

CHAPTER SIX

Summary, Conclusions, And Recommendations

6.1 Summary

The Gezira scheme is the area that extends from latitude 13° N to latitude 15° N between the Blue and White Niles. It covers a net cultivable area of little less than one million hectares (about 2.1 million feddans). The scheme contributes about 58, 46, 12, and 23 percent to the total amount of cotton, wheat, dura, and groundnuts produced in Sudan, respectively. Three parties are involved in the production management of the scheme. The government, which provides land and water, the scheme management (Sudan Gezira Board) which organizes the basic cultivation operations, as well as, providing inputs mainly for cotton and the tenants carry out the remaining operations. After the Gezira Scheme Act of 2005, farmers are free to take decisions related production. And they have the right to participate in planning, management and management of irrigation channels at the level of the field by (WUAs). There are many constraints and drawbacks to agricultural production like high costs of production, low crop yields and low incomes from agricultural production. The main objectives of this study was to analysis and evaluate the technical efficiency of crop production in the Gezira scheme, more specifically are to: study the socio-economic characteristics of farmers' in the Gazira scheme, estimate productivity and profitability of produced crops in the study area, evaluate farmers' technical efficiency and investigate the main factors behind their technical inefficiency in producing the main crops, and determine the optimum crop combination that maximizes farmers' returns. Both primary and secondary data were used for the study purposes.

Primary data were collected by using a structured questionnaire using multi-stage stratified random sampling techniques through direct personal interviewing, where a sample of 150 tenants was collected during season 2011/12. Secondary data were collected from different relevant sources. To achieve the objectives of the study a variety of analytical techniques were used. Tabular as well as general descriptive statistics were used throughout the study to reveal the different descriptive aspects of the Gezira farming system and socio- economic characteristics of the farmers; also a gross margin analysis was used. Estimate of marginal value of product of different factors of production were calculated; through Stochastic frontier production function and Linear programming models.

6.2 Summary of the main results

The descriptive statistics of socio-economic characteristics result showed that the average age of the sampled farmers was 50 years. The most of the farmers 88.7% were within the active age of (25-65) and about 11.3% are over 65 years. The most of the farmers 98% have attained some sort of education. This means about 69.45% of the farmers received good education. For the sampled farmers, the average family size was found to be 8 persons per household. All surveyed farms are managed by males farmers, about 90 % of the surveyed farmers were married. The stochastic frontier production function analysis revealed that socioeconomic characteristics effected of technical efficiency of farmers in crops production, also revealed that the mean technical efficiency was 63%, 75%, 65%, and 90% for cotton, sorghum, groundnuts, and wheat productions, respectively was achieved by tenancies in the study area. This shows that there is scope for increasing cotton, sorghum, groundnuts, and wheat production lie by 37%, 25%, 35%, and 10%, respectively with present technology. An analysis of the determinants of technical

efficiency indicated that tenancy location, age, education years, sowing date, farm income, irrigation number, weeding number and total labour, for production crops were significant variable for improving technical efficiency. Education level, experience, family size, marital status and credit were significant in explaining technical inefficiency in Gezira scheme. The most of the labours used were devoted to the main cash crops, onion and cotton which received 23.5% and 19.26%, respectively of the total labour used. The results of the basic models were obtained by one run, compared with the actual situation, it is clear that most of the land is allocated to onion crop which was 8.68 feddans, followed by cotton crop which was 6.88 feddans, while sorghum and groundnuts entered in the optimal plan with small areas 1.74, and 0.92 feddans, respectively, wheat and chickpea did not enter in the optimal plan. In the real situation cotton, sorghum, and onion occupied about the same area (4 feddan), followed by wheat and chickpea, (3 feddan), and then groundnuts (2 feddan). The levels of resource use it clear that there is difference between the actual total land allocated and optimal total land, which was 20 and 18.22 feddans respectively. It also noticed that the total labor mandays required for the basic solutions were 360 mandays and the actual mandays utilized in the Gezira scheme were 382mandays. In the basic solution, about 83.33% of available family labour was utilized in the Gezira scheme compared to 91.65% in the actual situation. 83.32% of the available hired labour was utilized in the Gezira scheme compared to 86.76% in the actual situation. Percentage of the hired labor out of the total labour in the basic solution was 61.74% as compared to 61.74% in the actual situation. About 83.33% of the total labour available was utilized in the basic solution compared to 88.42% in the actual situation. In the basic solution, about 60.09% of available water was utilized in the Gezira scheme compared to 58.9% in the actual situation. The monthly water required in the basic optimal plan model of the Gezira scheme in comparison with

the actual situation, October, November, and December months had no surplus of water. The comparison of the optimal and actual net farm income difference, the actual net return is about SDG 11735.86 while the optimal plan's returns are SDG18697.24 which more than actual one by 59.3%. The result of the basic model reveals was no cash problem except in March and April months. The results of scenarios examined the impact of productivities, prices, and cost of production on the crop mix and net farm income of the basic solutions.

a) Impact of crops productivities:

Increase of productivity of all crops by 25% in the basic model changed net farm income and crops mix, net farm income increased by 73.4%. Increase of productivity of cotton and dura crops by 25% in the basic model changed net farm income and crops mix, net farm income increased by 25.2%. Increase of productivity of chickpea crop by 50% in the basic model changed net farm income and crops mix, net farm income increased by 1.6%. By restricting dura area in the Gezira scheme model to 2 feddans in order to produce 12.5 sacks, which is equal to the amount consumed by family during the year, the net farm income decreased by 0.1%, and changed crops mix.

b) The impact of prices:

Increase price of cotton crop by 25% in the basic model did not change crops mix, it only increased the net farm income by 22.7%. Increase of price of chickpea crop by 50% in the basic model changed net farm income and crops mix, net farm income increased by 1.6%. Decrease of prices of cotton and onion crops by 25% in the basic model changed net farm income and crops mix, net farm income decreased by 64.8%. Decrease of prices of onion crop by 25% in the basic model changed net farm income and crops mix, net farm income decreased by 40.9%.

c) The impact of production cost

Lowering costs of all crops by 25% in the basic model changed net farm income and crops mix, net farm income increased by 34.5%. Lowering costs of cotton and wheat by 25% and 50% in the basic model did not change crops mix, it only increased the net farm income by 8.5% and 15.6%, respectively. The profitability analysis of crops, onion crop recorded the highest total costs and gross margin per feddan.

