes. China has excellent universities which are producing a large pool of competent graduates. Despite the history of state-owned enterprises, the Chinese people have a long history of entrepreneurship (McFarlan, 2012).

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V. Incentives for Foreign Investors

In order to attract foreign investment, Chinese government has introduced a number of benefits and incentives towards foreign investors in particular industries of which we set out a brief list as follows (Lam, 2012):

Qualified small and low profit enterprises and qualified high/new-tech enterprises are subject to reduced income tax rates.

Technology Advanced Service Enterprises (TASE) which include information technology outsourcing (ITO), business process outsourcing (BPO) and knowledge process outsourcing (KPO) are subjects to income tax benefits; entitled to a preferential Corporate Income Tax (CIT) rate of 15% and a higher education expense deduction cap of 8%.

Enterprises or projects with a focus on technological development, environmental protection, energy and /or water conservation, production safety, for example, may be entitled to various types of income tax incentives.

Tax incentives for foreign investment enterprises of a productive nature and most of the "geography based incentives have been removed.

Technology transfer, technology development and related services are exempt from business tax (BT).

Apart from incentives, China's investment attraction strategy is the customized liberalization of trade with some of its key partners, in the form of a Free Trade Agreement (FTA) (Tsoi and Zheng 2012).

VI. Scope of Doing Business in China

Many of the industries with the highest growth potential in China over the next decade will be in the services sector, but not all. For example, energy and agriculture will have segments with very rapid growth. It is expecting to grow more than 6% for the next five years (Dwight, 2014). Below is a very brief description of where foreigners have business opportunities:

a) E-tailing

The online share of retail in China, at 8 percent in 2014 (Orr, 2014), is higher than it is in the United States and is not close to reaching saturation. Increasingly, this is conducted through mobile devices. The payments system is in place, logistics are improving, and online providers are trusted. Many retailers will adapt, often with far fewer physical locations. Malls will have to become destinations for services beyond retail.

b) Logistics

Modernization of supply chains is a key enabler of increasing productivity in many sectors in China today. Until recently, most goods were carried by individual truck owner–operators. As express parcels become a $100 billion industry on the back of e-tailing, e-commerce companies themselves are investing billions in modern warehouses and trucks (Orr, 2014). Alibaba alone is committed to spending billions of dollars on its own logistics. Third-party carriers such as SF Express are rapidly becoming regional leaders on the back of growth in China. Even in agriculture, massive investment is under way in cold storage and cold carriage to reduce waste and provide higher-quality food products to China's middle class.

c) Education

Education is a top government priority and critical to China's economic development. Alongside companies opening private universities for their employees, annual government investment in education of about US$250 billion should help expand access to education, and boost the quality of the education system and its ability to support China's transition toward a more services-based economy.

Nearly two-thirds of registered kindergartens in China are privately owned (Sun, 2015). Private universities are expanding, namely Shanghai New York University, Duke Kunshan University, John Hopkins University in Nanjing, etc. Traditional and online vocational learning schools are publicly listed multibillion-dollar businesses. Niche businesses, such as preparing children to apply to the US, the UK, and the Australian high schools and universities, are also flourishing. The Chinese are also willing to spend on tutoring and support for their children is almost unlimited. As the middle class becomes wealthier, the increased ability to spend will drive market growth (Sun, 2015).

d) Healthcare

China has 13,440 hospitals that are government-owned as of October 2013, providing more than 90% of all health services (Orr, 2014). More than 1,500 new private hospitals opened in China in 2013, a number of which are 100 percent foreign owned (Orr, 2014). The shortcomings of the mainstream public healthcare system in China are not likely to be overcome quickly. Patients are looking for solutions where both cost and quality are more certain, and private and foreign companies are being encouraged to deliver. There is a related boom in supplying equipment to these new facilities.

China's healthcare market is expected to boom over the next decade, driven by the country's giant economic expansion and its burgeoning senior population. The consulting firm McKinsey & Company estimates that health care spending in China will grow to $1 trillion by 2020 equivalent to nearly 7% of GDP, up from just over $350 billion in 2011 (Sun, 2015).

e) Tourism

Available hotel rooms in China have tripled over the last decade. Four million mainland Chinese visited

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South Korea in 2013; four million visited Thailand (Orr, 2014). China's middle class expects to take three to four weeks of vacation each year and no longer accepts visiting the overcrowded, overexploited traditional domestic destinations. Disneyland's opening in Shanghai in 2016 could trigger a new wave of investment to create higher-caliber resorts.

f) Wealth management

China represents more than 50 percent of Asia ex-Japan growth, with high-net-worth assets expected to reach $16 trillion by 2016 (Orr, 2014). The more than one million high-net-worth individuals in China remain generally unsophisticated as investors, seeking advice on how to broaden their investment portfolio both onshore and offshore.

g) Entertainment

China is the second-largest movie box office market in the world .Chinese box office ($4.8 billion) increased 34% in 2014, becoming the first international market to exceed $4 billion in box office ("Theatrical Statistics Summary",, 2014), although tickets cost upward of $10 and DVDs are still available for $1 (Orr, 2014). In 2013, more than 1,000 new theaters opened, yet admissions per capita are less than one-fifth of South Korea's.

h) IT Services

Finding the chief information officer (CIO) in a Chinese company is often hard, especially in a state-owned enterprise. Historically regarded as simply a support role for the business, CIOs were pushed three to four levels down in the organization and attracted little talent (which instead went to Internet start-ups). A typical Chinese company spends only 2 percent of revenue on IT versus international benchmarks of around 4 percent (Orr, 2014). As these companies struggle to bring technology into the core of their operations, they need massive amounts of help to do so. The cost of good IT talent is already soaring. Most Chinese companies will be unable to solve their technology challenges for themselves.

i) Clean energy

China already produces 60 percent of solar panels and wind turbines. Increasingly, it is consuming this output domestically (Gandolphe, 2014). For example, 11 gigawatts were installed in large-scale solar farms in 2013, and this will grow an additional 30 percent in 2014. China is also investing heavily to exploit its shale-gas assets and develop cleaner coal technologies (Orr, 2014).

j) Agriculture

China does not feed itself today-certainly not with the kind of quality and value-added products that the middle class seeks-but it will be challenged to do so in the future. Continual food-safety crises illustrate the challenge. For many successful technology investors, such as Legend Holdings, agriculture is the new Internet. Chinese companies are investing in agriculture outside of China at scale, from Chile to the Ukraine, for China (Orr, 2014). They also invest in China, especially in value-added products-such as fruit and the production of frozen ready meals.

VII. Challenges of Doing Business in China

China still holds a number of challenging areas for foreign investors and businessmen. It is obvious to face cultural and communication challenges in China when someone is going to business with China. In particular, while investing in China; careful attention needs to be paid to intellectual property rights (Lam, 2012). Even though the Chinese government has somewhat recently made its agenda, foreign companies or investors still need to be aware of issues related to copyright. In addition to this, China is not a homogeneous market; Chinese consumer behavior can change from one province or city to another (Cisse, 2013). Moreover, there are some other challenges may have to face in China at the time of doing business found by Lam (2012) and McFarlan (2012).

a) Foreign exchange restrictions

This is the first restriction faced by foreigners to make the payment. Foreign investment enterprises are required by the State Administration of Foreign Exchange (SAFE) to separate their foreign currency bank accounts into capital accounts and current accounts (Lam, 2012). The Chinese government is clamping down on the amount of cash its citizens can withdraw from ATMs overseas, its latest attempt to stop money flooding out of the country. From January 2016, an annual limit of 100,000 Yuan ($15,737) is applied. China already limits the amount of money an individual can move out of the country to $50,000 per year (Riley, 2015).

b) Anti-Trust Law impacts foreign investment

Merger and acquisition transactions in china involving foreign parties will be subject to review and can be halted due to anti-trust law which came on effects on 1st August, 2008 (Lam, 2012). On 19 January 2015, the Ministry of Commerce of the PRC ("MOFCOM") published a new *Foreign Investment Law* on its official website. Under the current foreign investment regulatory regime, a foreign-invested enterprise, regardless of its scale, investment amount and industry, will require governmental approval from cradle to crave, including its incorporation, liquidation, increase or decrease of capital or share transfer. The regulatory red-tape increases regulatory costs for foreign investors and, to some extent, impedes free competition and liquidity flow (King & Wood, 2015).

