

## **An Integrated Value-Based Framework for Modeling Strategic Decision Analysis and Planning in Public Agricultural Corporations in Sudan: The case of the Gezira Scheme.**

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### **Abstract**

Towards addressing the complexity of the problems facing Public Agricultural Corporations (PACs) in Sudan, this paper highlights the need to adopt a value-based approach to strategic planning. Directing attention to strategic decision analysis and planning system (SDAPS) in PACs will assist in halting, repairing, and preventing the current deterioration. The framework detailed in this paper enables efficient and effective utilization of the capital input and available resources toward meeting stakeholders' expectations and the PACs' objectives, nicely illustrating a quintessential "win-win" scenario. Additionally, this framework can serve as a comprehensive and straight forward path for the implementation of strategic decision making and planning in similar large organizations in other sectors.

**Key words:** strategic decision-making, stakeholders, value chain, public agricultural corporations (PACs), Gezira Scheme.

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## I. Introduction:

In the real world, especially in the agricultural sector, the decision-making process is generally complex and requires weighing multiple criteria related to the physical, environmental, socio-cultural, and economic issues involved. These are multi-criterion (or multi-objectives) decision problems for which one single solution is not readily available, usually due to the trade-offs between conflicting quantitative and qualitative objectives. In addition, in the agricultural sector, the decision-making process and its outcomes are affected by the input and perceptions of the different parties involved. Here the value is created by the value chains and value networks, which leads to multiple stakeholders and the multi-decision makers' problem of ensuring fair distribution of the resulting reward.

Therefore, a key aspect of supporting strategic decisions using value-based thinking is the structuring of the strategic objectives, Keeney, R. L. 1992. There are several tools that can be used to structure objectives and value trees (chains and networks). This approach provides better and more balanced strategic options that meet the needs of the various stakeholders fairly (Keeney and Raiffa 1976, Winn and Keller 1999).

Thus, this paper formulates and develops an integrated value –based framework and straight forward path for the implementation of strategic decision making and planning in PACs in Sudan and in similar large organizations in other sectors.

This paper is outlined as follows. Section II states the research problem. Section III illustrates the importance of the research problem. Hence, determine the contribution of this study. Section IV states the objectives of the study. Section V provides review for the relevant literature. Section VI discusses the research methodology. Section VII defines and operationalizes the main components of the framework. In addition, this section details the basis of the proposed framework and examines its foundations, usefulness and applicability in the Gezira Scheme. Section VIII discusses and summarizes the findings. Finally, section IX concludes the paper.

## 2. Research problem:

Figure 1 shows the strategic objectives of the Gezira as stated by the 2014 Act. These objectives are largely shared by other PACs in Sudan. This figure relays the diversity of the stakeholders in PACs and the variety of objectives pursued by PACs. The main categories of stakeholders include tenants, federal ministries, the private sector (e.g. input, service and fund providers, and investors), trade unions, employees, consumers, universities and research institutions, and non-government organizations (NGOs). Each group has their own stakes, desires, and expectations (i.e. values to be delivered), which need to be met by PACs. Broadly, the objectives cover national, regional, local, and individual interests. From another perspective, these objectives can be classified as economic, social, financial, food security, employment and environmental objectives. Some of the objectives are conflicting (e.g. social vs. financial and economic vs. financial). Due to the multitude of stakeholders, conflict and misalignment between their interests is likely to happen (Zoponidis and Pardolos 2010, Dyper and Larson 1984, Feng, Keller, Zheng 2011, and George and Keeny 1994). This situation harms and hinders the strategic decision process and, in turn, negatively affects the performance and the roles that are supposed to be filled by PACs. Therefore, PACs are deteriorating and even collapsing. For example, the Gezira Scheme reduced its staff considerably from around

7000 employees in 2000 to only 400 by 2013, Salman 2013. Cotton production in PACs and the value of cotton exports had declined, which used to provide about half of the total export earnings

### 3. Importance of the research problem:

In Sudan, between 60% and 80% of the population engage in subsistence agriculture. Agriculture remains a crucial sector in the Sudanese economy as a major source of raw materials, food, and foreign exchange. It also employs a majority of the labor force and serves as a potential vehicle for diversifying the economy.

PACs are a part of the irrigated sector that covers about 1.8 million hectares and includes the Gezira, Rahad, New Halfa, Elssuki, White Nile and Blue Nile schemes. Main crops produced by PACs are cotton, groundnuts, wheat, sorghum, and vegetables. Thus, the relevance of the agricultural sector to the economic recovery and consolidation of long-lasting peace in Sudan cannot be overstated. At the same time, a new phenomenon of large-scale agricultural land acquisition is now taking place. Many countries, such as China, Saudi Arabia, and some Gulf countries have invested interest in Sudan's agricultural lands.

The Gezira Scheme (Gezira) is the oldest and the largest – in terms of area – irrigated scheme in the history of Sudan and represents its most important development project to date. This scheme also used to be the biggest irrigation system under one administration (Sudan Gezira Board) in the world, Bernal 1997. The Gezira's objectives, regulations, rules, policies, and procedures are regarded as models adopted by other PACs in Sudan.

Institutional reforms for PACs have always been controversial. The challenges to reform are compounded by the huge size of PACs in general and Gezira in particular. Each aspect of the reform, whether it deals with water management, land ownership, freedom of crop choice, the role of PACs top management or that of the private sector, is, for different reasons controversial. The interests and positions of the many stakeholders in PACs vary greatly, World, Bank 2010 and Al-Naiem, 2009.