6.3 Conclusions

The study concluded that, most of the tenants of the Gezira scheme were within the active age group, have attained some sort education, and most of them are married and good experience in the agricultural work. The study concluded that farmers' socioeconomic characteristics were affected of technical efficiency of farmers in crops production, the study shows that the mean technical efficiencies of farmers in the Gezira scheme more than 60%, the most of crops output deviation among the farmers were caused by differences in farmers' level of technical efficiency as opposite to the conventional random variability. Also the result revealed that tenancy location, age, education years, sowing date, farm income, irrigation number, weeding number and total labour, for production crops were significant variables for improving technical efficiency, and the study showed that there late sowing data had bad effects on production level of sorghum, groundnut, and wheat crops, and good education level, large family size, and married farmers were a negative affected level of inefficiency. Also the result revealed that each crops had two peaks period of labour requirements, onion and cotton crops received higher labour compared to other crops. The results of LP models revealed that the net farm income in the optimal models was over the current situation by 59.3%, and

for the basic model has cash problem to meet harvesting operations only for March and April months. The study revealed that there optimal model and all scenarios wheat crop unprofitable did not enter the plan, also concluded that onion and cotton crops recorded the highest profitable crop in the Gezira scheme.

6.4 Recommendations

The main recommendation is improvement of the technical efficiency of crop production in the Gezira scheme. The specific recommendations can be stated as follows:

1. The peak period of labour could be solved by mechanization of agricultural operations.
2. Wheat should be excluded cultivated in the scheme.
3. Introduction of high yielding sorghum varieties the dedicated area to meet consumption needs of tenant family would definitely be less.
4. Adoption of the recommended improved technologies will increase farmers' income.
5. More coordination between Gezira Scheme management, Ministry of Irrigation and Water Resources, and Ministry of Agriculture and Forestry to solve the problems of irrigation by cleaning and maintaining water canals.
6. Gezira Scheme management should improve the extension services and supervision, and supply of credit, agricultural inputs should be at the right time with easy access for tenants.

REFERENCES

- Abbadi, Karrar A. B. and Ahmed, A. Elhag (2006) Brief Overview of Sudan. Economy and Future Prospects for Agricultural Development. Khartoum Food Aid Forum from 6-8 June 2006, Sudan.
- Abdalla, T.B. (2005). *The determinants of agricultural production and the optimum cropping pattern in the Northern state. Sudan.* Ph.D. Thesis. Faculty of Agriculture, University of Khartoum, Sudan
- Abdalla .A.A, Abdel Nour.H.O.(2001). The Agricultural Potential of Sudan Executive Intelligence Review, pp.37-45.
- Abdel-Aziz, H.H. (1999). *An Economic Analysis Of Small Private Farms In The River Nile State.* Ph.D. Thesis Faculty of agriculture university of Khartoum, Sudan.
- Adam, H.S. (2005). Agro climatology, Crop Water Requirement and Water Management. Water Management Irrigation Institute, University of Gezira, Wad Medani, Sudan.
- Adam, M. A. (1996). The policy Impacts on Farmers' Production and Resources Use in the Irrigation scheme of Gezira Sudan. Ph.D. Thesis, Germany.
- Ahmed, A. E. (1996). Productivity and Resources Allocation Efficiency of Major Field Crop in the Gezira Scheme, M.Sc Thesis, Faculty of Agriculture, University of Khartoum, Sudan.

- Ahmed, A.E. (2004). Economic Analysis of Irrigated Cotton Production Constraints in Sudan: Case study Gezira scheme. Ph.D. Thesis, University of Giessen, Germany.
- Ahmed S. A. (2000): A better utilization of land and water resources for the production of wheat in the Gezira Scheme, unpublished paper, the Hydraulic Research Station, Medani (in Arabic).
- Ahmed, A.E. (1997). Productivity Resource Allocation Efficiency of the Major Field Crops in the Gezira scheme. M.Sc. Thesis, Faculty of Agriculture, University of Khartoum, Sudan.
- Aigner, D., C. A. K. Lovell and P. Schmidt (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics* 6: 21-37.
- Babiker, O. M. (2006). The Economics of Agricultural Labour Markets in Sudan: A case Study of Gezira Scheme. Ph.D. Thesis, Faculty of Agriculture, University of Khartoum, Sudan.
- Battese, G.E. and Coelli,T.J. 1995), “Inefficiency Effects in a Stochastic Frontier production function for panel Data” *Empirical Econometrics*,20:325-332.
- Bank of Sudan (2006). Annual report. Khartoum, Sudan.
- Bank of Sudan (2008). Annual report. Khartoum, Sudan.
- Bank of Sudan (2012). Annual report. Khartoum, Sudan.
- Beneke, R. And R. Winterboer (1973). *Linear programming Application to Agriculture*. The Iowa State University Press, Ames