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c) *Lack of infrastructure*

By all measures, China's infra- structure is far behind that of the United States. The lack of infrastructure could actually hinder growth. In the 12th fifth year plan, infrastructure development remains a top priority for China's government, which has long recognized that a modern economy runs on reliable roads and rails, electricity, and telecommunications (Chen et al. 2013).

d) *Lack of raw materials*

China has an extraordinary need for raw materials and energy resources. To address this need, China has developed and continues to develop international relationships. For example, Australia has become "China's quarry" and China has made investments in Africa to procure raw materials. The Chinese Minister of Land and Natural Resources announced that by 2020 it will encounter serious shortages in 25 different raw materials. Currently China is experiencing shortages in 11 metals that are critical for the development of the Chinese economy. China is the world's largest user of iron, copper, lead and zinc ("Chinese demand for raw materials will accelerate", 2015).

e) *Environmental issues*

Environmental issues in China are plentiful that severely affecting the country's biophysical environment and human health. Rapid industrialization and lax environmental oversight are main contributors to these problems. According to eco-city designer Thomas V. Harwood III, 16 of the world's 20 most polluted cities are in China ("Environmental issues in China", 2016). Pollution mainly related with air and water pollution. Manufacturing industries and 5 million-plus cars in Beijing' all contribute to the city's crippling air pollution, but most experts primarily blame the coal-burning electrical plants that power China's breakneck economic growth (Marc Lallanilla, 2013). These problems are not unique to China. Other developing economies faced similar situations, including the United States (McFarlan, 2012).

f) *Corruption*

China is very much a relationship society, where long-term, carefully nurtured relationships are tremendously important but the importance of relationships can result in corruption. Companies are likely to experience bribery, political interference or facilitation payments when acquiring public services and dealing with the judicial system. The common practice of 'Guanxi' is a custom for building connections and relationships based on gifts, banqueting, or small favours ("Business Corruption in China", 2015).

g) *Income inequality*

A widening gap between China's rich and poor makes it "one of the most unequal countries in the world" where the rich are gleaning most of the fruits of the transition from a system of centrally-planned socialism to a market-oriented economy (Cevik and Correa-Caro, 2015). "China's widening income inequality is largely a reflection of faster income growth among the rich, rather than stagnant living standards among the poor".

h) *Social stability*

New wealth is developing quickly but deep inequalities have emerged. There are major imbalances between the eastern and western regions of the country, as well as between the rural and urban areas. Although national peace has existed since 1948 under the philosophy of "harmonious development," incidents of civil unrest have grown 400%.

VIII. Conclusion

Businessmen must recognize, respect, and reconcile cultural differences if they hope to contact successfully in the Chinese environment. Bridging these cultural differences adds value to business transactions and minimizes the risk of failure (Eric, 2014). While there remains a strong emphasis on hierarchy in Chinese business culture, this is changing. The two main elements specifically driving these changes in China are the Internet and unique structural demographics driven by the family planning policy (Dumont, 2012). China is by far the biggest global market and has the world's largest and most vibrant online community and, as much as anything, it is these sheer numbers that is driving this rush to embrace global business practices and management systems. China's family planning policy, with a consequent focus on educational performance, which is at the heart of Chinese culture, has produced a generation of highly educated, highly motivated and extremely competitive professionals. Grosse and Ling (2015) identified three important themes in their paper titled "Competing in China: Local Firms, Multinationals, and Alliances". First in order to compete with china's changing situation, managers need to work on different aspects to enhance and retain their firm's flexibility and innovativeness. Second the institutional environment in China, from government regulation to the style of doing business, presents some important differences from that in the west; and foreign firms operating in China need to understand these differences. Third, the cultural differences in particular are the key barriers or opportunities for foreign companies to understand and leverage so that they can operate most successfully in China. The principal forms of business open to foreign investors in China are equity joint ventures, cooperative joint venture, wholly foreign owned enterprises, joint stock companies, foreign enterprises, branches of foreign enterprises and so on (Lam, 2012).

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Prospects of Entrepreneurial Competencies of Micro and Small Enterprise in Jimma Zone, Ethiopia

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Abstract- *Objective:* The Objective of this Study is to assess the entrepreneurial competencies of Micro and Small enterprises of Jimma Zone.

Methods: An enterprise based cross sectional study was done using both quantitative and qualitative methods in three purposively selected districts/towns of Jimma Zones namely Agaro, Limu Kossa, and Shebe Sombo. A total of 183 entrepreneurs from both Micro and small enterprises were randomly sampled for quantitative and 16 FGDs and 9 Key informant interviews were conducted to describe and determine the outcome of interest. The data were analyzed using SPSS 20 and qualitative data was managed by transcribing verbatim on daily basis.

Results: All of the respondents were aged 19 years and above with mean age of 26.8±4.2. 71% of them were male managers indicating gender inequality in business leadership of micro and small enterprises of the zone. Majority 124(67.8%) of them were from families having no business. the result of this study indicates that there is high gender gap in the leadership of micro and small enterprises.

GJMBR - B Classification : *JEL Code : L26*



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Shabudin Shenura [α], Ashenafi Haile [σ] & Emnet Negash [ρ]

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Results: All of the respondents were aged 19 years and above with mean age of 26.8±4.2. 71% of them were male managers indicating gender inequality in business leadership of micro and small enterprises of the zone. Majority 124(67.8%) of them were from families having no business. the result of this study indicates that there is high gender gap in the leadership of micro and small enterprises. It also shows that there is a difference in entrepreneurial competencies between those who took management and technical trainings before and after the opening of the business and who didn't and between those who have higher educational qualification with those who have lesser.

Moreover, many entrepreneurial competencies are strongly associated with the average time spent by entrepreneurs on business in a week.

The qualitative data reveals that there is poor opportunity, relationship, strategy and commitment competencies among the leaders of MSEs.

I. Background

The field of entrepreneurship continues to struggle with the development of a modern theory of entrepreneurship (Gartner, 2001). In the past 20 years, the current development of theories of entrepreneurship have centered on either opportunity recognition (Gaglio& Katz, 2001; Baron, 2004). During this time period, many theoretical insights also came from those in other fields such as economics Kirzner (1979), Casson (1982) & a rediscovery of the work of Schumpeter (1934,1939).

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However, despite the attempts of many entrepreneurship scholars to develop theory in this field there continues to be a lack of consensus about what constitutes entrepreneurship theory and no generally accepted theory of entrepreneurship has emerged (Alvarez, 2007). According to Alvarez, this lack of consensus is in large part due to the lack of clarity that entrepreneurship scholars have about the unstated assumptions of entrepreneurship. As Gartner (2001) suggests we in the field of entrepreneurship are unconscious about the assumptions that we make in our theoretical perspectives.

While different explanations of entrepreneurship have adopted sometimes radically different theoretical assumptions, most of these concern three central features of entrepreneurial phenomena: the nature of entrepreneurial opportunities (Kirzner,1979, Shane & Venkatraman, 2000; Gaglio & Katz, 2001), the nature of entrepreneurs as individuals (Mc Clelland, 1961; Collins & Moore, 1964, Busenitz & Barney, 1997) and the nature of the decision making context within which entrepreneurs operate (Knight, Alvarez & Barney, 2005).

II. The Concept of Entrepreneurship

Entrepreneur is a highly respected person in the developed world. The word entrepreneurship conjures up visions of active, purposeful men and women accomplishing significant achievements

The entrepreneurs are important agents of change in every society, yet they present the most enigmatic characters in the drama of economic development, particularly in the less developed world. Although it is an entrepreneur's purposive activity that bridges the gap between plan and reality, the precise way that this agent of change acts is often unpredictable.