SN	Gezira Scheme's strategic objectives per the 2014 Act
1	Achieve optimal and rational utilization of the Scheme's resources
2	Increase income level
3	Boost agricultural output
4	Maximize benefits and returns
5	Achieve food security
6	Create jobs
7	Increase and diversify exports
8	Introduce manufacturing industries
9	Achieve citizen's well-being within the Scheme through economic development
10	Preserve the environment within the boundaries of the Scheme
11	Ensure farmers' right to manage their production and economic aspects within the technical parameters
12	Employ technology support to boost production and maximize their respective returns

13	Ensure farmers' right to manage irrigation operations at field canal level through Village Councils
14	Promote farmers' effective collective action to ensure efficient provision of services and economic production while maximizing economies of scale
15	Provide an opportunity to the private sector to play a leading role in the provision of auxiliary commercial services in a competitive environment
16	Introduce irrigated forestry and livestock into the agricultural cycle

**Figure 1: The Gezira Scheme's strategic objectives.**

**Source: Gezira Scheme Act 2014.**

However, the basic resources in PACs (i.e. land, water, climate, human, and knowledge) are largely available but in need of qualified management to utilize them efficiently and effectively; this are required to meet the expectations and desires of the Scheme's many stakeholders. Very few studies are devoted to tackling the managerial issues facing PACs (for examples see Abdalla 1992, 1998 and 1999). Most studies focus on the technical and legal issues. Therefore, this study will focus on the strategic planning issues facing PACs towards providing a platform for the coming reforms that aim to rescue PACs by hindering the deterioration and collapse currently taking place. The framework presented here represents a model can be applied to rescue other sectors in Sudan.

#### **4. Objectives of the Study:**

This paper is seeking to:

1. Develop an integrated value-based framework for modeling the strategic decision-making process to enhance the efficacy of strategic decision analysis and planning system (SDAPS) in PACs in Sudan.
2. Examine the foundations of the SDAPS and its usefulness and applicability in reference to the Gezira Scheme.

#### **5. Methodology:**

The study aims at developing a framework for effective SDAPS in PACS in Sudan and examines its usefulness and applicability. Therefore, the study seeks a practical managerial solution towards providing a platform for the coming reforms that aim to rescue PACs. To that end, it is deemed suitable to approach the study through the pragmatic lenses of "what works" in finding appropriate solution to the research problem. The author background, knowledge and experience about the PACs played significant role in the study.

To cope with the complexity of the research problem and to ensure triangulation, a combination of methods and techniques for data collection, analysis and results presentation were applied. The data was gathered from primary and secondary sources. Unstructured interviews were conducted with key and informed persons during the framework developing phase. Questionnaire techniques were used to determine the expectations and desires of the tenants (key stakeholder) in Gezira and their priorities and ranking regarding the cultivation of the different crops.

The applicability and usefulness of the proposed framework was examined through a case study and contents analysis approach (i.e. in Gezira Scheme). The time devoted to this study was very long (started in 2015). This fact made possible applying both inductive “bottom up” and deductive “top-down” reasoning processes during the framework development and its examination phases.

At the beginning of the research, inductive reasoning, which is open – ended, is applied to explore the appropriate solution to the research problem that “what works”. Inductive research involves the search in the literature for theories, models and concepts to help in developing the framework. The author learning from experience with PACs supports the application of the inductive reasoning in order to reach conclusions (or to generate theory).

Deductive reasoning, which is narrower in nature, is applied when testing the usefulness and applicability of the proposed framework with reference to one case (i.e. Gezira Scheme).

## 6. Literature review:

The literature review focus on studying the models, methods, concepts and theories related to the subjects of strategic decision analysis and planning.

### 6.1 Strategic planning:

Business dictionary defined Strategic Planning as “A systematic process of envisioning a desired future, and translating this vision into broadly defined goals or objectives and a sequence of steps to achieve them”. strategic planning begins with the desired-end and works backward to the current status. In contrast to tactical planning (which focuses at achieving narrowly defined interim objectives with predetermined means), strategic planning looks at the wider picture and is flexible in choice of its means. Here are the main steps for strategic planning:

- Analysis of the current state.
- Defining the future state.
- Determination of objectives and strategies.
- Implementation and evaluation.

### 6.2 Strategic planning models:

A model is a representation of a system that allows for investigation of the properties of the system and, in some cases, prediction of future outcomes. Models are often used in quantitative analysis and technical analysis, and sometimes also used in fundamental analysis.

The literature includes number of strategic planning models. Most of the models were built around a number of processes developed to carry out the above mentioned four steps of strategic planning and they vary with regard to emphasis. Some emphasize the internal environment (e.g. Issues-Based and alignment and inspirational models) while others concentrate on both internal and external environment (e.g. the conventional and BSC models). Figure 2 summarizes the main strategic planning models and frameworks reviewed.

SN	Strategic Planning Models	
	Model	Attributes
1	Conventional Strategic Planning	<p>This is the most common model of strategic planning, although it is not suited for every organization. It is ideal for organizations that have sufficient resources to pursue very ambitious visions and goals, have external environments that are relatively stable, and do not have a large number of current issues to address. The model usually includes the following overall phases:</p> <ol style="list-style-type: none"> <li>1. Develop or update the mission and optionally, vision and/or values statements.</li> <li>2. Take a wide look around the outside and a good look inside the organization, and perhaps update the statements as a result.</li> <li>3. As a result of this examination, select the multi-year strategies and/or goals to achieve the vision.</li> <li>4. Then develop action plans that specify who is going to do what and by when to achieve each goal.</li> <li>5. Identify associated plans, for example, staffing, facilities, marketing and financial plans.</li> <li>6. Organize items 1-3 into a Strategic Plan and items 4-6 into a separate one-year Operational Plan.</li> </ol>
2	Issues-Based Strategic Planning	<p>This model works best for organizations that have very limited resources, several current and major issues to address, little success with achieving ambitious goals, and/or very little buy-in to strategic planning. Using the conventional model of strategic planning for these organizations is a bit like focusing on the vision of running a marathon and on deciding the detailed route and milestones -- while concurrently having heart problems, bad feet and no running clothes.</p> <p>This model might include the following phases:</p> <ol style="list-style-type: none"> <li>1. Identify 5-7 of the most important current issues facing the organization now.</li> <li>2. Suggest action plans to address each issue over the next 6-12 months.</li> <li>3. Include that information in a Strategic Plan.</li> </ol>
3	Organic Strategic Planning	<p>The organic model is based on the premise that the long-term vision is best achieved by everyone working together toward the vision, but with each person regularly doing whatever actions that he or she regularly decides to do toward that vision. The model might include the following phases:</p> <ol style="list-style-type: none"> <li>1. With as many people as can be gathered, for example, from the community or generation, articulate the long-term vision and perhaps values to work toward the vision.</li> <li>2. Each person leaves that visioning, having selected at least one realistic action that he or she will take toward the vision before the group meets again, for example, in a month or two.</li> <li>3. People meet regularly to report the actions that they took and what they learned from them. The vision might be further clarified during these meetings.</li> </ol>