- Coelli, T.J. (1995), "Recent Development in Frontier Modeling and Efficiency Measurement" *Australian Journal of Agricultural Economics*, 39(3): 219-245.
- Dent, J.B., S.R. Harison and K.B. Woodford (1986). *Farm Planning with Linear Programming Concept and Practice*. Abb-typesetting Pty.Ltd. Collingwood. Victoria.
- Entesar, A.A (2006). Economic evaluation of Galla melon marketing for local consumption and export. M.sc Thesis, Department of Agricultural Economics, Faculty of Agriculture, University of Gezira, Sudan.
- Eldaw Ahmed Mohamed, (1998). *The Sudan Agricultural Policy, 1990– 1997*, Department of Agricultural Economics Faculty of Agriculture and Natural Resources University of Gezira.
- FAO, (2001) "FAOSTAT Database" Online in internet: <http://apps.fao.org/page/>.
- FAO, (2007) "FAOSTAT Database" Online in internet: <http://apps.fao.org/page/>.
- FAO, (2012): one line <http://www.fao.org/sudanfoodsecurity>.
- Gass, S.I., (1985). *Linear programming: method and applications*. Mc Graw-Hill: New York, U.S.A.
- Hazel, P.B.R. and R.D. Norton (1986). *Mathematical programming for Economic Analysis in Agriculture*. Macmillan Publishing Company New York, U.S.A.
- Heady, E.O and W. Canler (1973). *Linear Programming Methods*. The Iowa University Press, Ames, Iowa, U.S.A.

Heady E.O. and Jil. Dillon, (1969). *Agricultural Production Function*. Iowa, state University Press, Ames, Iowa, U.S.A .

<http://www.uq.edu.au/economics/cepa/frontier.htm>.

[http://www.uned.edu.au/staff/g Battese](http://www.uned.edu.au/staff/g_Battese)

[http://www.en.wikipedia.org/wiki/stochastic Frontier Analysis](http://www.en.wikipedia.org/wiki/stochastic_Frontier_Analysis).

<http://www.springerlink.com/index/h5x6j80852428mp1>.

<http://www.uq.edu.au/economics/cepa/frontier.htm>

[http://www.economicsentwork.ac.uk/copy right.html](http://www.economicsentwork.ac.uk/copy_right.html).

International Fund for Agricultural Development (IFAD), (2002). *Republic of the Sudan. Country strategic opportunities paper (COSOP)*. Rome.

Issam A.W. Mohamed (2011), *Assessment of the Role of Agriculture in Sudan Economy*, [http://mpa.ub.uni-muenchen.de/33119/MPRA Paper No. 33119](http://mpa.ub.uni-muenchen.de/33119/MPRA_Paper_No.33119), posted 2. September.

Khalid, Y. E. Ibrahim (2010). *Economic Efficiency Analysis. A Case Study of Crops Production in the Rahad Agricultural Corporation*. Ph.D. Thesis, Sudan University of Science & Technology, College of Graduate Studies.

Kourouma, A. (1982). *The Effects of Export and Food Crop Strategies on Farm Income and Food Self-Sufficiency in Eastern Senegal and Upper Casamance: A linear programming analysis*. M.Sc. Thesis. Michigan State University. U.S.A.

Kumbhaker, S. C. and Lovell C. A. K. (2000). *Stochastic Frontier Analysis*. Cambridge: Cambridge University Press.

- Lucks, J.S.(2003). Linear programming: formulation, computer solution, and interpretation. Edward's University 2003. On line in internet <http://www.business.gsw.edu/busa/faculty/jkooti/om/ppts/PPT08.ppt>, January 2004
- Mustafa, R.H. (2006), Risk Management in the Rain-fed Sector of Sudan: Case Study, Gedaref Area Eastern Sudan. Ph.D. Thesis, Justus- Liebing University, Giessen, Germany.
- Ministry of Finance and National Economics (MFNE), 2005), report.
- Mirghani, I.M., Adam, I.A., Elhaj, T.S. and Salih, M.M. (2002). Financial Report on the Assessment and Evaluation of credit and Marketing development in A/Hakam Block. Sudan Gezira Board, Planning and Socio-economic Research Administration, Sudan.
- Magar, W. Y. (1986): Farms in the Gezira, in: Zahlan, A.B. (ed.), The Agricultural Sector of Sudan: Policy and system Studies, London
- Malik, A.M. (1994). Analysis of Traditional Farming Systems. *A case Study from Jebel Marra Area, Darfur State, Sudan*. Ph.D. Thesis. Faculty of agriculture, university of Khartoum, Sudan.
- Mohamed, E.S. (1986). The Economics and Implications of the Land Water Charge System at the Farm level: case study Rahad Scheme. M.Sc. Thesis. Faculty of Agriculture, University of Khartoum, Sudan.
- Omara, S. (2002): The Gezira and Path of Development, Unpublished paper, Regional Ministry for Agriculture and Livestock Resources of the Gezira State (in Arabic).