III. Perspectives for the Study of Entrepreneurship

On a broader plane, entrepreneurial activities have developed in a systematic way for the last two hundred years since the beginning of the industrial revolution in Europe. One has to bear in mind that no single factor therefore can be assumed as the only determining variable for studying the phenomenon of

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entrepreneurship even though some of the scholars emphasized one or the other factor as the prime factor. Various factors are explained till now to give a proper analysis of entrepreneurial development. For instance ethical value is said to be the significant factor for entrepreneurial behavior for Max Weber (1947), minority group moral and status withdrawal is assigned to be a core principle for entrepreneurial development by Hegan (1964). McClelland (1961) emphasized on psychological need for achievement motivation is responsible for accomplishing entrepreneurial development. Bounding (1957) and Hoselitz (1964) argued that it is the political system, which determines the development of entrepreneurship. For some others new ideas and opportunities, importance of family background are the important factors that facilitates entrepreneurship. However it is evident from the above that analysis of any single variable would provide only a partial understanding of entrepreneurship.

The theories of entrepreneurship and development are broadly classified into two categories: psychological and sociological theories of entrepreneurship. McClelland (1961) and Hegan (1964) emphasized on the psychological approach towards the analysis of entrepreneurship whereas Max Weber (1947), Cochran (1967) and Hoselitz (1964) advocated a sociological explanation for the study of entrepreneurship.

In search of an integrated approach, the behaviorists tried to synthesize psychology and sociology to explain entrepreneurship. However there has beena dominant influence of psychological parameters in their interpretation of entrepreneurial behavior.

From the above explanations it emerges that neither a single factor nor a model is adequate to explain the development of entrepreneurship. There is a consensus among some scholars with regard to factors facilitating entrepreneurial development.

MSE's Entrepreneurial Competencies: Conceptual Framework

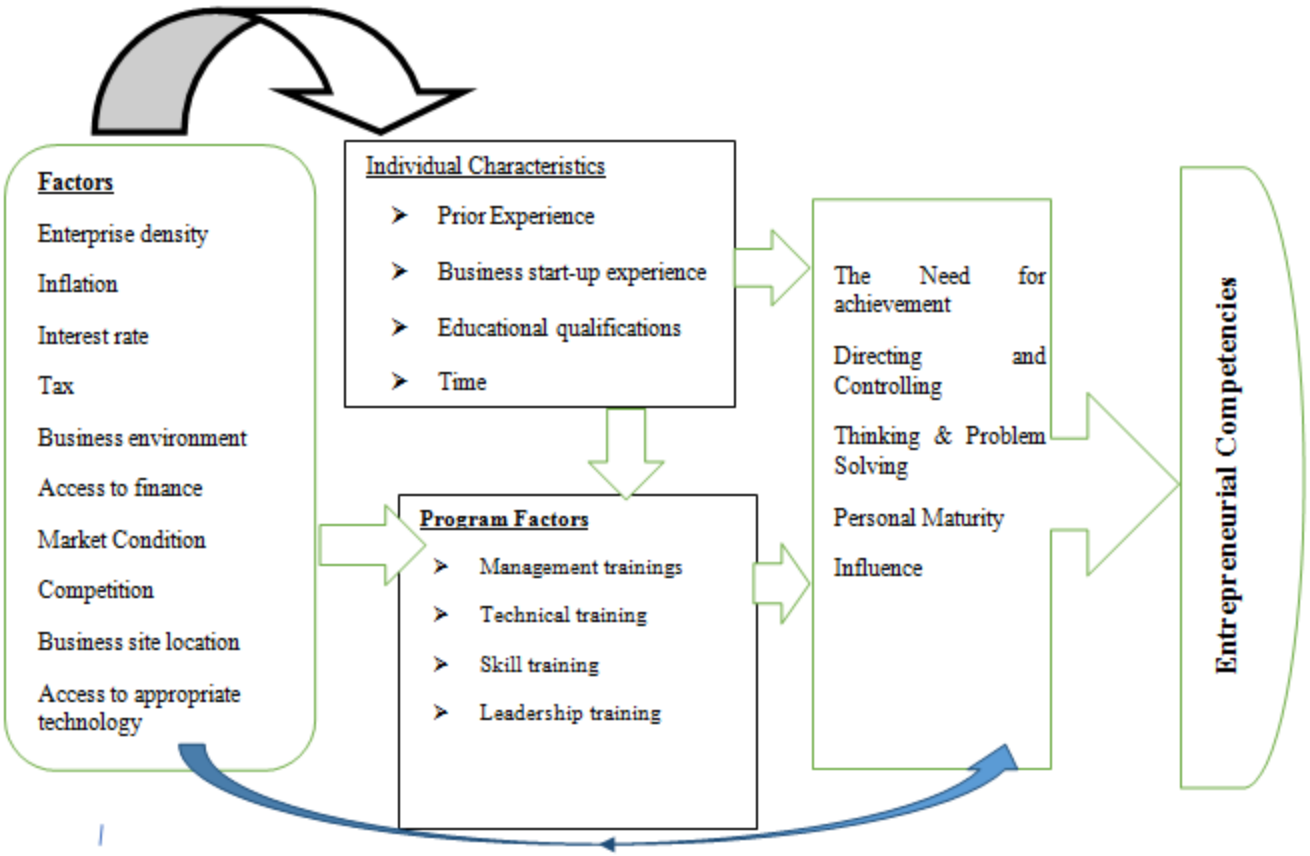

Figure 1 : Conceptual framework of the study developed by researcher from different literatures

IV. Result & Discussions

a) Firms' Perceived performances

Respondents were asked to indicate the degree of importance their firm attach to selected performance indicators and to rate their level of satisfaction to each performance criterion for the last three years. Majority of the respondents indicated moderate importance to different performance criterion. 51.9%, 68.3%, 55.7%, & 59%, of them rated moderate importance to gross profit margin, net profit from operation, profit to sales ratio and return on investment respectively.

Regarding the level of satisfaction enjoyed during the past three years, 67.8%, 73.2%, 71.6% and

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66.10% of the respondents reported that they were moderately satisfied with gross profit margin, net profit from operation, profit to sales ratio and return on investment respectively. The following figures (figure 1 & 2) shows different degree of importance their firms attach to each indicators and level of satisfaction respondents indicated respectively.

