Business Education Journal
Volume IV Issue I
Email: *jeditor@cbe.ac.tz*
Published Online: August, 2020 in *http://www.cbe.ac.tz/bej*

PERFORMANCE OF NON-LIFE INSURANCE COMPANIES IN TANZANIA

Omary J. Ally and Kembo M. Bwana (PhD), College of Business Education – Dodoma Campus, Accountancy Department
P. o. Box 2077, Dodoma. Corresponding Email: omary_lly@yahoo.co.uk

ABSTRACT

This study aims to evaluate relative efficiency in terms of resource utilization in 19 non-life insurance companies in Tanzania covering the year 2014 up to 2017. The study also investigates factors deriving efficiency performance of non-life insurance. Data envelopment analysis model (DEA) was adopted to carry the computation of efficiency score of each company. Findings revealed that out of 19 non-life insurance companies only six (32%) were found to be most efficient during different period under review while the rest of non-life insurance companies (68%) were found to be inefficient. Findings also revealed that fourteen (14) non-life insurance companies equivalent to (74%) were experiencing efficiency score above the average during the period under review. The study recommends that, all non-life insurance company involved in this study should revisit their size since the results revealed that only six (6) were operating at their optimal size or scale in different years under review and the rest were either large or small in terms of the relationship between the size and activities.

Keywords: *Performance, Non-Life, Insurance, Companies.*

1.0 INTRODUCTION

Tanzania insurance industry has traditionally been regulated and protected. As a result of the implementation of the Arusha Declaration in 1967 the industry underwent significant changes after nationalization of the insurance business as part of the declaration that required all the major means of the country economy to be under state control. The Insurance Act No.4 of 1967 was enacted effectively making it illegal for any insurance company, other than state-owned National Insurance Corporation of Tanzania Limited (NIC), to transact insurance business in Tanzania. The nationalization of the insurance industry was designed to control the large surpluses that were being transferred for investment outside the country. The Revolutionary Government of Zanzibar took a similar step in 1969. A decree known as the Insurance Corporation Order No .11 of 1969 was made to the effect that all insurance businesses in Zanzibar were restricted to one state insurance company in Zanzibar namely, Zanzibar Insurance Corporation (ZIC) (National Insurance Policy, 2015). Since then, these two companies operated as sole insurance companies in the United Republic until l996 when the industry was once again opened to private participation following adoption of Trade Liberalization Policy by the Government. In 1996 the Parliament of the United Republic of Tanzania passed the Insurance Act No.18 of 1996. The Act, among other things, provided for the establishment of the Tanzania Insurance Regulatory Authority (TIRA) which took over the role of its predecessor, the Insurance Supervisory Department (ISD).

Insurance in Tanzania is mainly grouped as general (non-life) insurance and life insurance. General insurance includes motor-commercial, motor-private, fire-domestic, aviation, fire-industrial and engineering, theft, workmen's compensation, and marine. Any insurance policy that is undertaken and does not cover against the life of an individual is referred to as non – life insurance or general insurance. Currently Tanzania has 31 general registered insurance companies, 596 insurance agents, 115 insurance brokers and 54 loss adjusters/assessors (TIRA Annual Report, 2018).

TIRA report in 2017 indicated that, the insurance sector contribution to Gross Domestic Product (GDP) stood at 0.55 percent which is equivalent to TZS 116,102 billion which indicate the importance of insurance sector to the Tanzania economy. According to Udaibir (2003) a strong and well-regulated insurance industry can considerably contribute to economic growth and efficient resource allocation through transfer of risk and mobilization of savings. In addition, it can develop financial system efficiency by reducing transaction costs, creating liquidity, and facilitating economics of scale and investment. A study conducted by Hammoud (2008) shows that, in addition to its traditional role of managing risk by indemnification, the insurance sector can enhance long term savings and serves as a medium to channel funds from policy holders to investment opportunities including mortgage lending.

Bwana (2018) contended that an economic system is considered to be relatively efficient than the other only if it can produce more goods (or provide services) without consuming more resources. Efficiency means a highest level of performance that uses the minimum amount of inputs to achieve the given amount of output, alternatively efficiency refers to the production of maximum amount of outputs given the amount of inputs. Efficiency requires reducing the number of unnecessary resources used to produce a given output, it is a measurable concept that can be determined using the ratio of

useful output to total input. It minimizes the waste of resources (inputs) while accomplishing the desired output. Ashagrie and Gizachew (2018) argued that efficiency measurement is one of the key aspects when one is assessing firm's performance. As contended by Memon and Tahir (2012) a business entity nowadays, has to remain efficient in order to perform and sustain its business operation.