Follow figure 2

4	Balanced Score card	<p>The BSC suggests that we view the organization from four perspectives, and to develop objectives, measures (KPIs), targets, and initiatives (actions) relative to each of these points of view:</p> <p>Financial: often renamed Stewardship or other more appropriate name in the public sector, this perspective views organizational financial performance and the use of financial resources</p> <p>Customer/Stakeholder: this perspective views organizational performance from the point of view the customer or other key stakeholders that the organization is designed to serve</p> <p>Internal Process: views organizational performance through the lenses of the quality and efficiency related to our product or services or other key business processes</p> <p>Organizational Capacity (originally called Learning and Growth): views organizational performance through the lenses of human capital, infrastructure, technology, culture and other capacities that are key to breakthrough performance. <a href="https://www.balancedscorecard.org/BSC-Basics/Strategic-Planning-Basics">https://www.balancedscorecard.org/BSC-Basics/Strategic-Planning-Basics</a></p>
5	Alignment Model of Strategic Planning	<p>The primary purpose of this model is to ensure strong alignment of the organization's internal operations with achieving an overall goal, for example, to increase productivity or profitability, or to successfully integrate a new cross-functional system, such as a new computer system. Overall phases in this model might include:</p> <ol style="list-style-type: none"> <li>1. Establish the overall goal for the alignment.</li> <li>2. Analyze which internal operations are most directly aligned with achieving that goal, and which are not.</li> <li>3. Establish goals to more effectively align operations to achieving the overall goal. Methods to achieving the goals might include organizational performance management models, for example, Business Process Re-engineering or models of quality management, such as the TQM or ISO models.</li> <li>4. Include that information in the Strategic Plan.</li> </ol>
6	Inspirational Model of Strategic Planning	<p>This model is sometimes used when planners see themselves as having very little time available for planning and/or there is high priority on rather quickly producing a Strategic Plan document. Overall phases in this model might include:</p> <ol style="list-style-type: none"> <li>1. Attempt to gather Board members and key employees together for planning.</li> <li>2. Begin by fantasizing a highly inspirational vision for the organization -- or by giving extended attention to wording in the mission statement, especially to include powerful and poignant wording.</li> <li>3. Then brainstorm exciting, far-reaching goals to even more effectively serve customers and clients.</li> </ol>

Figure 2: Strategic planning models. Source: Authors' own elaboration

### 6.3 Strategic analysis methods:

Figure 3 summarizes the main strategic analysis methods and tools used in conjunction with the strategic planning models discussed above. There are many definitions of strategic analysis, for example, strategic analysis is: 'The process of conducting research on the business environment within which an organization operates and on the organization itself, in order to formulate strategy (BNET Business Dictionary). Worrall, 1998 defined strategic analysis as "A theoretically informed understanding of the environment in which an organization is operating, together with an understanding of the organization's interaction with its environment in order to improve organizational efficiency and effectiveness by increasing the organization's capacity to deploy and redeploy its resources intelligently.

Definitions of strategic analysis often differ, but the following attributes are commonly associated with it:

- Identification and evaluation of data relevant to strategy formulation.
- Definition of the external and internal environment to be analyzed.

By carrying out a detailed analysis of existing methods and tools of strategic analysis, Rudnicki (2014) summarizing the work of Downey (2012), Hirsh (2014) and Sharrieff (2012) and suggested classification to strategic methods and tools, (Figure 3)

S N	Strategic decision analysis methods and tools					
	Internal environment	Main attributes	References	Internal and external environment	Main attributes	References
1	New BCG matrix	used to characterize the products (services), which the enterprise provides. In this model, two factors are interacted: number of competitive advantages of products (services) and the importance of competitive advantages in general.	<a href="https://www.businessnewsdaily.com/5693-bcg-matrix.html">https://www.businessnewsdaily.com/5693-bcg-matrix.html</a>	Abell model	The Abell model is a three-dimensional model for defining the business of the company and finding areas for growth and diversification along its axis.	<a href="https://www.intemarketing.org/marketing-information/marketing-models/abell-business-definition-model">https://www.intemarketing.org/marketing-information/marketing-models/abell-business-definition-model</a>
2	GE/McKinsey matrix	The GE/ McKinsey matrix is similar to the BCG growth-share matrix in that it maps strategic business units on a grid of the industry and the SBU's position in the industry. The GE matrix, however, attempts to improve upon the BCG matrix in the following two ways: – The GE matrix generalizes the axes as 'Industry Attractiveness' and 'Business Unit Strength'. The GE matrix has nine cells vs four cells in the BCG matrix.	<a href="http://www.quickmba.com/strategy/matrix/ge-mckinsey/">http://www.quickmba.com/strategy/matrix/ge-mckinsey/</a>	SWOT analysis	is one of the most famous methods of strategic analysis, which is being made in view of factors of both external and internal environment, which in turn makes it possible to evaluate existing opportunities and potential threats, strength and weaknesses of the company, to develop a strategy for the further development.	<a href="https://www.managementstudyguide.com/swot-analysis.htm">https://www.managementstudyguide.com/swot-analysis.htm</a>