- Rahman, K. M. M. (2002). Measuring Efficiency of Producing Rice in Bangladesh, A Stochastic Frontier Analysis, Department of Agricultural Economics and Social Sciences, Justus-Liebig University Giessen, German
- Sudan census committee. (2011). <http://www.sudantribune.com/spip.php>
- Sulieman. A.H. (2007). Impact of Crop Intensification Policy on the Irrigation Water Network in Gezira scheme, Sudan. Ph.D. Thesis Water Management and Irrigation Institute, University of Gezira , Wad Medani, Sudan.
- Siddig, R. A. (1999). The Economic of Crop Production Under The Different Land Tenure Systems in Merowe Province, M.Sc Thesis, Department of Rural Economy, Faculty of Agriculture, University of Khartoum, Sudan.
- Tutor2u. (2006). Economic Efficiency, on line the internet www.tutor2u.net/economics/content/topic/competition/efficiency.htm-19k.
- United Nations Development Programme Sudan, 2012(net).
- Upton, (1979). Agricultural production Economics and Resource use. Journal of Farm Management In Africa. Oxford University Pres.
- World Bank (1980): In El nour S.A. An Economic Evaluation of crop Combination in Rahed Scheme, M.Sc Thesis, Department of Rural Economy, Faculty of Agriculture, University of Khartoum, Sudan.
- World Bank (1990): Gezira Irrigated scheme in Sudan, objectives, Deign and Performance, World Bank, technical paper No. 120 Washington, D.C.
- World Bank (2000). Sudan Options for the Sustainable Development of the Gezira Scheme, Sector Report, No. 20398.SU.

World Bank (2000): Options for Sustainable Development of the Gezira Scheme, Washington. .

Yousif, A. H. (2001). Economics of Groundnut production in New Halfa Agricultural Production Corporation. M.Sc Thesis, Department of Rural Economy, Faculty of Agriculture, University of Khartoum, Sudan

Yousif, M. H. (2008). Economic and technical Efficiency of Wheat production in White Nile Pump Schemes. M.Sc Thesis, Department of Rural Economy, Faculty of Agriculture, University of Khartoum, Sudan

Appendixes

APPENDEIX (1)

In the Name of God, The merciful, The Compassionate

THE GEZIRA SCHEME ACT of 2005

Pursuant to the provisions of the Constitution of the Republic of the Sudan of 1998, the National Council hereby has adopted, and the President has signed the following Act:

Chapter One

Preliminary Provisions

Citation of the Act and Effective Date

1. This Act shall be cited as “The Gezira Scheme Act of 2005” and shall come into effect upon signature.

Rescission

2. (1) The Gezira Scheme Act of 1984 is hereby repealed but all bylaws, orders and regulations issued thereunder shall remain valid and applicable until repealed or amended in accordance with the provisions of this Act.
(2) The Gezira Land Act of 1927 is hereby repealed but all bylaws, orders and regulations issued thereunder shall remain in valid and applicable until repealed or amended in accordance with the provisions of this Act.

Interpretation

3. In this Act, unless the context may otherwise required, the following words and phrases shall have the meaning hereby assigned to them:

Government: Refers to the Federal Government.

Competent Minister: Refers to the Federal Minister of Agriculture and Forestry.

Scheme: Refers to the Gezira Scheme with its current command areas or any extension thereof.

Board: Refers to the Scheme’s Board of Directors established pursuant to Article (6) hereof.

General Manager: Refers to the Scheme’s General Manager who is appointed in accordance with Article (15) hereof.

Farmer: Refers to any individual hired a hawasha (lot) in accordance with Article (16) hereof.

Employee: refers to any individual hired within the Scheme’s job structure.

Fiscal Year: Refers to the period of twelve months commencing on July 1 of each year and ending on June 30 of the following year, or any date to be set by the Board of directors for the beginning and end of the fiscal year.

Field Canals: Refer to irrigation canals called secondary canals, “Abou Ishreenat” and “Abou Sittat” and to water regulators and controllers.

Irrigation Canals: refer to primary and secondary canals and to major canals and drainages, including regulators and pipes branching out to feed canals.

Water User Association: refers to farmers organizations undertaking actual tasks with regard to water management, operation and uses.

Chapter Two

Scheme’s Identity, Headquarter and Sponsorship

4. (1) The Gezira Scheme, which is an economic and social entity with various activities and enjoys national support as part of the development effort, shall be established pursuant to this Act. It shall be an administratively, financially and technically independent juridical person with a permanent, perpetual character and a public seal, it shall have the right to litigate in its own name.

(2) The State, as represented by the Ministry of Finance and National Economy, shall own the current assets of this Scheme, and may allow future participation of private sector investment, whether in current assets or through addition of new assets to the Scheme.

(3) The Gezira Scheme shall be composed of
 - A. Farmers.
 - B. The Government, as represented by its respective units providing basic services such as development, irrigation and public goods, including: research, plant protection, technology support, agricultural extension, technical studies, training as well as supervisory management and indicative planning.
 - C. Private sector with regard to provision of auxiliary commercial services.
- (4) The Scheme shall be headquartered in the City of Barakat. The Board of Directors may create branches and offices in or outside the Sudan whenever necessary.
- (5) The Scheme shall be under the aegis of the competent Minister.

Scheme’s Objectives

5. The Scheme aims to utilize its sustainable and stable agricultural production resources and potentials to improve the economic and social standards of farmers and its own employees as well as the area it is located in, and to improve respective services provision. It also aims to contribute to attainment of national objectives. Without prejudice to the foregoing, the Scheme shall aim to:
 - a. Achieve optimal and rational utilization of the Scheme’s resources and potential to increase income level, boost agricultural output and maximize benefits and returns.
 - b. Achieve the Scheme’s local and national objectives, such as food security, job creation, increase and diversified export, and introduction of manufacturing industries.
 - c. Achieve citizen’s well-being within the Scheme through economic development.