According to Mwangeti (2012) efficiency in modern business management is a very important tool in re-allocation of available resources in business environment with homogeneous products and with multiple units of inputs and outputs. Efficiently operating firms are able to minimize inputs used and maximize outputs produced thereby remaining competitive in the market. According to Ashagrie and Gizachew (2018) the insurance sector forms an important part of the international financial market, with insurance companies being important institutional stockholders. In recent years, the insurance sector, like other financial services, has continued to grown interms of economic importance. According to Ward and Zurbregg (2000) this growth can be caused by a number of factors including, but not limited to: rising income and demand for insurance, rising insurance sector employment, and increasing financial intermediary services for policyholders, particularly in the pension business. Increasing the relationship between gross domestic products (GDP) and insurance market development. It is worth noting that, the insurance sector main purpose is to supply individuals and businesses with coverage against specified contingencies, by redistributing losses among the pool of policyholders. Insurance companies, therefore, engage in underwriting, managing, and financing risks.

Insurance efficiency have drawn attention of several authors in different parts of the world, for example in a study conducted by Eling and Luhnen (2008) using DEA and SFA model, 4,372 life and non-life insurance companies from 98 countries were surveyed for the period 2002 to 2006. Their results revealed that Denmark and Japan had the highest average efficiency while the Philippines had the least efficient firms. It was also found that mutual companies were more efficient than stock companies. Hwang and Kao (2006) employed the two stage data envelopment analysis, where in the first stage they measured marketability and the profitability at the second stage. The sample of the study was 24 non-life insurance firms in Taiwan for the period 2001-2002. An interesting finding was that company which had efficiency in the traditional one stage could never achieve efficiency both in the marketability and profitability stages. Moreover they found no different values for efficiency between domestic and foreign and with different sizes or scales.

A study conducted by Eling and Luhnen (2010a) present a survey of efficiency and productivity models related to the insurance sector in a cross country comparison. Findings revealed that there is growth in efficiency in the international insurance markets, although there are large differences between countries. The same findings were revealed Nektarios and Barros (2010) analyzed the efficiency of Greek insurance companies throughout the period 1994–2003. Abdul Kader et al. (2010) studied the cost efficiency of non-life Takaful insurance firms operating in 10 Islamic countries. DEA was used to compute cost efficiency scores and at a second stage a logit model was used to test the influence of corporate characteristics on insurance efficiency. In another study Mahlberg and Url (2010) analyzed efficiency of German insurance industry with DEA that calculates the bootstrapped efficiency scores from1991 through 2006, by applying a scale efficiency test based on bootstrapped statistics. In the same view, Ethiopia, Ashagrie and Gizachew (2018) analyzed the efficiency of insurance companies in Ethiopia using Data Envelopment Analysis (DEA). The study used panel data covering ten years period from 2006 – 2015, findings showed that Ethiopian insurance company and Nyala insurance company were relatively efficient taking first and second rank respectively. It was also found that company size and number of branches were significantly affecting efficiency at 95% confidence.

Another study by Ansah-Adu et al. (2012) evaluated the efficiency of insurance companies in Ghana using a two-stage procedure to determine whether insurance companies are cost efficient and also to examine the efficiency determinants of insurance companies. Carlos and Peter (2014) employed a two stage DEA models to measure the efficiency of insurance companies in Mozambique using panel data from 2002 – 2011. Results revealed that Mozambican insurance companies output – increases potentials and are severely constrained, particularly in terms of the ceded reinsurance increasing potentials. In a line with literature reviewed on insurance efficiency, evidence shows that despite its contribution to the economy of the country, there is a little or no attention given to the efficiency of non-life insurance companies in Tanzania using DEA model. Therefore the main objective of this research is to measure efficiency of non-life insurance companies in Tanzania. Specifically, the research aimed to:

i) Analyze resource utilization in non- life insurance companies in Tanzania, and
ii) Examine major factors deriving performance of non-life insurance companies in Tanzania.