Follow figure 3

3	Thompson and Strickland method	foresees the choice of alternatives of corporate level depending on two parameters: rates of market growth (rapid or slow) and competitive position of enterprise (strong or weak). Possible strategic alternatives in the fields of the matrix are placed in order to reduce their attractiveness.	<a href="http://higherstudy.org/thompson-and-strickland-strategic-management-model/">http://higherstudy.org/thompson-and-strickland-strategic-management-model/</a>	Shell/DPM model	Fundamental idea of Shell/DPM model is that the overall enterprise strategy should ensure the maintenance of balance between the cash surplus and the deficit through the development of new promising businesses based on the latest scientific and technological developments that will absorb excess of money supply, which are in the maturity phase of the life cycle	<a href="http://www.marketingteacher.com/shell-directional-policy-matrix/">http://www.marketingteacher.com/shell-directional-policy-matrix/</a>
4	7S' McKinsey	is a way of understanding the major internal factors, influencing its present situation and future development? A conceptual diagram of this model includes seven factors for success of business entities: strategy, skills, generally accepted values (shared values), structure, system, staff, cultural identity (style).	<a href="https://www.indtools.com/pages/article/newSTR_91.htm">https://www.indtools.com/pages/article/newSTR_91.htm</a>	PIMS model	(Profit Impact of Market Strategy)—method of analyzing the impact of market strategy on profit. This model provides determination of quantitative patterns of factors influence on outcomes of business entities (profitability, profits) arising from the analysis of empirical experience of the potential operation of a large number of industrial enterprises	<a href="https://www.encyclopedia/profit-impact-of-market-strategies-pims.html">https://www.encyclopedia/profit-impact-of-market-strategies-pims.html</a>

Follow figure 3

5	ADL/LC matrix	developed by Arthur D. Little. The concept of the life cycle of the field consistently passes four stages: nucleation, growth (or development), maturity, aging (decline). The main theoretical provision of ADL/ LC model is that a separate kind of business and any business entity may be located on one of these life cycle, and therefore it is necessary to analyze it within that stage.	<a href="https://www.toolshero.com/strategy/adl-matrix/">https://www.toolshero.com/strategy/adl-matrix/</a>	SPASE analysis	Strategic Position and Action Evaluation); SPASE method (evaluation of strategic assessment of actions) is a comprehensive method for analysis of the position in the market and choosing the optimal strategy for medium and small enterprises. The analysis assesses the internal and external environment and allows to design an appropriate strategy.	<a href="https://managementmania.com/en/spase-analysis">https://managementmania.com/en/spase-analysis</a>
6	Hofer/Schendel model	is concentrated on the positioning of existing businesses in the matrix of the goods development and determination of ideal set development. It should be noted that there are only two optimal sets of business: buying a new or sale of the old type of business, however, the situation of each business is determined according	<a href="http://kullzick.com/stu/Hoferdef.htm">http://kullzick.com/stu/Hoferdef.htm</a>	Seiners matrix	includes: classification of markets and products on existing markets, new products, but they are related to existing markets. This model is used to determine the probability of success in choosing one or another type of business and for choosing between different types of businesses.	<a href="http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element/de-sklight-1f3e5d27-3aa2-4367-90f4-4e04c765b2ee/c/Methods_of_">http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element/de-sklight-1f3e5d27-3aa2-4367-90f4-4e04c765b2ee/c/Methods_of_</a>

		to the degree of market development and its performance according to competitors.				strategic_analy sis_and.pdf
	Internal environment	Main attributes		Internal and external environment	Main attributes	

Follow figure 3

7	PEST analysis	is a description of factors of four groups: social, technological, economic and political? Some authors often add: ecology (E), legislation (L), demographics (D) to the above mentioned four factors. STEP, SLEPTE, STEEPLD-analysis	<a href="https://www.mindtools.com/page/article/newTMC_09.htm">https://www.mindtools.com/page/article/newTMC_09.htm</a>	Ansoff's product/market growth matrix	marketing planning tool that helps a business determine its product and market growth strategy. Ansoff's product/market growth matrix suggests that a business' attempts to grow depending on whether it markets new or existing products in new or existing markets.	<a href="http://www.ansoffmatrix.com/">http://www.ansoffmatrix.com/</a>
8	Stakeholders analysis	There are three steps to follow in Stakeholder Analysis. First, identify who your stakeholders are. Next, work out their power, influence and interest, so that you know who you should focus on. Finally, develop a good understanding of the most important stakeholders, so that you know how they are likely to respond, and how you can win their support.	<a href="https://www.mindtools.com/page/article/newPPM_07.htm">https://www.mindtools.com/page/article/newPPM_07.htm</a>	Cooper portfolio matrix	defines the criteria for selection of the enterprise strategy:	<a href="http://ccooper-portfolio.wiki.westga.edu/home">http://ccooper-portfolio.wiki.westga.edu/home</a>
9	value chain analysis	Value chain analysis (VCA) is a process where a firm identifies its primary and support activities that add value to its final product and then analyze these activities to reduce costs or increase differentiation.	<a href="https://www.strategicmanagementinsight.com/tools/value-chain-analysis.html">https://www.strategicmanagementinsight.com/tools/value-chain-analysis.html</a>	Model of 5 competitive forces by Porter'	identify the contribution of the enterprise at the market and the level of profits Porter identified five competitive forces: new competitors who get into the industry and produce similar goods, existing competitors in the industry.	<a href="https://www.businessnewsdaily.com/5446-porters-five-forces.html">https://www.businessnewsdaily.com/5446-porters-five-forces.html</a>

**figure 3: Strategic decision analysis methods and tools Source: Authors' own elaboration**

Most of these models were developed in the context of private business organizations operating in advanced economies and each model or framework emphasizes a single perspective and ignores others. In these organizations, the objectives, stakeholders, stakeholders' expectations, and needs and the related value chains are assumed to be easily defined and determined with known characteristics and stable technology.

As a consequence, researchers accepted the settings as given and attempted to derive optimal models and processes for strategic decision analysis and planning. These assumptions simplified the strategic decision process and, in turn, resulted in overlooking very basic strategic planning processes (e.g. analysis of organizations' strategic objectives, stakeholders, value chain, and collaborations). In regards to PACs in developing countries, these assumptions are not applicable due to the multiplicity of sometimes conflicting and misaligned objectives.