- d. Preserve the environment with the boundaries of the Scheme.
- e. Ensure farmers' right to freely manage their production and economic aspects within the technical parameters, and employ technology support to boost production and maximize their respective returns.
- f. Ensure farmers' right to effectively participate, at all administrative levels, in planning and implementation of projects and programs that affect their production and livelihoods.
- g. Ensure farmers' right to manage irrigation operations at field canal level through water user associations.
- h. Promote farmers' effective collective action to ensure efficient provision of services and economic production while maximizing economic of scale.
- i. Provide an opportunity to the private sector to play a leading role in provision of auxiliary commercial services in a competitive environment.
- j. Introduce irrigated forestry and livestock in agricultural cycle.
- k. Provide auxiliary services to the Scheme's activities by competent authorities.

Chapter Three

Board of Directors

Board Composition

6. (1) A Board of Directors shall be established by Decree of the President of the Republic, upon a recommendation by competent Minister, and shall be composed of a chairman and 14 members, as follows:
- a. A Board chairman appointed by the President.
 - b. The General Manager in ex officio capacity.
 - c. Farmers' Union representatives who shall form at least 40% of the Board membership.
 - d. A representative from the Scheme's employees.
 - e. Representative from the relevant Ministries.
- (2) The positions of Board chairman and General Manager shall not be held by one and the same person.

Conditions for Board membership

7. A member of the Board of Directors must be:
- a. A Sudanese citizen who is mentally competent.
 - b. A person who has not been convicted of a crime of moral turpitude or breach of honor.
 - c. A person who has not been declared bankrupt.
 - d. A literate person who meets all eligibility requirements.

Declaring Vacancy and Appointing a Replacement

8. (1) The Board position of any member shall become vacant for any of the following reasons:
- a. Loss of any of the conditions of membership stipulated in Article (7) of this Act.
 - b. Resignation.
 - c. Being relieved of duties or removed by the appointing authority.
 - d. Death of the incumbent.
 - e. Failure to attend three successive meeting without and acceptable justification.
- (2) In the event that a Board membership position has become vacant, a replacement shall be appointed following the same procedures applied in appointing the replaced member.

Board Functions and Power

9. The Board shall be entrusted with formulating plants and general policies for achieving the Scheme's objectives, without prejudice to the foregoing, the Board shall have the following functions and powers:
- a. Developing scientific parameters for research, economic and social studies required to ensure optimal utilization of the Scheme's resources to achieve the highest possible profit rates.
 - b. Developing equitable incentive policies in order to carry out the State's strategic policies with regard to agricultural produces.
 - c. Managing and developing basic services of research, plant protection, technology support, agricultural extensions, seeds multiplication, training and inner roads.
 - d. Establishing a burden-sharing [social safety] system allowing compensations for earnest farmers in the event of exposure to pests and natural catastrophes.
 - e. Establishing technical parameters for cropping patterns and agricultural cycle.
 - f. Approving plans and programs submitted by the General Manager.
 - g. Determining its charges categories of services performed in coordination and agreement with component authorities, and respective charges to be levied on farmers by water users associations.
 - h. Approving employment of workers whom the Board may deem necessary to carry out its functions in accordance with the job structure it approved, and issuing regulations governing their employment.
 - i. Approving annual draft budget for running the Scheme, as well as the development determine the required development support.
 - j. Ensuring optimal use of the Scheme's assets and moveable and immoveable property owned by the government, and investing the same economically.
 - k. Maintaining the Scheme's land and taking measures necessary to preserve the soil.
 - l. Providing information to help farmers market their produces.
 - m. Entering into contracts and agreements necessary to carry out the Scheme's objectives.
 - n. Carry out other actions as may be deemed necessary or supportive by the Board to realize the Scheme's objectives.
 - o. Forming permanent or temporary committees to assist the Board of Directors.
 - p. Delegating and y of its function or powers to the General Manager or any of its committees.
 - q. Issuing the necessary by-laws to regulate its activities.

Meeting of the Board

10. (1) The Board shall hold at least six meetings during a fiscal year. The Board Chairman may call an extraordinary meeting when necessary or at the written request of half of the Board members.
(2) The quorum for the Board meeting shall be met with the simple majority of the members.

- (3) Board resolutions shall be adopted by majority of votes of the members present, and the Board chairman shall have the casting vote in the event of a tie.
- (4) The Board chairman may ask any Board member to chair the meeting in his absence.
- (5) The Board may invite any person to attend the Board or committee meetings but the invitee shall not have the right to vote.
- (6) All Board procedures and discussions shall be confidential and no member shall disclose any information about them before they are made public in manner to be decided by the Board.

Disclosure of interest

- 11. Any member of the Board or affiliated committees who has a vested direct or indirect interest in any matter, proposal or topic submitted to the Board or any of its committees for discussion must disclose this interest to the Board or committee. He shall not participate in any discussion or resolution adopted by the Board or committee in this respect.

Remuneration of Board and committees

- 12. The Board shall determine the remuneration package of the Board chairman, members and affiliated committees in accordance with financial regulations.

General Secretarial

- 13. The Board shall have a general secretarial, headed by a Secretary appointed by the Board. The Board shall specify his terms of reference and duties.

General Manager

- 14. (1) The Board shall enter into a contract with a highly competent and experienced person to be the Scheme's General Manager.
(2) Said contract shall specify a renewable four-year-term as well as terms of employment and remuneration of the General Manager.

Powers and Duties of the General Manager

- 15. The General Manager shall be the most senior executive officer charges with implementation of the Board's policies, plans and programs. Without prejudice to the above, the General Manager shall oversee and have powers in respect of the following:
 - a. Provision of agricultural extension services to enable farmers to apply appropriate technology to increase production and productivity.