The study is crucial since it intends to disclose the performance of non-life insurance companies in Tanzania, part of the financial services sector which is not yet fully tapped. The findings of this research may be used as benchmark in reviewing the operational and cost strategies of inefficient insurance companies in the country. Ministries, Departments and Agency (MDA's) in collaboration with Tanzania Insurance Regulatory Authority (TIRA) may use findings in formulating and improving the existing policies. Management may also use the findings to revisit their strategies in terms

of resource utilization and setting standards of company's size and resource utilization to ensure sustainability in performance of non-life insurance companies in Tanzania. The findings are also expected to contribute to the existing body of knowledge and literature on insurance efficiency in Tanzania, for researchers this will attract more studies and replicate studies on performance of insurance from different perspectives.

2.0 METHODOLOGY

2.1 Data Type and Source

In this study efficiency of 19 non-life insurance companies operating in Tanzania were analyzed from 2014 through 2018. Out of 19 insurance companies two companies are state owned companies. However, domestic and foreign companies are also included in this study. The study involves secondary data which was collected from Tanzania Insurance Regulatory Authority (TIRA) published annual reports for the period covering 2014 – 2018.

2.2 Data Envelopment Analysis (DEA) Model

The study employed Data Envolopment Analysis (DEA) Model in measuring the efficiency of non- life insurance companies in Tanzania. DEA has been widely used in analyzing general substitutability between outputs and inputs. This model is non-parametric in which efficiency frontier is determined by the data (Bates, Baines &Whynes, 1996). DEA was first proposed by Charnes, Cooper& Rhodes in 1978, then Banker, Charnes & Cooper proposed modified DEA in 1984, with the use of the models firm's relative performance can be evaluated. When using DEA firms under scrutiny with the same inputs and outputs are called Decision Making Unit (DMU). DEA model provide a framework of measuring efficiency of each DMU whereby relative comparison can be done. A reference unit usually found in DEA by projecting the inefficient DMU's radially to the efficient surface (Korhonen, 1997). The advantage of DEA lies in its applicability to all types of data as inputs and outputs, data based on various scales can be used on behalf of calculating efficiencies. DEA is designed to measure the relative efficiency in situations where, there are multiple inputs and outputs and there is no obvious objective way of aggregating either inputs or outputs into a meaningful index of productive efficiency (Bwana, 2015a; Ozcan, 2008). Paradi, Yang & Zhu,(2011) indicated that the number of DMU's should be at least three times the total number of inputs and outputs.

2.3 Model and Variable Selection

One of the requirements of using DEA in measuring efficiency of DMU is selection of appropriate input and output variables. However, literature does not provide consensus regarding selection of inputs and outputs of financial service sector in general, insurance companies in particular in the measurement of efficiency analysis. Inputs variables are those used to produce firm's outputs while outputs variables are the results of the firm's operating activities (Bwana 2015). In this study variables were selected based on past experience from the literature (similar previous studies) and availability of data. This study follows the study conducted by Norma *et al* (2006) which employed *commission paid and management expenses as inputs while premium written and net investment income as outputs.* The study also used non-life insurance variables that were employed in previous studies by Hawang and Kao (2006) and Huang and Lai (2007). Outputs selected were premium income (direct and reinsurance premium); net underwriting income and investment income while Inputs used were business and administration expenses, and marketing expense.

Table 1: variables employed in this study and previous similar studies

	Inputs variables	**Previous studies**
1	***Commission Paid*** **-** An amount of money paid to a broker (agent) or insurance sales-person as a percentage of the policy premium. Commission is generally paid as a percentage of the premium on the insurance policies.	Norma *et al* (2006) Study conducted in Malaysia.
2	***Management expenses*** **-** Include expenses, commission, brokerage and remuneration to agents and to intermediaries, charged to the revenue	Norma *et al* (2006) Study conducted in Malaysia.
	Outputs variables	
1	***Premium written*** - money an individual or entity pays for an insurance policy. It also represents a liability, as the insurer must provide coverage for claims being made against the policy.	Hawang and Kao, (2006) Study conducted in Indonesia.
2	***Net investment income*** **-** Income derived from its investments as opposed to its operations. The term has special significance in the insurance industry as various parties consider whether such income should be considered in rate making	Hawang and Kao, (2006) Study conducted in Indonesia.