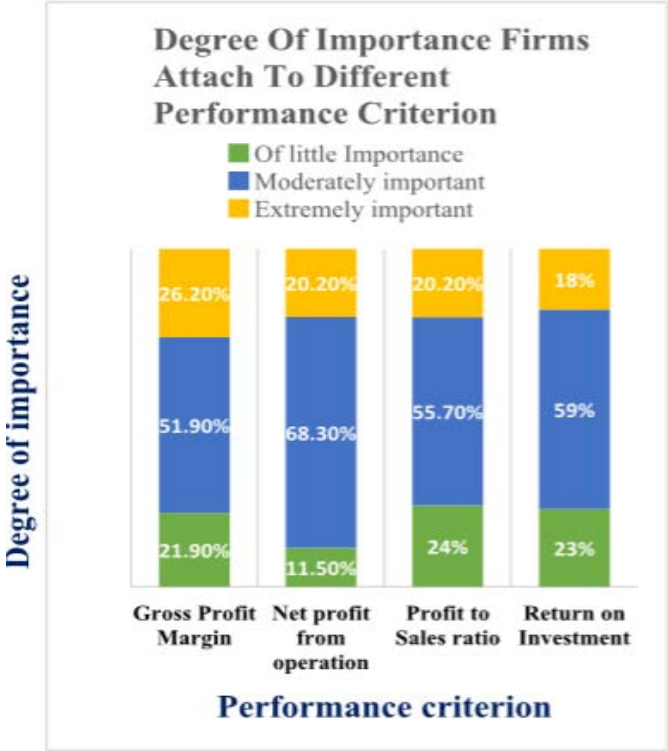

Figure 3 : Degree of importance firms attach to various performance criterion

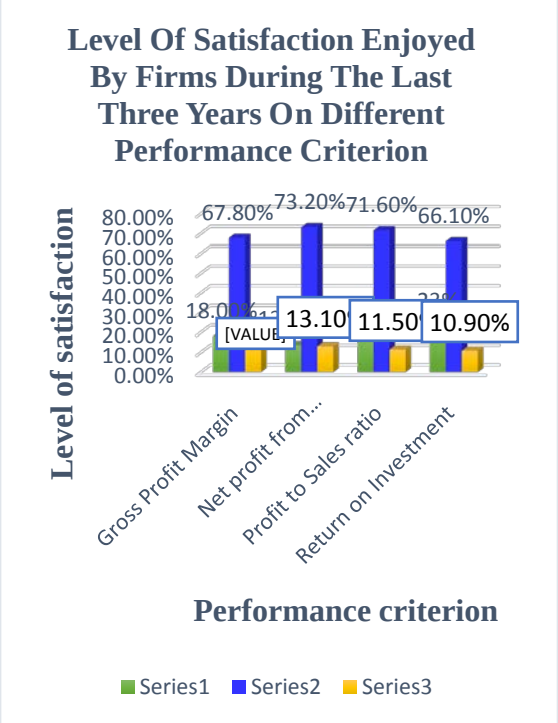

Figure 4 : Level of satisfaction firms enjoyed during the past three years

Moreover, respondents were asked to compare their firms with their counterpart competitors on the grounds of some selected indicators like sales growth, return on sales, cash flow, and return on investment, net

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profit, and growth in market share. Majority of them replied their firms to be about the same with their counterpart competitors on all of the selected indicators: 52.5% voted "about the same" on sales growth, 56.8% on return on sales, 48.6% on cash flows, 46.4% on return on investment, 54.6% on net profit and 50.3% on growth in market share. On contrary, 29%, 29.5%, 30.6%, 26.8%, 29.5%, and 27.9% voted their firms to be moderately lower than their counterpart competitors on their sales growth, return on sales, cash flow, and return on investment, net profit, and growth in market share. The following graph depicts perceived performances of their firms as compared to their counterparts.

Regarding the innovation history of the enterprises, only 45.6% (83) reported that they introduced during the past three years, new or significantly improved processes for producing or supplying products (goods or services) which were new to their enterprises. But, out of this, only 24.2% were new to their industry.

On the other hand, out of the innovated processes/products, 27.2% were new to market and 31% were new only to their enterprises.

b) Entrepreneurial Competencies

According to Baum & Locke (2004) "Entrepreneurs must also be willing to experiment different strategies in the pursuit of profitable outcome because it is the entrepreneur's energy, creativity & motivation that trigger the production of superior product & services".

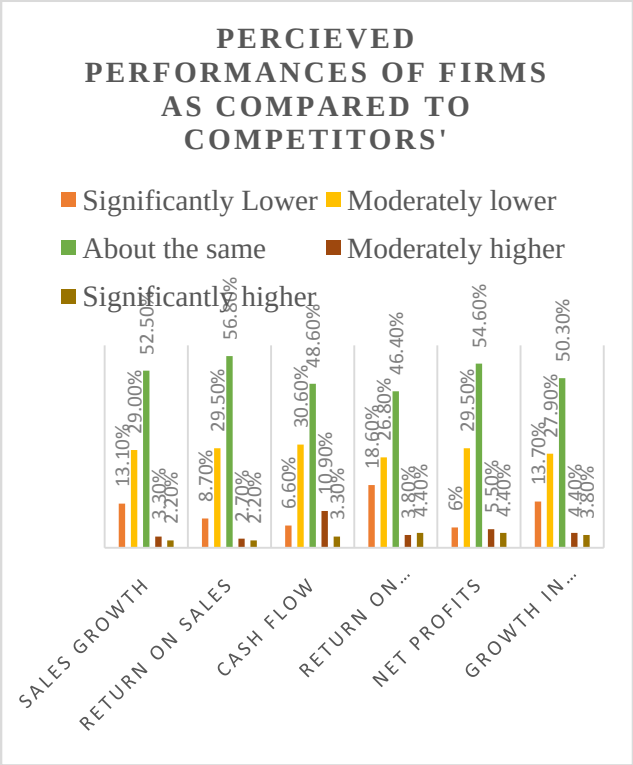

Figure 5 : Respondents' Perceived performances of firms evaluated against selected indicators in comparison with competitors

Therefore, entrepreneurship requires certain strategic skills for profitable functioning. These factors are initiative, see and act on opportunities, persistence, knowing, concern for high quality of work, commitment to work contract, persuasion, efficiency orientation, systematic planning, problem solving, self-confidence, assertiveness, use of influence strategies, monitoring and concern of employee welfare. Entrepreneurial competency thus becomes critical for Micro and Small Enterprises to become competitive in the globalized world.

Entrepreneurs play a very important role for business survival and its success. For the survival and success of the business entrepreneurs require skills and abilities. Bird (1995) "maintains that entrepreneurial competencies are defined as underlying characteristics possessed by a person which result in new ventures creation, survival, and /or growth." Man, Lau& Chan (2002) refer to these competencies as the "total ability of the entrepreneur to perform this role successfully. Several studies have found positive relationship between existences of competencies and venture performance". (Kaur & Bains, 2013)

The result of this research shows that there is almost somewhat fair competencies as perceived by the leaders of the enterprises even if the qualitative data indicated very poor competencies. The details of the quantitative result along with the qualitative result will be

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discussed thoroughly on each parameters of entrepreneurial competencies.

c) Opportunity Competency

Opportunity Competency relates to the ability to recognize opportunity, ability to capture opportunity, ability to identify customers need and so on. Several questions that ask for this competency from different perspectives were incorporated in the questionnaire to assess how the leaders of the enterprises perceive that they do/don't have opportunity competencies. Consequently, the quantitative findings of the research shows that 67 (36.6%) of the respondents (table 3) believe that they have average level of ability to identify goods or services customers want, perceive unmet consumer needs, actively look for products or services that provide real benefit to customers, seize high-quality business opportunities, and notice opportunities to do new things, prefer activities that they know well and with which they are comfortable, try things that are very new and different from what they have done before and take advantage of opportunities that arise. 48 (26.2%) of the respondents perceived that they do have below average ability and significant proportion of respondents, 68 (35.1%) to have very competent ability to recognize and capture opportunities and identify customers' unmet needs.

However, the qualitative data result reveals that many leaders of the micro and small enterprises spent no time looking for opportunities that may arise in their surroundings. One FGD participant said

"Gaggeessitooni maaykiro baay'een isaani yeroo isaani heddu caati qaamutti dabarsu malee carrawwan saatta'uu fi itti fayyadamu miti. Tasumaa hojii tokko qabani jennaan isumaan deeffataa taa'u" Gareen nikolfe

Meaning most of them spent most of their time chewing khat and don't bother to look for and utilize the opportunities. If someone possesses, one business he/she belches out of satisfaction; easily satisfies" Group laughing…

Moreover, from the quantitative result, we have come to know that opportunity competency of the leaders were affected by such factors as sex, start-up experience, training, and education. There is strong association between opportunity competency and the above variables. There is also positive association of this competency with average time leaders of micro and small enterprises spend on business in a week.

d) Relationship Competency

According to Kaur & Bains, (2013), it possesses and uses good interpersonal and communication skills, ability to influence others and gain support. A key success factor for an entrepreneur has been found to be his or her capabilities to work with others such as employees, business partners, family, friends, customers and so forth.

42 (22.9%) rated their ability to develop long-term trusting relationships with others, negotiate with others, interact with others, maintain a personal network of work contacts, understand what others mean by their words and actions, communicate with others effectively below average whereas 50(27.1%) and 91(50%) rated their competency of relationship as average and above average respectively.

The qualitative data reveals that some of them are good to establish good relationship with their customers, but most of them even don't respect their customers. *''Maamilli gooftaadha' jechi jedhu mammaaksuma qofaan hafe*" says one FGD participant from Agaro, meaning the saying 'customer is a king' is simply forgotten and became just a saying not more than that.