- b. Taking measures necessary to provide protective services for crops against pests and diseases.
- c. Taking measures necessary to provide seeds multiplication services.
- d. Carrying out the Scheme's sustainable economic development with regards to its services.
- e. Preparing the annual budget and submitting the same to the Board in a timely fashion before the commencement of the fiscal year.
- f. Preparing the Annual Report, listing what has been accomplished in the previous year and including performance indicators for the following year.
The Report shall be submitted to the Board of Directors at least one month before commencement of the new fiscal year.
- g. Monitoring the progress of work in the Scheme's facilities and submitting periodic report to the Board in a timely fashion.
- h. Submitting to the Board recommendations for the appointment and promotion of the Scheme's employees in accordance with the regulations issued by the Board.
- i. Disciplining of employees and transferring them in accordance with regulations issued by the Board.
- j. Ruling on grievances submitted by employees in accordance with applicable by-laws.
- k. The General Manager may delegate of his powers to any of his assistants.

Chapter Four

Ownership of Hawashas, Irrigation and Drainage

Ownership of Hawashas

16. (1) All hawashas allocated to the farmers in the Scheme prior to the issuance of this Act shall be considered as though they had been allocated pursuant to the provisions of this Act.
- (2) The government shall take the following necessary measures:
- a. Farmers, holding land in freehold, to whom hawashas are allocated under such ownership, shall be allowed to have such hawashas registered in their names as freehold in the Directorate of Land Registration.
 - b. Farmers who have not been allocated any hawashas during distribution and who have surplus land according to para (a), their land title shall be transferred to the Scheme and they shall be fairly compensated thereof.
 - c. The rest of the farmers who do not have freehold hawashas in the Scheme shall have hawashas they currently possess registered in their names as leasehold for a period on ninety nine years.
- (3) The new owners of the Hawashas shall pay charges to be determined by the Board in return for freehold title registration.

(4) The Board shall have the right to issue regulations governing optimal utilization of hawashas in accordance with public agricultural policies, as well as other regulations necessary for implementation of technical control for owners.

(5) Utilization of the Hawashas shall be governed by the following condition:

- a. Using Hawashas strictly for agricultural purposes.
- b. No fragmentation of landholding.
- c. Sale or transfer of ownership shall be governed by the right of acquisition by pre-emption.

Disposing of Hawashas

17. (1) Subject to para. (5) C of Article 16, a farmer may dispose of his hawasha by sale, mortgage or assignment in accordance with directions set by the Board.

(2) The Board shall have the right to determine the minimum size for ownership of hawasha.

Irrigation and Drainage

18. (1) The Ministry of Irrigation and Water Resources shall be responsible for operation and management of the primary irrigation and drainage canals and pumps in the Scheme, and for providing sufficient water for water user associations at the mouth of the respective field canals, and the Ministry of Finance and National Economy shall be responsible for financing maintenance, rehabilitation and operations of water canals in return for water charges to ensure provision of such services.

(2) Water user association shall maintain, operate and manage field canals and internal drainage.

(3) All irrigation operations for any part within the Scheme command area shall have to be approved by the Board.

Water User Association

19. (a) Water users association shall be established under supervision of the Board at the Scheme level. They shall be legal entities representing the farmers' self-management system. They shall also undertake actual responsibilities in managing water user through entering into a contract with the Ministry of Irrigation and Water Resources in the area of supply of water and technical consultation.

(b) The ministry of Irrigation and Water Resources shall establish a separate department for Gezira Scheme irrigation.

Chapter Five

Financial Provisions

Vesting of Assets and rights.

20. (1) To the Scheme shall be vested with:
- a. All assets and rights had been transferred to Gezira Scheme pursuant to Gezira Scheme Act 1984.
 - b. All debts and liabilities due from Gezira Scheme pursuant to Gezira Scheme act 1984.
- (2) a. The assets, rights, debts and liabilities that have been transferred to the Scheme shall be assessed pursuant to Item (1) above, and the net assessed value shall be entered in the records of the Scheme.
- b. The Board may take any measures necessary for privatization of the cost centers.

Capital of the Scheme

21. The capital of the Scheme shall consist of the following:
- a. Accruals to the Scheme pursuant to the provisions of Article (20) of this Act.
 - b. Allocations earmarked by the State for the scheme.
 - c. Funds and charges earned by the Scheme as a result of its activities or in return for services provided and privileges and exemptions granted to it.
 - d. Grants and technical assistance accepted by the Board of Directors.
 - e. Any other legitimate resources approved by the Board of Directors.

Utilization of Scheme Resources

22. The Scheme financial resources shall be used to achieve its objectives, without prejudice to the above, these financial resources shall be used as follows:
- a. Managing the Scheme and executing its activities, plans and programs,
 - b. Paying the Scheme's financial obligations.
 - c. Defraying the Scheme's expenses, including depreciation and replacement.
 - d. Paying employments' salaries, wages, bonuses, benefits and allowances and retirement benefits as well as remunerations to Board chairman and members.

Budget of the Scheme

23. (1) The Scheme shall have a separate operating budget prepared according to sound accounting principles issued by the Board of Directors.
- (2) The General Manager shall prepare the development and rehabilitation budget and forward the same to the Board of Directors for discussion ad approval. He shall then submit the same to the

Ministry of finance to attain respective support for the budget's various components, including irrigation, research and technology support under the mandate given to the Board of Directors.

(3) The Board of directors shall approve the draft annual budget.

(4) Surplus budget shall be used to develop and improve the Scheme.

Opening Bank Account and Maintaining Assets Records

24. a. The Board shall select the banks where the Scheme's bank account be opened in local and foreign currencies.

b. The General Manager shall determine the persons authorized to handle those accounts.

c. The Scheme shall maintain a regular record of fixed assets, which shall be audited annually.