This research adopted DEA model with constant return to scale (CRS) assumptions. The aim of CRS model is the maximization of the ratio of weighted numerous outputs to numerous inputs. With the criticisms against the insufficiency of financial ratios as a measure of performance, DEA model has been widely used as a general measurement of efficiency. Any non-life insurance compared to others should have maximum efficiency score of 1 or less. DEA is formulated from the simple formula available in linear programming as follows (DenizerdanDinc, 2000):

$$\text{Maximize } h_j = \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}}$$

$$\text{Subject to } \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1 \quad \text{for j =1 … n}$$

$$v_i \geq 0 \text{ for i = 1 … m, and } u_r \geq 0 \text{ for r = 1 … s}$$

In the equation above, *Ur and* V_i represent the weights of the outputs and inputs variables respectively, and *"o"* denotes a focal DMU (in this case each non-life insurance company) (i.e., which in turn, becomes a focal insurance company when its efficiency score is being calculated relative to others). In the above equation input and output values, together with all weights assigned are assumed to be greater than zero.

3.0 FINDINGS AND DISCUSSION

Summary of statistical results for inputs and outputs for the period under review (2014- 2017) is presented in Table 2 below:

Table:2 Descriptive Statistics (inputs and output variables)

Variables	N	Range	Mini	Maxim	Mean	Std. Deviation	Variance
net investment income	76	7818.0	11.0	7829.0	1363.855	1782.3477	3176763.165
Premium written	76	31145.0	876.0	32021.0	9828.184	7255.6874	52644999.139
Commission paid	76	9936.0	2.0	9938.0	932.566	1397.7844	1953801.156
management expe	76	11742.0	594.0	12336.0	4478.632	2781.5531	7737037.462
Valid N(list wise)	76						

Max DEA 5 was used to measure overall technical efficiency score based on constant return to scale (CRS) and variable return to scale (VRS) for each 19 non-life insurance company involved in this study. Appendix 1 reflects referenced insurance companies set for inefficient companies as well as number of times (frequency) in which the particular insurance company appear in the efficient set of other non-life companies, while appendix 2 indicates decomposition of overall efficiency into technical and pure efficiency. The DMU, for this case non-life insurance company is considered most efficient if it acquire the maximum efficiency score of 1(one), less than 1 (one) is deemed to be inefficient. Results revealed that, observed efficient score varies from 0 to 1 with a mean score of 0.54 (54%), out of 19 non-life insurance companies only six (32%) were found to be most efficient during different period under review (Alliance_2014, First_2014,NIC_2018,Pheonix_2014-2015,Sanlam_2014,Tanzindia_2014) while the rest of non-life insurance companies (68%) were found to be inefficient(had efficiency score of less than 1).

Findings also revealed that fourteen (14) non-life insurance companies equivalent to (74%) were experiencing efficiency score above the average (50%) during the period under review (Alliance_2015,2016&2017 – 82.8%,83% and 78.1%, First_ 2015 – 75.4%,Icea Lion_2015-2016 -58% and 61%,IGT_2014-2017 – 70%,74.3%,59.1% and 50.1%, Bumaco_2014-2017 -52.7%,59.8%,51.8% and 57.9%, Max insure_2015-2016 – 56.3% and 55.4%, May Fair_2018-51.4% ,Milembe_2014- 50.9%,Mo_2015- 64.5%, NIC_2015-91.7%,Pheonix_2016 – 63.9%,Reliance_2014-2016- 71.5%,57.6% and 51.9%,Star General_2014-2016 – 55.7%,72.4% and 56.7% , Tanzaindia_2015-2017 – 76.7%,66.1% and 57.9% and ZIC_2015- 54.6%. Also the study revealed that (First_2016-2018 – 29.2% and 9.1%, Max insure_2014 -29.6%,Mgen_2017-27.2%

,Sanlam_2017 -27.5% and Star General_2018-18.6%) were some of least efficient non-life insurance under the study period.

A DMU which tends to appear frequently in efficient set of other non-life insurance company (times the benchmark of another non-life insurance companies) is considered to be the best performer and a good examples of the best practices among the DMUs. With regard to this, out of six (32%) most efficient non-life companies, Alliance company was found to appear most frequently in the efficient set of DMUs during the period under review. This implies that Alliance company is a good example to most of inefficient non-life insurance companies in terms of operations. DMU`s with a small or zero frequency in the efficient set are not good example to be followed by inefficient insurance companies.