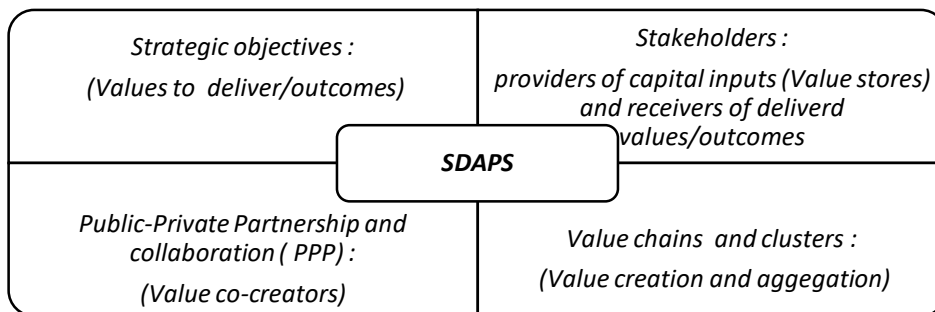
Most of the public enterprises and corporations in the developing countries are established mainly towards achieving national goals (e.g. economic growth, food security). The internal activity of PACs

is not necessarily in agreement with goals of the national policies. Additionally, other parties involved in PACs may pursue different goals. Some parties are striving to maximize their return rather than just maximizing production. These differences in priorities (i.e. values pursued) will negatively affect the performance of these corporations if not carefully catered to through appropriate strategic decision analysis and planning systems, Abdalla 1999.

Therefore, an approach that includes SDAPS that takes into account all of the factors contribute to creating value within the corporation is needed. Value-focused thinking encourages behavior that resolves conflict between the different parties involved in a corporation in a win-win fashion. Ultimately, congruency between the goals and risks of the different stakeholders will be reinforced by the positive results of the corporation's performance, Abdalla 1999. To that end, the next section presents and discuss the proposed framework for developing SDAPSs in PACs. Simultaneously and while building up the framework, an attempts was made to examines the usefulness and applicability of the framework with reference to Gezira Scheme.

## 7. The Framework for Developing SDAPSs in PACs:

Recognizing the complexity of the situation in PACs in Sudan, we argue that to approach the strategic planning in these corporation one should have a complex framework. To that end, this section is devoted to developing a value-based framework for the SDAPS in PACs in Sudan. The proposed framework benefited from the existing strategic planning models and strategic decision analysis tools by integrating many of them and put them into a value driven perspective. The proposed framework consists of five main interrelated and interconnected components, pillars, or phases (Figure 4). During the development of the framework, reference is made, when appropriate, to the Gezira Scheme to examine the foundations of the proposed framework and its usefulness and applicability in the real setting (i.e. in Gezira).



**Figure 4: The conceptual framework for developing an SDAPS in PACs in Sudan**

Source: Authors' own elaboration.

### Phase 1: Determining and analyzing organizational strategic objectives:

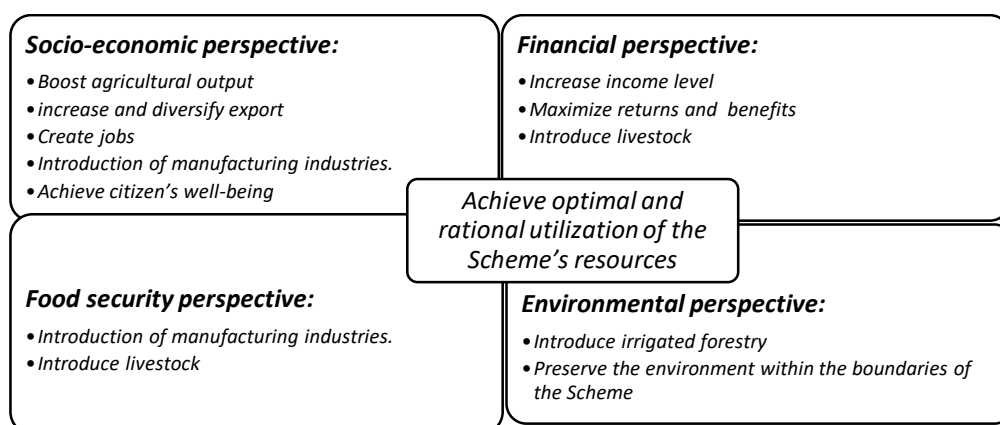
This is the first phase of developing the framework and involves identifying and shaping the overall goal, purpose, and mission of a business by its owners and management, which must be clearly communicated to the stakeholders.

Perhaps the most familiar use of decision analysis among most operations researchers is using the decision tree. The tree technique assumes that the objectives placed higher in the tree are less variable over time and more shared by a larger proportion of the interest groups. The construction of an

objective tree starts with identifying the organization's strategic objective and/or mission. Followed by determining the main objectives, sub-objectives, and the focus (key success) areas, Feng. T, Keller. L.R. Zheng .X, 2011.

Figure 1 shows Gezira's strategic objectives as stated in the Gezira 2014 Act. The primary strategic objective to “**achieve optimal and rational utilization of the Scheme's resources**” could be regarded as the main strategic and long-term objective (i.e. at the top of the objective tree) to be pursued by Gezira's management to ensure the growth and sustainability of the Scheme. All other strategic objectives should be treated as main objectives below and in support of the main strategic objective.

The matrix in Figure 5 is a schematic of Gezira's main strategic objectives distributed into socio-economic, financial, food security, and environmental categories with the primary objective to “**achieve optimal and rational utilization of the Scheme's resources**” occupying the central position. Objectives 11, 12, 13 and 14 basically intended to foster achieving the strategic objectives (2), (3) and (4) which state “**Increase income level**”, “**Boost agricultural output**” and “**Maximize benefits and returns**”, respectively. Thus, we can argue, that these objectives can't be placed in the same level with strategic objectives (2), (3) and (4) in the objective tree. Therefore, it will be wise to deal with these objectives as sub or operational objectives.



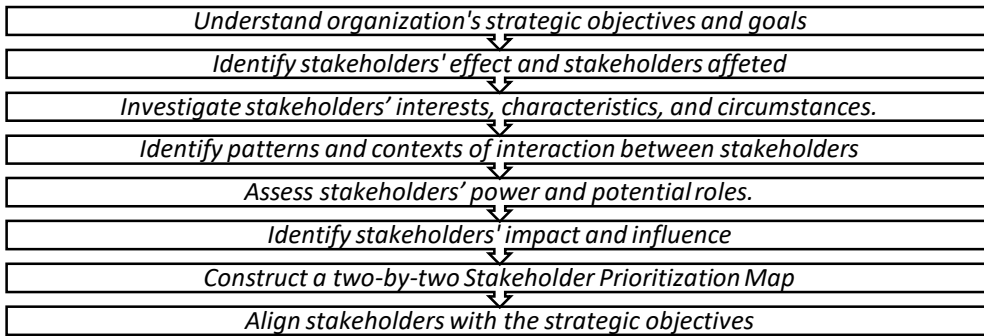
**Figure 5: Categorical representation of the Scheme's main strategic objectives.**

**Source: Authors' own elaboration**

From a managerial perspective, the objectives for the Gezira Scheme can be classified into strategic, financial, and operational.