Depreciation and Replacement Account

25. (1) The Scheme shall maintain a separate account for depreciation and replacement. It shall only be used for the purpose specified therein.

(2) The Board may write off the value of obsolescent assets by subtracting the items so designed from the depreciation and replacement account.

Accounts and Audit

26. (1) The Scheme shall maintain proper and accurate accounts in accordance with proper accounting principles.

(2) The Auditor General or any auditor (s) approved by the Auditor General shall audit the Scheme's accounts at the end of each fiscal year.

Balance Sheet and Statement

27. The General Manager shall submit to the Board within three months from the close of the fiscal year a final account statement and the auditor's report on the Scheme's account.

Chapter Six

Transitional Provisions

28. (1) The Scheme's workers shall continue to carry out their mission until the job structure is approved and the terms of their services and employment are determined.
- (2) The cost centers at the Scheme shall continue to operate until they are privatized.
- (3) Farmers shall continue to hold Hawashas in the Scheme when this Act is adopted until the provisions specified in Article (16) hereof are implemented.
- (4) Responsibilities for field canals shall be passed, after rehabilitation, to the water user associations.

Chapter Seven

Final Provisions

Primacy of the Provisions of this Act

29. In case of contradictions with any other law, the provisions of this Act shall prevail to the extent that such contradiction is removed.

Authority to Issue Regulations

30. The Board of Directors may issue necessary by-laws and regulations to implement the provisions of this Act.

IN WITNESS WHEREOF, the national Council has hereby passed "GEZIRA SCHEME ACT of 2005" in its meeting No. (18) of its 9th Jumada Al-Awal 1426 H. corresponding to June 22, 2005.

Ahmed Ibrahim El-Tahir

Speaker of the National Council

This Act was assented to by the President of the Republic on 6 July 2005.

APPENDEIX (2)

بسم الله الرحمن الرحيم

استمارة استبيان المزارعين لمشروع الجزيرة

هذه البيانات تستخدم فقط للبحث العلمى

القسم..... التفتيش..... القرية.....

1. الوضع الاجتماعى والاقتصادى:

الاسم..... العمر.....

1- مستوى التعليم أ / امى ب / خلوة ج / ابتدائى د / متوسطة هـ / ثانوى و / جامعى س / فوق الجامعى

2- الحالة الاجتماعية أ / متزوج ب / عازب ج / مطلق د / ارمل

3- عدد سنوات ممارسة مهنة الزراعة.....

4- موقع الحواشة من النمرة أ / اول النمرة ب / وسط النمرة ج / نهاية النمرة

5- المهنة و مستوى الدخل والمستخدم منة فى الزراعة بالجنية السودانى

المهنة الاساسية	المهنة الثانوية	الدخل السنوى من الزراعة	المستخدم منة فى الزراعة	الدخل السنوى من غير الزراعة	المستخدم منة فى الزراعة

6- هل تمتلك ثروة حيوانية أ / نعم ب / لا

اذا كانت الاجابة نعم وضح الاتى

الحيوان	ابقار	ضان	ماعز	دواجن	حمير	ابل
العدد						

7- الدخل الشهري من تربية الحيوان والمستخدم منة فى الزراعة.....

8 - هل تمتلك آلة زراعية أ/ نعم ب/ لا

إذا كانت الاجابة نعم وضح الاتى

نوع الآلة..... الدخل الشهري بالجنية المستخدم منة فى الزراعة.....

9- مصادر دخل اخرى (التحويلات من الخارج)

الدخل الشهري بالجنية المستخدم منة فى الزراعة.....

2. العمليات الزراعية :

أ- المساحة المزروعة

1- اجمالى المساحة المزروعة فى هذا الموسم بالفدان

2- ملكية الارض المزروعة 1/ ملك 2/ ايجار 3/ شراكة 4/ اخرى

3- مساحة المحاصيل المزروعة فى هذا الموسم

المحصول	المساحة /فدان	المساحة المحصودة /فدان	الانتاج /قنطار /جوال	الانتاجية/قنطار /جوال
القطن				
الفول السودانى				
الذرة				
القمح				
البصل				
الطماطم				

4- هل تقوم بكل العمليات الزراعية بنفسك أ/ نعم ب/ لا

5- عدد افراد الاسرة أ/ من 1-5 ب / 6- 10 ج/ اكثر من 10 افراد

6- عدد افراد الاسرة العاملين بالحواشة

ب/ العمالة المطلوبة :

1- القطن:

الشهر	عمالة اجرة			عمالة من الاسرة			البند
	اطفال	نساء	رجال	اطفال	نساء	رجال	العمليات الزراعية
							نظافة الارض
							الزراعة
							الرقاعة
							الشلخ
							رفع التكاند
							ازالة الحشائش 1
							ازالة الحشائش 2
							ازالة الحشائش 3
							الرى
							التسميد
							رش المبيدات
							الحصاد

2- الفول السوداني:

الشهر	عمالة اجرة			عمالة من الاسرة			البند
	اطفال	نساء	رجال	اطفال	نساء	رجال	العمليات الزراعية
							نظافة الارض
							الزراعة
							الرقاعة
							الشلخ
							رفع التكاند

							ازالة الحشائش 1
							ازالة الحشائش 2
							ازالة الحشائش 3
							الرى
							التسميد
							رش المبيدات
							الحصاد

3- الذرة:

الشهر	عماله اجرة			عماله من الاسرة			البند
	اطفال	نساء	رجال	اطفال	نساء	رجال	العمليات الزراعية
							نظافة الارض
							الزراعة
							الرقاعة
							الثلخ
							رفع التكاند
							ازالة الحشائش 1
							ازالة الحشائش 2
							ازالة الحشائش 3
							الرى
							التسميد
							رش المبيدات
							الحصاد