General efficiency (technical efficiency) can further be disintegrated into pure efficiency and scale efficiency in order to scrutinize the sources of inefficiency in 68% of non –life insurance companies deployed under this study. Findings indicate that, almost all inefficient non-life companies' inefficiency was mainly caused by the technical inefficiency as demonstrated by average higher degree of relatively scale efficiency (83.7%) as related to pure technical efficiency of (65.4%). Pure technical efficiency score for the inefficient non-life insurance companies ranges from 0 to 0996(99.6%) on the other side the scale efficiency score of the inefficient DMUs range from 0 to 0.999 (99.9%).

Findings further revealed that, none of the non-life insurance company were found to be efficient in terms of pure efficiency, scale efficiency and overall technical efficiency during the period under review (2014-2017). It was also found that only Phoenix insurance company experienced pure efficiency, scale efficiency and overall technical efficiency for only two years (2014-2015) during the period under review. Five (5) insurance firms namely (Alliance_2014, First_2014, SanSlam_2014, Tanzaindia_2014 and NIC_2018) experienced pure and technical efficiency only for one year during the study period. When studying the scale efficiency of any DMU (in this case non-life insurance) we normally compare the efficiency score found under Constant Return To Scale(CRS) assumptions and that found under Variable Return Scale (VRS) assumptions. Constant Return to Scale (CRS) of one (1) indicate that the insurance has the best scale efficiency, while the Increase Return to Scale(IRS) of one (1) implies that inputs contribute to a more than proportionate increase in output (Bwana & Omary, 2019) .

Five (5) insurance companies (26.3%) namely Britam, IGT, UAP, ZIC, and Reliance demonstrated decreasing return to scale (DRS) which implies any attempt to increase or add inputs by ***n*** percent will lead to increases in the output by less than ***n*** percent while the other five (5) companies (26.3%) (Maxinsure, Mayfair, Milembe, Mo, Star General) manifested Increasing Return to Scale (IRS) implying that insurance company with IRS have an opportunity to enjoy economies of scale (i.e when the inputs increased by ***n*** percent the outputs also increases by more than ***n percent***).

Results also revealed that ten insurance companies were experiencing both increasing return to scale (IRS) and Decreasing Return to Scale (DRS) at different years during the period under review (2014-2017). A study by Ashagrie and Gizacheu (2018) revealed that efficiency score of Ethiopian insurance companies indicated that none of insurance companies under the study period (2006-2015) was efficient throughout the period under review, this conforms to the findings of this study which indicated no any non-life insurance was efficient between study period(2014-2017). In terms of average efficiency score results from Ethiopian non –life insurance indicated that, no company was perfectly efficient under study period but Ethiopia and Nyala insurance companies had efficiency score of one 2014-2015 this also conforms with this study as Phoenix company was found to have the same efficiency score of one (1) in the same period 2014-2015. Both studis done in Ethiopia and Tanzania revealed that, the main source of inefficiency of insurance companies is caused by higher degree of relatively scale efficiency as evidenced by 83.7% in Tanzania and 81.9% in Ethiopia insurance companies.

4.0 CONCLUSION AND RECOMMENDATIONS

This study aimed at analyzing efficiency of 19 non-life insurance companies in Tanzania over the study period 2014-2017 (four years). The study employed non-parametric approach (DEA) with two inputs and two outputs. The study concluded that, in terms of technical efficiency (TE) and Scale Efficiency (SE) none of the insurance companies under review were perfectly efficient, Phoenix company was performing relatively well compared to other insurance companies, this indicated that Phoenix company had an ability to produce maximum outputs with a given level of outputs. Findings also revealed that, inefficiency in almost all inefficient insurance companies was mainly caused by technical efficiency (TE) as evidenced by average higher degree of relatively scale efficiency as compared to pure technical efficiency. It was further found that, five insurance companies demonstrated decrease return to scale (DRS) which implies that any attempt to increase or add inputs by ***n*** percent twill increase output by less than by ***n*** percent while the other five companies manifested increasing return to scale (IRS) this indicated that insurance companies with IRS have an opportunity to enjoy economies of scale (i.e when the inputs increased by ***n percent*** the outputs also increase by more than ***n percent***). Results also revealed that ten insurance companies were experiencing both increasing return to scale (IRS) and decreasing return to scale (DRS) at different years during the period under review.