### **Phase 2: Identifying and analyzing stakeholders.**

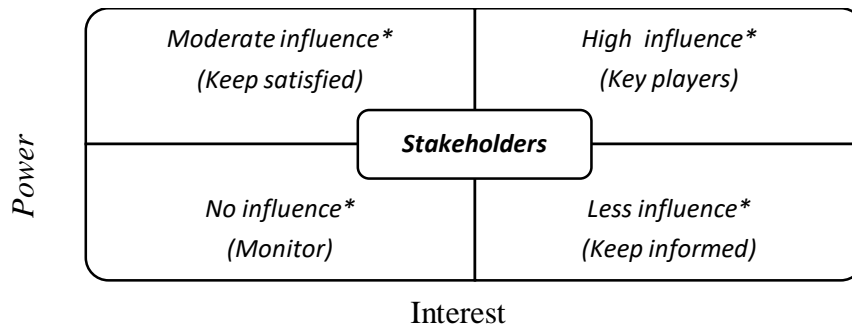
Stakeholders are the people and/or organizations that matter to an organization. Stakeholders' analysis is a tool used to understand how people and organizations affect policies and institutions, and how policies and institutions affect people and organizations. There are various approaches for conducting a stakeholders' analysis, Figure 6 illustrates a five-step process.



**Figure 6: Step process to conduct stakeholders' analysis.**

**Source: Authors' own elaboration**

Stakeholder analysis is best done using a two-by-two Stakeholder Prioritization Map (Figure 7). The degree to which each stakeholder is engaged will be reflected by the prioritization map. Stakeholders in the upper-right quadrant are the highest priority and should be involved extensively in the initiative. Stakeholders in the upper-left and lower-right quadrants should have their concerns actively addressed and should be involved in the initiative as needed. Stakeholder Prioritization Map will inform which **Stakeholder Engagement Strategies** should be employed. Together, the prioritization map combined with the engagement and collaboration strategies will help guide the generation and development of appropriate strategies for each stakeholder group, Winn, M. I. and Keller, L. R., 1999.



**Figure 7: Two-by-two Stakeholder Prioritization Map**

**Source: Winn, M. I. and Keller, L. R., 1999.**

$$*Influence = Power * Interest$$

The stakeholder map reveals which stakeholders are expected to be blockers and critics and which stakeholders are likely to be advocates and supporters.

Figures 8 and 9 depict the categorization of the main stakeholders in Gezira mapped to the main strategic objectives of the Scheme. The mapping reveals the following points:

	Gezira overall and main strategic objectives	Main stakeholders in Gezira Scheme							
		Tenants	MOAF	MOI	MOFEP	Landowners	Gezira State community	National community	Private sector *
1	<b>Overall objective (To achieve optimal and rational utilization of the Scheme's resources)</b>								
2	Increase income level	√							
3	Boost agricultural output		√		√				
4	Maximize benefits and returns	√				√			
5	Achieve food security	√						√	
6	Create jobs						√		
7	Increase and diversify exports		√		√				
8	Introduce manufacturing industries		√		√				√
9	Achieve citizen's well-being within the Scheme through economic development	√					√		
10	Preserve the environment within the boundaries of the Scheme		√	√			√	√	
11	Ensure farmers' right to manage their production and economic aspects within the technical parameters	Objectives 11, 12, 13 and 14 basically intended to foster achieving the strategic objectives (2), (3) and (4) which state "Increase income level", "Boost agricultural output" and "Maximize benefits and returns", respectively. Thus, we can argue, that these objectives can't be placed in the same level with strategic objectives (2), (3) and (4) in the objective tree. Therefore, it will be wise to deal with these objectives as sub or operational objectives.							
12	Employ technology support to boost production and maximize their respective returns								
13	Ensure farmers' right to manage irrigation operations at field canal level through Village Councils								
14	Promote farmers' effective collective action to ensure efficient provision of services and economic production while maximizing economies of scale								

Follow figure 8

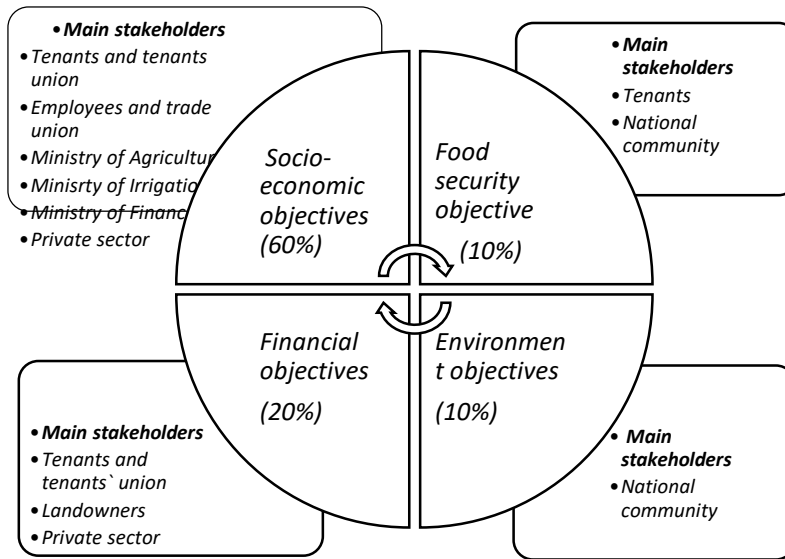
15	Provide an opportunity to the private sector to play a leading role in the provision of auxiliary commercial services in a competitive environment								√
16	Introduce irrigated forestry and livestock in agricultural cycle	√	√		√				
	Total number of stakes met by the stated objective for each group of stakeholders (10 considered main strategic objectives)	5	5	1	4	1	3	2	2
	% of stakes met by the stated objective for each group of stakeholders (out of 11 considered main strategic objectives)	45%	45%	9%	36%	9%	27%	18%	18%