The chi-square test indicates there is an association between relationship competency and trainings (both management and technical trainings) that the leaders got just after the opening of their business at 5% level of significance and before business start-ups (p-value of 0.003 & 0.001 for management & technical training respectively). Moreover, there is an association between relationship competency and business start-ups experiences of the leaders of the enterprises (p-value of 0.020)

e) Conceptual Competency

This sub competency relates to the entrepreneurial requirement for analytical competency when faced with addressing complex situations. It demonstrates the possession of cognitive ability and decision-making skill, ability to weigh risks, think analytically, be innovative, be creative, show reasoning, capacity to reduce risks.

Majority of the respondents, 71 (38.6%), believe that they do have average capability of applying ideas, issues, and observations to alternative contexts, integrating ideas, issues, and observations into more general contexts, taking reasonable job-related risks, monitoring progress toward objectives in risky actions, looking at old problems in new ways, exploring new ideas, and treating new problems as opportunities followed by 57 (31%) of respondents who rated their competency to be well.

The chi-square test shows positive association of this competency with the average time spent on business in a week (p-value of .015) meaning those who spend more time on their businesses are most likely to have conceptual competency. In addition, leaders of the enterprises whose mothers and or fathers possessed businesses are more likely to have conceptual competency than those whose parents with no possession of businesses (p-value, 0.004).

On the other hand, those who took management training before and after starting businesses are more likely to develop this competency (p-value, 0.001). Regarding the technical trainings, only

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those who took it before the business start-up develop conceptual competency whereas the data reveals that there is no association between technical trainings after the business and this competency, meaning those who took technical trainings after they engage in business didn't show any improvements in conceptual competencies (p-value,0.008). This competency is also closely associated with educational competency (p-value, 0.036) indicating as educational qualification of the respondents increase, the more likely of this competency to increase.

f) Organizing Competency

It is ability to direct, lead, delegate, motivate, plan and schedule work, develop program, prepare budget. Entrepreneurs should have the ability to lead, coordinate, control, monitor, and organize internal and external resources of the business such as finance and human resources (Kaur & Bains, 2013)

76 (41.3%) perceive that they do possess somewhat fair ability of planning the operations of the business, planning the organization of different resources, keeping organization running smoothly, organizing resources, coordinating tasks, supervising subordinates, leading subordinates, organizing people, motivating people and delegating effectively. 66(35.9%) believe they are well enough in capability of directing, leading, delegating, motivating and scheduling work. According to this quantitative data, sex is positively associated with this competency (p-value, 0.012); females are more likely to have this competency than males. In this regard, 50(38.5%) & 46(35.4% of males rate their competency as 'average' and 'well' respectively, whereas 26(49.1%) & 20(37.7%) of females rate their competency as 'average' and 'well' respectively. Moreover, the management training after the business has to do with organizing competency (p-value, 0.002). The respondents' average time spent on the business is also associated with this competency (p-value, 0.004).

g) Strategic Competency

It relates to entrepreneurs ability to develop a vision in mind for their business Develop vision and strategy, plan ahead, set goals and standards, sell ideas (Kaur & Bains, 2013). It is believed that organizations that develop the capability to process information strategically are more likely to proactively shape their own destiny, whereas strategically incompetent organizations are more likely to react to their environments (Paul, Sparrow and Hodgkinson, 2015).

The quantitative result (Table 2) indicates 80(43.7%) of respondents rate themselves as average competent of being aware of the projected directions of the industry and how changes might impact the firm, being able to prioritize work in alignment with business goals, redesign the department and/or organization to better meet long-term objectives and changes, align current actions with strategic goals, assess and link short-term, day-to-day tasks in the context of long-term direction, monitor progress toward strategic goals, deal with problems as they arise, rather than spend time trying to anticipate them, and think about the advantages and disadvantages of different ways of accomplishing things. Moreover, they indicate that they take a logical and systematic approach to activities. In dealing with competitors, they typically initiate actions, which competitors then responded to. Moreover, when confronted with decision-making situations involving uncertainty, they report they typically adopt a bold, aggressive posture in order to maximize the probability of exploiting potential opportunities. The majority, 87(47.6%) rate themselves as being poor (below average) competencies of this kind. Similarly, the qualitative data reveals that the majority of discussants in focus group discussion (FGD), reported that this competency is very poor in almost all micro and small enterprises. They tried to justify their argument by indicating that no enterprise has written plan, clearly written vision and mission. In addition, the participants also comment on how the enterprises deal with their counterpart competitors indicating its position as being the lowest.

The key informant interviews result also reveals that many leaders of the enterprises, being of micro or small, have no the culture to write down all the strategically important activities, have no skills of preparing strategic plan. Most of the informants said that they even don't think of written strategy.

Commitment Competency

It demonstrates strong motivation to compete, drive to see venture through to fruition, capacity to make an impact and dedication. According to Zimmerer & Scarborough, 2013, out of frequently exhibited characteristics of entrepreneur, high degree of commitment occupy the most important place. They state that entrepreneurship is hard work and launching a company successfully requires total commitment from an entrepreneurs. Most entrepreneurs have to overcome seemingly insurmountable barriers to launch a company and to keep it growing.

70 (38.0%), perceive that the do have average ability of dedicating to make the venture work whenever possible, and refuse to let the venture fail whenever appropriate, possess an extremely strong internal drive, commit to long-term business goals. In addition, they reported they do have somewhat fair capability of giving much effort to their work, working long hours and making personal sacrifices to complete jobs on time. When doing a job for someone, they make a special effort to make sure that person is satisfied with their work, do not let their work interfere with family or their personal life, maintain a high energy level, and motivate self to function at optimum level of performance.

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h) Learning competency

Learning competency is the ability of directing and utilizing their skills to be more successful in recognizing and adapting to the changing roles of entrepreneurs. The quantitative data reveals that majority of the respondents, 72 (39.1%), perceive that they do have average level of ability and attitude to learn from a variety of means, learn proactively, learn as much as they can in their field, keep up to date in my field, apply learned skills and knowledge into actual practices, respond to constructive criticism, prioritize tasks to manage time, identify own strengths and weaknesses and match them with opportunities and threats, manage own career development, recognize and work on my own shortcomings, favor a strong emphasis on research and development, technical leadership, and innovation. But on the same ability and attitude, 70(42.0% & 42 (22.8%) rated above & below average respectively.

The chi-square test indicates that there is strong association between learning competency and the average spent on business (p-value, 0.000), and between management & technical trainings after and before starting businesses respectively, (p-value, 0.003).

i) Competency of Initiatives

Acting out of choice rather than compulsion, taking the lead rather than waiting for others to start. Initiating Action can be separated from most other competencies by keeping in mind that it focuses on the propensity to act, not on the quality of the action. An individual can take independent action and go beyond expectations while demonstrating numerous other competencies (Jweaver, 2013). 81(44.0%), 52(28.3%), and 51(27.7%) rated respectively as average (somewhat fair), above average (good) and below average (poor) that they have somewhat fair capability and attitude of looking for things that need to be done, doing things that need to be done before being asked to by others, doing things before it is clear that they must be done, taking action before it is clear that they must and waiting for direction from others before taking action(table 3).

Initiative is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000)

j) Competency of Persistence

Persistence is related to the 'never say die' attitude, not giving up easily, striving to achieve pre-determined business goals even if in the time of difficulties.

The quantitative findings show that 74(40.2%) of respondents perceive they have the attitude and capability of spending a lot of time trying to find a solution, when faced with difficult problem, trying several times to get people to do what they would like them to do, keeping on trying to accomplish what they want When something gets in the way of what they are trying to do, and trying several ways to overcome things that get in the way of reaching my goals. A significant proportion of respondents 55(29.9%) voted they have very poor in this competency. Similar proportion (29.9%) rated their competency as good.

Regarding the qualitative data result, the summary of focus group discussion (FGD) shows that even though many youths start businesses, they don't go long in the journey of their business; they loss hope easily, they don't want to confront with difficult situations.

The key informant interviewees, all agreed that the major challenge facing the practitioners of micro and small enterprises development agency, is lack of persistence in their businesses.