The study recommends that in terms of overall efficiency management of non-life insurance companies which were inefficient should revisit company resources utilization. Since poor performance of inefficient companies was largely influenced by the technical inefficiency (managerial related issues) as evidenced by average higher measure of relatively scale efficiency. This study further recommends that in order to improve overall efficiency all inefficient companies (in terms of pure efficiency) should analyze managerial related issues. The study further recommend that all non-life insurance companies employed in this study should revisit their size since result revealed that only six were operating at their optimal size or scale only in different years under review and the rest were either large or small in terms of the relationship between the size and activities. Due to governmental directives that all public organizations should not be insured by private insurance companies most government operations have sought their insurance cover with NIC. This is probably one of the reasons why NIC insurance company which is governmental entity was relatively best insurance firm in 2017.

This study recommends that future study should focus on the use of the alternative approaches of measuring efficiency such as parametric so as to have the basis of comparison of the results obtained from non-parametric and parametric approach.

REFERENCE

Abdul Kader, H., Adams, M. and Hardwick, P. (2010) The cost efficiency of Takaful insurance companies, *The Geneva Papers on Risk and Insurance Issues and Practice, 35,161–81. doi:10.1057/gpp.2009.33*

Ansah-Adu, K., Andoh, C. and Abor, J. (2012) Evaluating the cost efficiency of insurance companies in Ghana, *The Journal of Risk Finance, 13, 61–76.doi:10.1108/ 15265941211191949*

Ashagrie Sharew and Gizachew Fentieb (2018) Data Envelopment Analysis on Efficiency of Insurance Companies in Ethiopia, *American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS), Volume 48, No 1, pp 138-170*

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management science*, *30*(9), 1078-1092.

Barros, C. P., Nektarios, M. and Assaf, A. (2010) Efficiency in the Greek insurance industry, *European Journal of Operational Research, 205, 431–36.doi:10.1016/j. ejor.2010.01.011*

Bates, J. M., Baines, D., &Whynes, D. K. (1996).Measuring the efficiency of prescribing by general practitioners.*Journal of the Operational ResearchSociety, 47(12), 1443-1451*

Bwana, K and Omary, J (2019).Efficiency of Listed Manufacturing Firms in Dar es Salaam Stock Exchange: Data Envelopment Analysis Model. *Business Education Journal (BEJ), Volume III, Issue I*

Bwana, K. M. (2015a) Measuring technical efficiency of faith based hospitals in Tanzania: An application of data envelopment analysis (DEA). *Research in Applied Economics, Vol. 7, No. 1*

Bwana, K. M. (2015) Technical efficiency of Tanzania teaching hospitals: The case of private not for-profit hospitals. *Business Managementand Strategy, Vol. 6, No. 1*

Bwana, K. M. (2018). Investigating Efficiency Based On the Hospitals Size: An Application of a Non-Parametric Approach to the Private Hospitals in Tanzania.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978) Measuring the efficiency of decision making units. *European journal of operational research*, *2*(6), 429-444.

Denizer, A. Cevdet and Dinc Mustafa (2000) Measuring Banking Efficiency in the pre and Post Liberalization Environment: Evidence from the Turkish Banking System. George Washington University

Eling Martin and Michael Luhnen (2008) Frontier efficiency methodologies to measure performance in the insurance industry: overview and new empirical evidence. *Working papers on risk management and insurance no 56. University of St. Gallen.*

Eling, M. and Luhnen, M. (2010a) Efficiency in the international insurance industry: a cross-country comparison, *Journal of Banking and Finance, 34, 1497–509.doi:10.1016/j. jbankfin.2009.08.026*

Hailu (2007). Insurance in Ethiopia,historicaldevelopment,present status & future Challenges. Addis ababa, Ethiopia. Master Printing Press Plc

Hammoud, V. A (2008).promoting the growth and competitiveness of the insurance sector in Arab World.Makati city; Philippines.

https://economictimes.indiatimes.com/definition/brokeragecommission accessed on 7th October, Monday, 02:51pm

https://www.business-standard.comaccessed on 7th October, Monday, 03:20pm

https://www.investopedia.com/terms/i/insurance-premium.aspaccessed on 6thOctober,Sunday ,11:24am