4- القمح:

الشهر	عمالة اجرة			عمالة من الاسرة			البند
	اطفال	نساء	رجال	اطفال	نساء	رجال	
							نظافة الارض
							الزراعة
							الرقاعة
							الشلخ
							رفع التكاند
							الرى
							التسميد
							رش المبيدات
							الحصاد

5- البصل:

الشهر	عمالة اجرة			عمالة من الاسرة			البند
	اطفال	نساء	رجال	اطفال	نساء	رجال	
							نظافة الارض
							الزراعة
							الرقاعة
							الشلخ
							رفع التكاند
							ازالة الحشائش 1
							ازالة الحشائش 2
							ازالة الحشائش 3
							الرى
							التسميد

							رش المبيدات
							الحصاد

6- الكبكي:

الشهر	عماله اجرة			عماله من الاسرة			البند
	اطفال	نساء	رجال	اطفال	نساء	رجال	العمليات الزراعية
							نظافة الارض
							الزراعة
							الرقاعة
							الثلخ
							رفع التكاند
							ازالة الحشائش 1
							ازالة الحشائش 2
							ازالة الحشائش 3
							الرى
							التسميد
							رش المبيدات
							الحصاد

5- هل العمالة متوفرة اثناء الموسم أ/ نعم ب/ لا

اذا كانت الاجابة (لا) ما هي الفترة التي يحدث فيها النقص او الندرة

المحصول	القطن	الفول السوداني	الذرة	القمح	البصل	الكبكي
الفترة						

6- تاريخ الزراعة -كمية التقاوى -تاريخ الحصاد / للقدان

المحصول	تاريخ الزراعة	كمية التقاوى	تاريخ الحصاد
القطن			
الفول السودانى			
الذرة			
القمح			
البصل			
الكبكي			

7- فى اثناء الموسم هل تتعرض مزرعتك الى الاصابة بالامراض والافات أ/ نعم ب/ لا

اذا كانت الاجابة (نعم) وضح الاتى

المحصول	نوع المرض او الافة	فترة الظهور	المساحة المصابة
القطن			
الفول السودانى			
الذرة			
القمح			
البصل			
الكبكي			

3- مصادر التمويل

1- ما هى مصادر التمويل للزراعة أ/ بيع المحصول سابق ب/ بيع حيوان ج/ اقتراض د/ اخرى

فى حالة الاقتراض وضح الاتى :

المصدر	المبلغ (جنية)	صيغة التمويل	سعر الفائدة	المحصول	تاريخ الاستلام	تاريخ الاسترداد

2 - هل تقوم ادارة المشروع بتمويل نقدى او عينى أ/ نعم ب/ لا

ما هى المحاصيل الذى يمولها المشروع

3- هل تقدم ادرة المشروع التمويل فى الوقت المناسب للعمليات الزراعية أ/ نعم ب/ لا

4- هل التمويل المقدم من الادارة كافى للعمليات الزراعية أ/ نعم ب/ لا

4- تكاليف الانتاج (جنية/للفدان)

المحصول البنند	القطن	القول السودانى	الذرة	القمح	البصل	الكبكي
أتحضير الارض						
الحرثة الاولى						
الحرثة الثانية						
التسطيح						
عمل الجداول						
ب-العملياتالزراعية						
الزراعة						
الرقاعة						
الشلخ						
ازالة الحشائش						
رفع التكاند						
التسريب						
الرى						
التسميد						
المبيدات						
ج- عمليات الحصاد						
عملية اللقيط						
القطع والجمع						

						قطع وجمع الفول
						حصاد القمح
						الدرس (الدق)
						الترحيل
						د- مدخلات الانتاج
						البذور
						التسميد
						المبيدات
						الخيش
						اجرة رى والارض
						اخرى
						اجمالى التكاليف

5- الانتاج والاستهلاك و العائدات :

المحصول	المساحة (فدان)	الانتاجية قنطار/جوال	الانتاج قنطار/جوال	استهلاك الاسرة فى السنة	المباع قنطار/جوال	سعر الوحدة بالجنية	العائد بالجنية
القطن							
فول السودانى							
الذرة							
القمح							
البصل							
الكبكي							

المتبقى من مخلفات المحصول بعد الحصاد	العائد للفدان بالجنية
قصب الذرة	
تبين الفول	

6- الري

عدد العزقات	الريات المتأخرة	عدد الريات	المحصول
			القطن
			الفول السوداني
			الذرة
			القمح
			البصل
			الكبيبي

ما هي اسباب تاخر الريات أ/ مشاكل قنوات الري ب/ عدم توفر الماء ج/ موقع الحواشة د/ اخرى ...

7- الخدمات الإرشادية :

1- هل تجد خدمات رشادية من ادارة المشروع أ/ نعم ب/ لا

2- وضح نوع الخدمات والمرحلة التي تتلقاه فيها اثناء الموسم

.....

2- عدد زيارات المفتش للحقل في الموسم

.....

4- أذا جعل لك الاختيار في وضع الدورة الزراعية ماذا تفضل من المحاصيل زراعية

.....

5- واجهتك مشاكل زراعية في هذا الموسم أ/ نعم ب/ لا

إذا كانت الإجابة نعم وضح الآتي

المشكلة	المحصول	طبيعة المشكلة	المقترحات و الحلول
تحضير الارض			
العمليات الزراعية			
مدخلات الانتاج			
الرى			
الافات و الامراض			
الحصاد			
التمويل			
التسويق			
الاسعار			