The chi-square test shows persistence is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000).

k) Competency of Information seeking

Information seeking is one of the most important entrepreneurial characteristics which is related to the habit of searching for relevant and updated business oriented information continuously until success is achieved. The descriptive analysis of response indicates that 85 (46.2%), 58 (31.6%), 41 (22.3%) of respondents rated average (somewhat fair), above average (good) and poor (below average) respectively in their attitude and capability of gathering a great deal of information, when starting a new task or project, seeking the advice of people who know a lot about the problems or tasks they are working on, when working on a project for someone, asking many questions to be sure they understand what that person wants, going to several different sources to get information to help with tasks orprojects. The chi-square test shows information seeking is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000)

l) Concern for high Quality

Providing Product or service of high quality is the most important quality of entrepreneurs. Entrepreneurs pay due attention to details and observance of established standards and norms. The result for this study indicates that 94(51.1%), 45(24.2%), 45(24.2%) of respondents rated average (somewhat fair), above average (good) and poor (below average) respectively in their attitude and competency and reported that they bother when things are not done very well, that it is important to them to do a high quality job and they do whatever it takes to complete a job. The chi-square test shows concern for high quality is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000)

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m) Efficiency orientation

Efficiency orientation of entrepreneurs refers to the concern for conservation of time, money and effort. The result for this study indicates that 92(50%), 48(26.1%), 44(23.9%) of respondents rated average (somewhat fair), above average (good) and poor (below average) respectively that they find ways to do things faster, it bothers them when time is wasted, find ways to do things for less cost, get the most they can out of the money and have to accomplish a project or task.

The chi-square test shows efficiency orientation is associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.004).

n) Problem solving

This competency deals with the skills necessary to observe the symptoms, diagnose and cure the problems that may an entrepreneur face in business situations. The respondents were provided with multiple statements used to assess the level of this competency; statements used to assess whether the respondents think of unusual solutions to problems, think of many new ideas, think of many ways to solve problems and their flexibility in devising and applying particular problem solving approach. In this regard, 78 (42.4%) of the respondents, rate their competency as average whereas 59 (32.1%) above average and 47 (25.6%) below average.

Management & technical training before the business is strongly associated with this competency (p-value, 0.000). Management training after, is also associated with this competency (p-value, 0.001)

o) Self Confidence

Self-confidence competency deals with not being afraid of the risks associated with business and relying on one's capabilities to successfully manage these.

The respondents were provided with statements such as 'I feel confident that will succeed at whatever I try to do', 'I change my mind if others disagree strongly with me', When trying something difficult or challenging, I feel confident that I will succeed', 'I do things that are risky', and 'I stick with my decisions even if other disagree strongly with me' and asked to rate themselves on these statements honestly on the Likert scale.

Accordingly, 89 (48.4%), 53 (28.8%) and 42 (22.8%) rate themselves as somewhat fair, good and poor in their self-confidence.

The chi-square test shows self-confidence is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000)

p) Assertiveness

Assertiveness is one of the most important quality or attributes helpful in entrepreneurial leadership. It deals with conveying emphatically one's vision and convincing others of its value. Majority, 92(50.0%) of the respondents have average level of assertiveness followed by 38(20.7%) and 35(19.0%) of the respondents rated 'well' and 'very little' in this competency.

The chi-square test shows assertiveness is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000).Educational qualification is also associated with assertiveness at 5% significance level.

q) Persuasion

This is an entrepreneurial competency of eliciting support of others in the business. With regard to this competency, respondents were asked to rate on statements like 'I get others to support my recommendations', 'I convince others of my ideas', 'I get others to see how I will be able to accomplish what I set out to do', 'I am very persuasive with others', and 'I cannot get people who have strong opinions or ideas to change their minds'.

Accordingly,5(2.7%),38(20.7%),93(50.5%)41(22.3%),7(3.8%) respondents rate themselves 'not at all', 'very little', 'somewhat', 'well' and 'very well' in their competency of persuasion.

The chi-square test shows persuasion is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000)

r) Use of influence strategies

Use of influencing strategies is about providing leadership. It is a matter of developing strategies to influence others, spending much time thinking about how to influence others, getting important people to help to accomplish goals, thinking of solutions that benefit everyone involved in a problem in order to reach goals, getting to know people who may be able to help to reach goals. The chi-square test shows use of influence strategies is strongly associated with the average time respondents (leaders of enterprises) spend on their businesses (p-value, 0.000). Moreover, the educational qualification is also strongly associated with use of influencing strategies (p-value, 0.001).

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Table 3 : Entrepreneurial competencies of MSEs in Jimma zone, selected districts/towns

Competency Parameters	Not at all	very little	somewhat	well	very well
Opportunity Competency	11 (6%)	37(20.2%)	67(36.6%)	59 (32.2%)	9 (4.9%)
Relationship Competency	4(2.2%)	38(20.7%)	50(27.2%)	69(37.5%)	23(12.5%)
Conceptual Competency	3 (1.6%)	33(17.9%)	71(38.6%)	57(31%)	20(10.9%)
Organizing Competency	5(2.7%)	22(12%)	76(41.3%)	66(35.9%)	15(8.2%)
Strategic Competency	4(2.2%)	83(45.4%)	80(43.7%)	16(8.7%)	
Commitment Competency	4(2.2%)	37(20.1%)	70(38.0%)	48(26.1%)	25(13.6%)
Learning competency	7(3.8%)	35(19.0%)	72(39.1%)	58(31.5%)	12(6.5%)
Initiative	14(7.6%)	37(20.1%)	81(44.0%)	41(22.3%)	11(6.0%)
Persistence	6(3.3%)	49(26.6%)	74(40.2%)	42(22.8%)	13(7.1%)
Information Seeking	5(2.7%)	36(19.6%)	85(46.2%)	45(24.5%)	13(7.1%)
Concern for high Quality	6(3.3%)	39(21.2%)	94(51.1%)	37(20.1%)	8(4.3%)
Efficiency orientation	7(3.8%)	37(20.1%)	92(50%)	36(19.6%)	12(6.5%)
Problem solving	6(3.3%)	41(22.3%)	78(42.4%)	48(26.1%)	11(6.0%)
Self Confidence	12(6.5%)	30(16.3%)	89(48.4%)	45(24.5%)	8(4.3%)
Assertiveness	10(5.4%)	35(19.0%)	92(50.0%)	38(20.7%)	9(4.9%)
Persuasion	5(2.7%)	38(20.7%)	93(50.5%)	41(22.3%)	7(3.8%)
Use of influence strategies	8(4.3%)	34(18.5%)	95(51.6%)	38(20.7%)	9(4.9%)

V. Conclusions

Most of the respondents' age lies between age 19-35 which is according to the categorization of global entrepreneurship monitor (GEM), are young youths (18-24) and older youths (25-34) indicating larger proportion of youth entrepreneurs are operating under the umbrella of micro and small enterprises in Jimma zone.

However, the result of this study indicates that there is high gender gap in the leadership of micro and small enterprises. It also shows that there is a difference in entrepreneurial competencies between those who took management and technical trainings before and after the opening of the business and who didn't and between those who have higher educational qualification with those who have lesser. Moreover, many entrepreneurial competencies are strongly associated with the average time spent by entrepreneurs on business in a week.

The qualitative data reveals however, there is poor opportunity competency, relationship competency, poor strategic competency, poor persistence and poor quality concern among entrepreneurs of the micro and small enterprises of the Jimma zone.

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Linear Programming on Portfolio Optimization: Empirical Evidence from Bist Mining Industry Index

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Abstract- A lot of methods are improved for the portfolio optimization within classical approach. Quadratic programming, one of these methods, has many disadvantages, so alternative methods are studied to improve. MAD Method, an improved new method, is converted portfolio optimization problem into a linear programming problem. MAD Method is demonstrated and a case study is done by using stock certificate which belongs to BIST Mining Sector.

Keywords: *BIST mining sector, linear programming, portfolio optimization.*

GJMBR - B Classification : *JEL Code : G11, G12*



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Linear Programming on Portfolio Optimization: Empirical Evidence from Bist Mining Industry Index

Buğra Bağcı[α] & Fatih Konak[σ]

Abstract- A lot of methods are improved for the portfolio optimization within classical approach. Quadratic programming, one of these methods, has many disadvantages, so alternative methods are studied to improve. MAD Method, an improved new method, is converted portfolio optimization problem into a linear programming problem. MAD Method is demonstrated and a case study is done by using stock certificate which belongs to BIST Mining Sector.