Huang Li Ying, Tzy-yih Hsiao, and Gene c. Lai (2007) Does Corporate and Ownweship Structure Influence Performance? Evidence from Taiwan Life Insurance Companies. *Journal of Insurance Issues. 30, 2, 123 – 151.*

Hwang Shiuh-Nan and Tong-Liang Kao (2006) Measuring Managerial Efficiency in Non Life Insurance Companies : An Aplication of Two Stage Data Envelopment Analysis. *International Journal of Management Vol 23 No.3, 699 – 720.*

Korhonen, P. (1997). Searching the efficient frontier in data envelopment analysis. Interim Reports, *Aiding Decisions with Multiple Criteria* (pp. 543-558). *Springer US.*

Mahlberg, B. and Url, T. (2010) Single market effects on productivity in the German insurance industry, *Journal of Banking and Finance, 34, 1540–48. doi:10.1016/j. jbankfin.2009.09.005*

Memon. A. M and Tahir, M.I (2011), Applying DEA in Analysing the Efficiency of Top Manufacturing Companies in Pakistan, *Journal of Public Administration and Governance, Vol. 1, No. 2, PP. 225-239.*

Mwangeti, N. T. (2012). Measuring Operational Efficiency of the Insurance Industry in Kenya using Data Envelopment analysis. Unpublished MBA Research Project, Nairobi Kenya

Ozcan YA. (2008). Healthcare Benchmarking and Performance Evaluation: An Assessment of DEA. *Springer, Norwell, MA.http://dx.doi.org/10.1007/978-0-387-75448-2*

Paradi, J. C., Yang, P. Z., & Zhu, H. (2011). Assessing bank and bank branch performance: modelling considerations and approaches, Handbook on Data Envelopment Analysis, *International Series In Operations Research &Management Science, 164, 315-361.*

Tanzania Insurance Regulatory Authority (2018) Annual Insurance Market Performance Report. Acceessed on 20th April 2020 from: *http://www.tira.go.tz/content/annual-insurance-market-performance*

Udaibir, S. D. (2003). *Insurance and Issues in Financial Soundness/Udaibir S Das, Nigel Davies, Richard Podpiera*. IMF Working Paper WP/03/138.-July 2003.–40 p.

Ward and Zurbregg, W. (2000). Does Insurance promote Economic Growth?evidence from OECD countries. *The journal of Risk and Insurance, , pp.489-506.*

APPENDIX

Appendix 1: Technical efficiency of insurance with benchmarking

S/N	DMU	Score	Benchmark(Lambda)	Frequency
1	Alliance_01	1	Alliance_01(1.000000)	57
2	First_01	1	First_01(1.000000)	22
3	alliance_03	1	Alliance_03(1.000000)	18
4	Milembe_01	1	Milembe_01(1.000000)	18
5	Sanlam General_01	1	Sanlam General_01(1.000000)	16
6	Pheonix_01	1	Pheonix_01(1.000000)	12
7	Tanzindia_01	1	Tanzindia_01(1.000000)	12
8	Pheonix_02	1	Pheonix_02(1.000000)	7
9	Alliance_04	1	Alliance_04(1.000000)	5
10	StarGeneral_02	1	StarGeneral_02(1.000000)	5
11	NIC_02	1	NIC_02(1.000000)	2
12	NIC_04	1	NIC_04(1.000000)	2
13	starGeneral_01	1	starGeneral_01(1.000000)	1

Appendix2: Decomposition of Overall Efficiency (TE) into Pure Efficiency and Scale Efficiency