**Figure 8: Mapping the Main Stakeholders with the Strategic Objectives in the Gezira Scheme.**

**Source: Authors' own elaboration.**

**\*(input providers, service providers, crop processors, traders, retailers)**

1. The main groups of stakeholders in Gezira include the tenants, Ministry of Agriculture and Forestry (MOAF), Ministry of Irrigation (MOI), Ministry of Finance and Economic Planning (MOFEP), landowners, agricultural input providers, agricultural service providers, crop processors, traders, retailers, local and state authorities, employee unions, tenant unions, the Agricultural Research Corporation, universities and research institutions.
2. Most of the stated strategic objectives contribute to meeting the needs and desires of more than one group of stakeholders simultaneously.
3. The socio-economic objectives (number 3, 6, 7, and 16) contribute to meeting the needs and desires of the tenants, Gezira State community, MOAF, MOI, and MOFEP.
4. The financial objectives (number 2, 4, and 9) contribute to meeting the needs and desires of the tenants and the landowners.
5. The food security objectives (number 5 and 16) contribute to meeting the needs and desires of the tenants and the national community.
6. The environmental objective (objective number 10) contributes to meeting the needs and desires of the national community.
7. The degree of contribution by the main stated objectives varies between meeting the desires and needs of the stakeholders. 45% of the objectives service the needs and expectations of the tenants and MOAF. 36% serve the MOFEP, 27% serve the local community (within Gezira State), 18% serve the national community and private sector while 9% serve the MOI, and landowners.

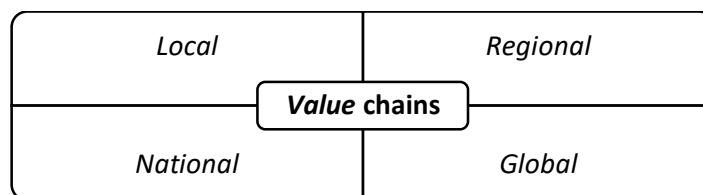


**Figure 9: Mapping the Main Stakeholders with the Strategic Objectives in the Gezira Scheme**  
**Source: Authors' own elaboration.**

**Phase 3: Determining and analyzing the potential values chains**

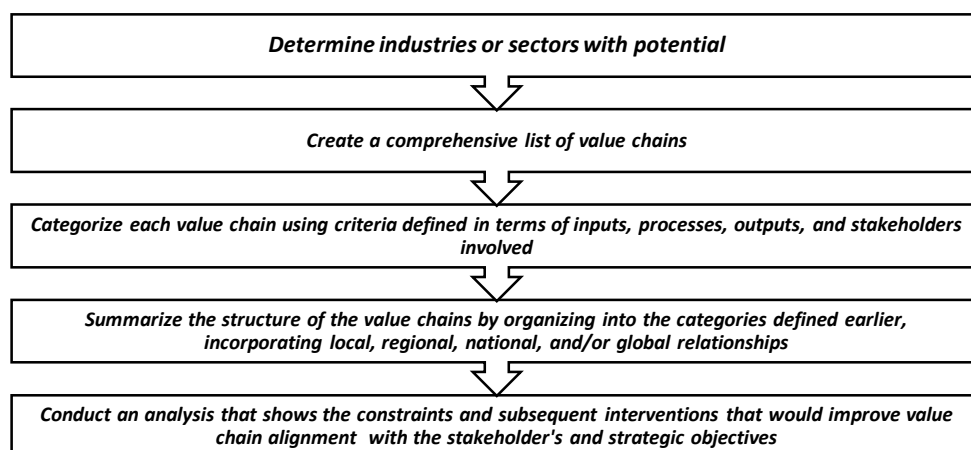
Based on the outcomes of Phases 1 and 2, Phase 3 focuses on identifying and analyzing the activities and processes on which the organization must focus (value chains). This provides the intended products and services using the available capital inputs and, in turn, meets stakeholders' expectations thereby achieving the organization's strategic objectives and goals.

Value chain analysis is a strategic tool used to analyze internal activities. Its goal is to recognize which activities are the most valuable to the organization (i.e. the source of the most cost or advantage) and which could be amended to provide a [competitive advantage](#), Porter 1985. Depending on the geographical distribution of the upper and lower streams of the value chain, one can talk about local, regional, national, and global value chains (Figure 10).



**Figure 10: Types of value chains.**  
**Source: Authors' own elaboration.**

The broad portfolio of the selected sector's value chains and their comparative and competitive advantages can be determined through the following steps (Figure 11).



**Figure 11: Steps to construct a portfolio of the relevant sector's value chains.**

**Source: Authors' own elaboration.**

Figure 12 depicts a framework of activities towards constructing holistic value chains for the existing and the potential crops and products within Gezira. The proposed value chain covers the upper and lower streams. The number of core activities in the proposed framework exceeds those of the existing value chain by five main agro-business core activities. The core activities to be added are: (1) research and development (R&D), (2) collecting, (3) processing (i.e. manufacturing), (4) marketing, and (5) distributing. Hence, to ensure achieving Gezira's strategic objectives (as stated in the 2014 Act) and to deliver values to stakeholders, the scope of the existing value chain needs to be extended by 167%. However, a single strategic objective might be achieved by performing a part of the holistic value chain. For example, strategic objectives number 2 (i.e. financial objective) that aims to, "Increase income level to the tenants" might be achieved by carrying out the core activities: R&D to the collection core activities. On the other hand, to achieve objective number 6 (i.e. economic objective) that aims to: "Increase and diversify exports" might require carrying out the whole value chain (i.e. all of the eight core activities from R&D to distribution).