Keywords: BIST mining sector, linear programming, portfolio optimization.

I. Introduction

Many models have been developed in the financial literature under the heading of portfolio optimization and these models were named as traditional portfolio and modern portfolio optimization. While attempting to minimize the risk of the portfolio through diversification of securities too much, not minding interrelationship between them, in traditional portfolio management approach; portfolio optimization has been made through mean- variance model (Markowitz, 1952:77-91) in modern portfolio management approach.

Harry Markowitz is called as the founder of the theory of modern investment with his study, by the name of "Portfolio Selection", that he presented as phd dissertation in the year 1952. In this study, Markowitz targeted the selection of the lowest-risk portfolio corresponding to a certain return on the basis of mean variances.

Various scientists attempted to develop portfolio selection model on the basis of mean -variance model. Tobin (1958), Sharpe (1964) ve Lintner (1965) adapted real-life constraints to the model, such as investor's decision on percentage of portfolio consisting of risky assets, borrowing- lending situation, short-term sales, transaction costs and taxes. Brennan (1971) investigated the subject of borrowing and lending; Turnbull (1977) investigated the subjects of personal taxation, uncertain inflation, nonmarket assets. Levy (1983) and Schnabel (1984) dealt with short-term sales problem.

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The difficulties caused by the increase in the number of securities for expected return of optimum portfolio and determination of variance were overcome by single index model developed by Sharpe (1963) and multiple index models developed by Perold (1984).The studies conducted on mean- variance model revealed the Capital Assets Pricing Model (CAPM), which is both mathematical and logical extension of the mean-variance model (Harrington, 1983). Sharpe (1964), Lintner (1965) and Mossin (1966) added moving risk-free financial asset to the model on the basis of Markowitz's studies.

Konno and Yamazaki (1991) proposed the mean absolute deviation (MAD) model, which is also a portfolio optimization model, alternatively to the mean-variance portfolio optimization model of Markowitz. MAD Model has used mean absolute deviation instead of variance intended to be minimized in the objective function of mean-variance model. Thus, portfolio selection problem was degraded from a quadratic program to a linear program (Simaan, 1997: 1437).

In this study, it is intended to inform about MAD model proposed by Konno and Yamazaki (1991) for also solution of large-scale portfolio optimization problems that can't be solved with Markowitz's classical mean -variance model and investigate its some properties. In the practice section, portfolio optimization was performed through MAD model for trading securities at BIST.

II. Mean Absolute Deviation (MAD) Model

MAD model is an alternative method simplifying Markowitz's classical formulation by using absolute deviation as a risk scale. When these two mathematically equivalent formulas have been considered in terms of calculation, significant differences are noticed between them. As well as approach of risk measurement through variance converts the problem to quadratic programming problem, absolute deviation approach degrades the problem to linear programming problem (Konno ve Koshizuka, 2005: 893).

Konno and Yamazaki revealed that mean absolute deviation of normal distribution was

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proportional with standard deviation of that. Consequently, MAD model and Markowitz model show the same activity under the multi variability of return of assets. Provided that these returns of (R_1,R_2,…,R_n) suggest multi variability normal distribution, then these two measures are the same. In other words, when returns of (R_1, R_2,…,R_n) suggest multi variability normal distribution, it means that minimizing the function $w(x)$ is minimizing the function σ (x) at the same time (Simaan, 1997: 1437). Furthermore, Rudolf, Wolter and Zimmermann (1999) revealed that minimizing mean deviation was equivalent to maximizing expected utility in case of avoiding risk (Rudolf et al. 1999: 85 103).

a) Mathematical Model

$R_j, (j = 1,2, \dots n)$, $j.$ represents the random variable implying return of asset and x_j, $(j = 1,2, \dots, n)$ $j.$ representing the ratio to be invested to asset, total return of portfolio consisting of assets is calculated as follows:

$$R(x) = \sum_{j=1}^{n} R_j x_j$$

Here, $j.$ represents return of asset, F_t ; asset's price at the end of the period, F_{t-1} ; asset's price at the beginning of the period $R_j = \frac{(F_t - F_{t-1})}{F_{t-1}}$, is calculated with this formula.

Standard deviation used as the scale of variance and risk in standard portfolio analysis is calculated as follows:

$$V(x) = E[(R(x) - E[R(x)])^2]$$
$$\sigma(x) = \sqrt{V(x)}$$

Mean absolute deviation used as a measure of the risk in MAD model is defined as follows (Konno ve Yamazaki, 1991: 523 524).

$$w(x) = E\left[\left|\sum_{J=1}^{n} R_j x_j - E\left[\sum_{j=1}^{n} R_j x_j\right]\right|\right]$$

This function is also the objective function that will be minimized.

$$minw(x) = E\left[\left|\sum_{J=1}^{n} R_j x_j - E\left[\sum_{j=1}^{n} R_j x_j\right]\right|\right]$$

$$\sum_{j=1}^{n} E(R_j) x_j \geq \rho$$

$$\sum_{j=1}^{n} x_j = 1$$

$$0 \leq x_j \leq 1\,, \quad j = 1,2, \dots, n$$

ρ: mimimum return desired by investor

$r_{jt} : t$ is the acquired return for time period $t = (1,2, \dots, T)$ and it is assumed that this return could be acquired from historical data or predictions for future; besides, expected value of random variable would converge these data resulted mean

$$let \;\; r_j = E(R_j) = \sum_{t=1}^{T} \frac{r_{jt}}{T}$$

$w(x)$ converges in the way given below :

$$E\left[\left|\sum_{J=1}^{n} R_j x_j - E\left[\sum_{j=1}^{n} R_j x_j\right]\right|\right] = \frac{1}{T}\sum_{t=1}^{T}\left|\sum_{j=1}^{n}(r_{jt} - r_j)x_j\right|$$

$$let \;\; a_{jt} = r_{jt} - r_j; \;\; j = 1,2, \dots, n; \;\; t = 1,2, \dots, T$$

In this case, the problem is converted to the minimizasyon problem given below:

$$minw(x) = \frac{\sum_{t=1}^{T}\left|\sum_{j=1}^{n} a_{jt} x_j\right|}{T}$$

$$\sum_{j=1}^{n} r_j x_j \geq \rho$$

$$\sum_{j=1}^{n} x_j = 1$$

$$0 \leq x_j \leq 1\,, \quad j = 1,2, \dots, n$$

By means of equations mentioned above, objective function became linear. This model will be equivalent to such a linear programming problem given below.

$$minw(x) = \frac{\sum_{t=1}^{T} y_t}{T}$$

$$y_t + \sum_{j=1}^{n} a_{jt} x_j \geq 0\,, \;\; t = 1,2, \dots, T$$

$$y_t - \sum_{j=1}^{n} a_{jt} x_j \geq 0\,, \;\; t = 1,2, \dots, T$$

$$\sum_{j=1}^{n} r_j x_j \geq \rho$$

$$0 \leq x_j \leq 1\,, \;\; j = 1,2, \dots, n$$

$$\sum_{j=1}^{n} x_j = 1$$

III. Aplication

In this section, portfolio optimization was carried out through that MAD model was applied to the actual data obtained from BIST. In the application part of this

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study, returns of mining sector concerned shares included in the SIST index between the dates 04.01.2010 to 4.12.2014 were calculated on the basis of daily closing prices and MAD model was applied to these data. It was assumed in the model that investors would create their portfolios with fully risky investments and risk-free investment and short selling wouldn't be allowed. MAD model was applied to the data by being written in an econometric package program. The shares used in the study belong to İhlas Mining (IHMIN), Ipek Natural Energy (IPEKE), Koza Mining (KOZAA), Koza Gold (KOZGO), Park Electric and Mining (PRKM).The statistics concerning these 5 shares have been given in Table 1.