s/n	DMU	TE	PE	SE		s/n	DMU	TE	PE	SE	
1	alli_01	1.00	1.00	1.00	CRS	39	Mile_03	0.21	0.25	0.85	IRS
2	alli_02	0.83	1.00	0.83	DRS	40	Mile_04	0.29	0.36	0.81	IRS
3	alli_03	0.83	1.00	0.83	DRS	41	Mo_01	0.65	0.77	0.84	IRS
4	alli_04	0.78	1.00	0.78	DRS	42	Mo_02	0.47	0.62	0.75	IRS
5	Britam_01	0.32	0.63	0.51	DRS	43	Mo_03	0.50	0.58	0.86	IRS
6	Britam_02	0.32	0.63	0.51	DRS	44	Mo_04	0.35	0.37	0.96	IRS
7	Britam_03	0.34	0.57	0.60	DRS	45	NIC_01	0.45	0.75	0.60	DRS
8	Britam_04	0.40	0.63	0.64	DRS	46	NIC_02	0.92	1.00	0.92	DRS
9	bum_01	0.53	0.56	0.94	IRS	47	NIC_03	0.27	0.48	0.57	DRS
10	bum_02	0.60	0.62	0.97	DRS	48	NIC_04	1.00	1.00	1.00	CRS
11	bum_03	0.52	0.57	0.91	DRS	49	Pheo_01	1.00	1.00	1.00	CRS
12	bum_04	0.58	0.63	0.92	DRS	50	Pheo_02	1.00	1.00	1.00	CRS
13	First_01	1.00	1.00	1.00	CRS	51	Pheo_03	0.64	0.77	0.83	DRS
14	First_02	0.75	0.80	0.94	DRS	52	Pheo_04	0.41	0.54	0.76	DRS
15	First_03	0.29	0.29	0.99	DRS	53	Reli_01	0.72	0.81	0.88	DRS
16	First_04	0.09	0.12	0.77	DRS	54	Reli_02	0.58	0.74	0.78	DRS
17	I L_01	0.40	0.43	0.94	IRS	55	Reli_03	0.52	0.68	0.77	DRS
18	I L_02	0.58	0.60	0.96	DRS	56	Reli_04	0.37	0.52	0.71	DRS
19	I L_03	0.61	1.00	0.61	IRS	57	S G_01	1.00	1.00	1.00	CRS
20	I L_04	0.46	1.00	0.46	IRS	58	S G_02	0.36	0.36	0.99	IRS
21	IGT_01	0.70	0.81	0.87	DRS	59	S G_03	0.37	0.38	0.95	DRS
22	IGT_02	0.74	0.86	0.87	DRS	60	S G_04	0.28	0.34	0.80	DRS
23	IGT_03	0.59	0.70	0.85	DRS	61	STG_01	0.56	1.00	0.56	IRS
24	IGT_04	0.50	0.60	0.83	DRS	62	STG_02	0.72	1.00	0.72	IRS
25	MI_01	0.30	0.30	0.99	IRS	63	STG_03	0.57	0.79	0.71	IRS
26	MI_02	0.56	0.57	0.99	IRS	64	STG_04	0.19	0.23	0.83	IRS

27	MI_03	0.55	0.56	1.00	IRS	65	TIa_01	1.00	1.00	1.00	CRS
28	MI_04	0.44	0.45	0.99	IRS	66	TIa_02	0.77	0.77	0.99	IRS
29	MF_01	0.46	0.52	0.88	IRS	67	TIa_03	0.66	0.67	0.98	DRS
30	MF_02	0.48	0.56	0.86	IRS	68	TIa_04	0.58	0.58	0.99	DRS
31	MF_03	0.48	0.56	0.86	IRS	69	UAP_01	0.49	0.67	0.74	DRS
32	MF_04	0.51	0.53	0.96	IRS	70	UAP_02	0.48	0.79	0.61	DRS
33	MG_01	0.50	0.50	0.99	IRS	71	UAP_03	0.46	0.74	0.61	DRS
34	MG_02	0.40	0.42	0.97	DRS	72	UAP_04	0.45	0.69	0.65	DRS
35	MG_03	0.34	0.36	0.96	DRS	73	ZIC_01	0.50	0.58	0.86	DRS
36	MG_04	0.27	0.27	1.00	IRS	74	ZIC_02	0.55	0.65	0.83	DRS
37	Mile_01	0.51	1.00	0.51	IRS	75	ZIC_03	0.49	0.59	0.82	DRS
38	Mile_02	0.31	0.37	0.83	IRS	76	ZIC_04	0.48	0.61	0.78	DRS
							AVER	***0.54***	***0.65***	***0.83***	

***Note**: some of the names of the insurance companies have been abbreviated for example Alliance-Alli, Bumaco-Bum, Milembe-Mil, Sanlam gen-SG. Tanzindia-Tia, Star gen-STG, Icea Lion-IL, Maxinsure-MI*