Table 1 : Descriptive Statistics

Shares	Mean	Std. Dev.	Skw.	Kur.
IHMAD	0,038	0,050	1,325	-5,341
IPEKE	-0,045	0,031	1,291	0,274
KOZAA	0,049	0,090	5,594	-2,584
KOZAL	0,089	0,046	3,863	1,209
PRKM	0,058	0,025	1,580	1,158

For an investor targeting different returns and will make an investment on the basis of MAD model; in which ratio from which shares he should invest to his portfolio have been shown in Table 2.

Table 2 : Minimum Risk Ratio of Shares by a different Target Return

HİSSE	ρ					
	0.0001	0.0002	0.0003	4E-04	0	6E-04
IHMAD	0	0	0	0	0	0
IPEKE	0	0	0	0	0	0
KOZAA	0	0	0	0	0	0.004
KOZAL	0	0	0	0	0	0
PRKM	1	1	1	1	1	0.996
Min.Risk	0.0173	0.0173	0.0173	0.017	0.02	0.018

Table 2 (Con't) : Minimum Risk Ratio of Shares by a different Target Return

HİSSE	ρ						
	0.0007	0.0008	0.0009	0.001	0	0.003	0.004
IHMAD	0	0	0	0	0	0	0
IPEKE	0	0	0	0	0	0	0
KOZAA	0.027	0.0501	0.0732	0.096	0.33	0.558	0.789
KOZAL	0	0	0	0	0	0	0
PRKM	0.973	0.9499	0.9268	0.904	0.67	0.442	0.211
Min.Risk	0.0183	0.0191	0.0199	0.021	0.03	0.037	0.0455

The expected return and variances of these portfolios acquired for different returns using MAD model have been shown in Table 3.

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Table 3 : The expected returns and variances of efficient portfolios by employing MAD model

ρ	Exp. Return	Variance
0.0001	0.000583	0.000651
0.0002	0.000583	0.000651
0.0003	0.000583	0.000651
0.0004	0.000583	0.000651
0.0005	0.000583	0.000651
0.0006	0.000599	0.0068
0.0007	0.000699	0.000852
0.0008	0.000799	0.001024
0.0009	0.0009	0.001196
0.001	0.001	0.001369
0.002	0.001999	0.00309
0.003	0.002999	0.004812
0.004	0.004	0.006535

a) Evaluation of the Consequences Acquired from the Model

Having constituted optimum portfolios with different minimum returns acquired through application of MAD Model; in order to test the reliability of this model, Tablo4 and Tablo5 will be examined.

Table 4 : Closing Share Prices and Returns by Years

	SHARES									
	IHMAD		IPEKE		KOZAA		KOZAL		PRKM	
Date	Close Price	Return	Close Price	Return	Close Price	Return	Close Price	Return	Close Price	Return
04.01.2010	0.87	0.33	3.22	0.15	1.7	0.35	15.7	0.23	2.93	0.34
31.12.2010	1.16		3.72		2.3		19.4		3.93	
03.01.2011	1.16	1.41	3.72	-0.4	1.6	0.12	19.5	0.59	3.87	-0.09
30.12.2011	2.8		2.2		1.8		31.1		3.49	
02.01.2012	2.77	0.84	2.18	1.75	1.8	0.11	32	0.33	3.47	0.78
31.12.2012	5.12		6		2		42.6		6.18	
02.01.2013	5.12	0.48	6.08	-0.48	2	-0.15	43	-0.51	6.14	-0.19
31.12.2013	7.6		3.12		1.7		21		4.95	
02.01.2014	7.78	-0.82	2.88	-0.44	1.8	0.05	20.75	-0.3	4.92	-0.17
24.12.2014	1.36		1.6		1.9		14.41		4.07	
Return	0.56		-0.5		0.11		-0.08		0.38	

Table 5 : Closing Share Prices, Min., Max. and Differences

	Min.	Max.	Difference
IHMAD	0.64	9.8	9.16
IPEKE	1.45	6.18	4.73
KOZAA	1.48	2.32	0.84
KOZAL	12.15	48	35.85
PRKM	2.34	7.28	4.94

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When examined the tables, it has been seen that the shares that will make contribution to portfolio in terms of profit that will be created for investor's desire and natural expectation are IHMIN, KOZGO and PRKM yielding positive return. Accordingly, it is obvious that other two shares will not make any contribution for profit growth. Two mainly recommended shares in the portfolios created by MAD model are KOZGO and PRKM. The reason why IHMIN securities haven't been included in the optimum portfolios is that there is so much risk due to excessive fluctuations between beginning of period and end of period related market closing prices of the years selected. Remembering that through MAD model it is intended to minimize the equation that is objective function, yielding mean absolute deviation; naturally, the shares to be selected are supposed to minimize the risk as well as increase profit. Therefore, not only the shares with positive returns but also the ones with minimum risk were selected in optimum portfolios created by MAD model. When these considerations taken into account, it has been noticed that MAD model has yielded positive results and can be used in daily life.

On the other hand, comparing the variation coefficients (coefficient of change), another criterion in the selection of shares; it can be decided that which shares should be included in the portfolio that will be created and which ones shouldn't. Variation coefficient is defined as follows.

$$Variation\ Coefficient = \frac{Risk}{Return}$$

Since standard deviation has been used as a risk scale in portfolio optimization,

$$Variation\ Coefficient = \frac{Standard\ Deviation}{Return}$$

Table 6 includes standard deviation and value of returns of the shares belonging to mine sector in question and the results of variation coefficient calculated on the basis of these values.

Table 6 : Standard Deviations, Returns and Variation Coefficients of Shares

	Std. Dev.	Return	Variation Coeff.
IHMAD	0,050	0,00388	129
IPEKE	0,031	-4,5E-05	-704,72
KOZAA	0,090	0,0049	18,31
KOZAL	0,046	0,00089	52,22
PRKM	0,025	0,0058	43,725

It was found in the evaluations mentioned above that IPEKE and KOZGO securities' returns were negative, accordingly they shouldn't be included in the portfolios created. On the basis of that, when other three shares compared, the risks of the ones that must be included in portfolio, are supposed to be small as much as possible. When their variance coefficients were compared, the order from high to low value would be respectively IHMIN, KOZAA, and PRKM. On the basis of that securities with small variation coefficient should be included in the optimum portfolio for portfolio optimization, since IHMIN return's variation coefficient is so high, KOZAA and PRKM securities are supposed to be included in the optimum portfolio to be created as much as possible. When all of these taken into account, it is seen that portfolio optimization carried out with MAD model comply with daily life and not conflict with other portfolio selection criteria or methods in finance sector.

IV. Conclusion

Mean-Variance Model creating major changes in Markowitz's portfolio selection understanding is a currently used quadratic programming model revealing interrelationships between assets through risk-return variation, accordingly, taking into account diversification and the evaluation of entire portfolio. MAD model proposed by Konno and Yamazaki is one of the models proposed in time to overcome several problems encountered in the selection of portfolio. In MAD model, which is a linear programming model, risk is expressed with mean absolute deviation, not with variance.

In this study, MAD model was theoretically introduced. In the study performed with actual data, daily values of returns of the securities between January 2010- December 2014 of mine sector being included in SIST's index were used and portfolios were acquired on the basis of different target returns through application of the model.

Model was tested firstly comparing the fluctuations between values of returns of actual data and market closing prices; secondly, variation coefficient comparison method, which is another criterion used for selection of share in portfolio optimization, was used. It was seen according to both these two considerations that there wasn't any conflict with the consequences of the portfolios created through MAD model.

MAD model brought a new perspective to the classic portfolio optimization problem and degraded the problem to linear programming problem by defining the risk on the basis of mean absolute deviation. Thus, model has brought along the advantages such as transaction easiness, not requiring distribution assumption, ability to be reformulated for various constraints. The only disadvantage of MAD model

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encountered in the literature is that it can lead to prediction error due to not taking covariance matrix into account. When theoretical benefits and application performance of the model have been considered together, it has showed itself as a preferable portfolio optimization model.

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Content

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

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- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
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- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
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- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

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- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

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