Figure 12 also maps the proposed core activities with the strategic objectives to determine how well they are aligned and their efficacy (i.e. doing the correct thing). A simple comparison between Gezira's strategic objectives and the stakeholder's needs, desires and expectations, on the one hand, with the current activities (i.e. value chains), on the other, reveals the gap between what is actually currently performed within Gezira and what expectations remain as indicated in its strategic objectives and by the stakeholders needs and desires. Very few crops are further processed within Gezira that add value to stakeholders.

Gezira's potential value chains could be classified into local, regional, national or global. This classification depends mainly on the targeted end markets (i.e. whether local, regional, national, or global).

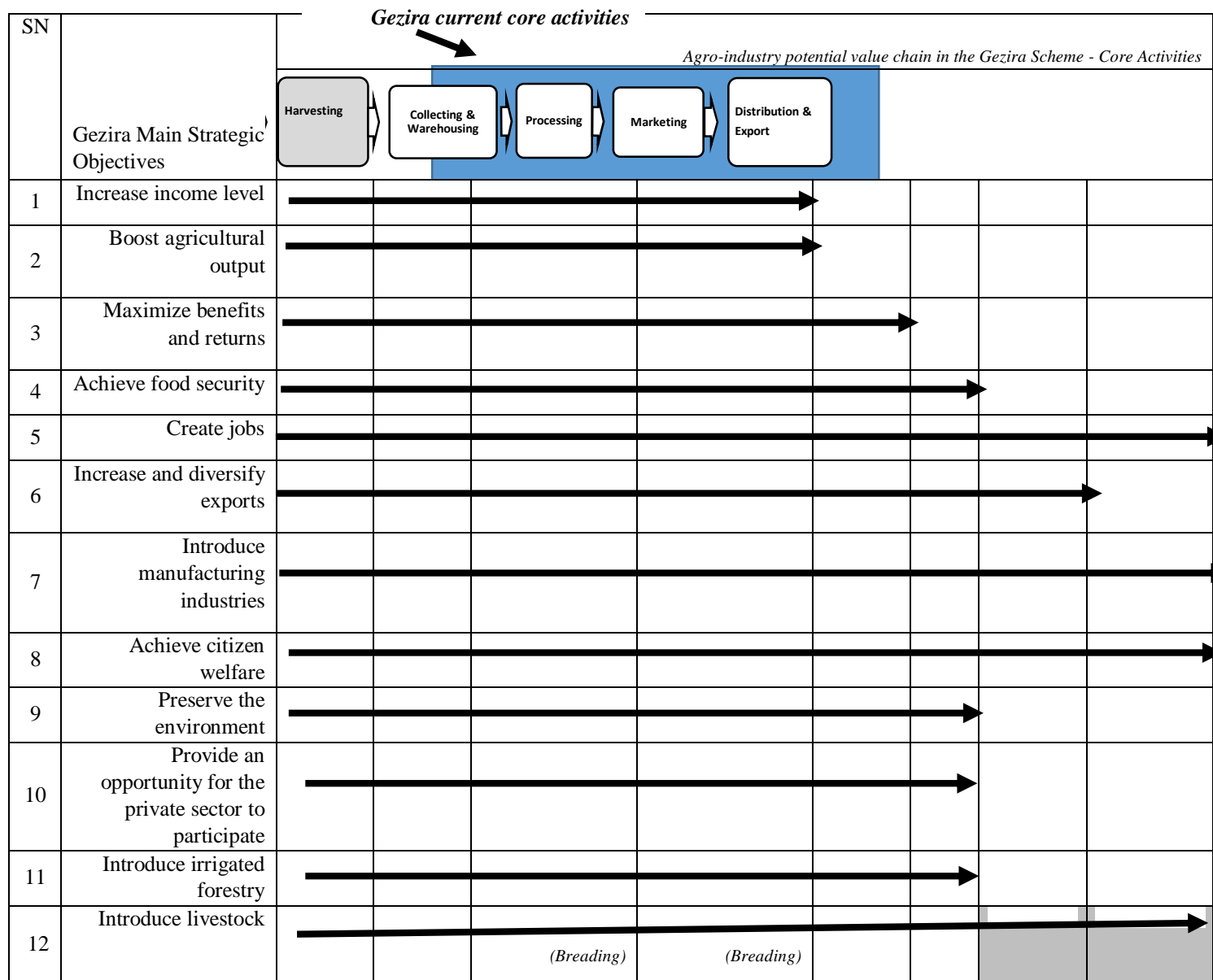


Figure 12: Agro-industry potential value chain in the Gezira Scheme. Source: Authors' own elaboration

Figure 13 shows a map between the types of value chains, on the one hand, and the main strategic objective and stakeholders, on the other. The map depicts that the financial objectives pursued mainly by the stakeholder (the tenants) are achievable through local and regional value chains (i.e. cultivating, harvesting, and selling the crops (raw) in the local and regional markets without any further processing. The economic objectives (e.g. increase and diversify exports) pursued by the stakeholder (MOFED) are achievable only through a global value chain (i.e. exporting). The end markets determine the core activities that need to be accomplished. Thus, achieving this objective requires additional core activities to be performed in order to send the crops abroad (i.e. collection, warehousing, *transporting*, etc.). Therefore, the nature of the value chain would determine the value(s) to be created first and then delivered to stakeholders. The value chain determines the nature of the resources and capabilities acquired and the capacity to build.

SN	Gezira`s main Strategic Objectives	Gezira`s stakeholders	Type of business value chain (focus)			
			Local	Regional	National	Global
1	Increase income level	Tenants	√			
2	Boost agricultural output	Tenants, MOA, MOF			√	
3	Maximize benefits and returns	Tenants, landowners	√			
4	Achieve food security	Tenants, national community			√	
5	Create jobs	Employees		√		
6	Increase and diversify exports	MOF, private sector (e.g. exporters, crop processors)				√
7	Introduce manufacturing industries	Private sector (e.g. traders, crop processors, retailers)			√	
8	Achieve citizen welfare	Tenants	√			
9	Preserve the environment	National community			√	
10	Provide an opportunity for the private sector to participate	Tenants, private sector (e.g. inputs providers, service providers, crop processors)			√	
11	Introduce irrigated forestry	Tenants, MOA		√		
12	Introduce livestock	Tenants, MOA, private sector (e.g. food processors, traders, distributors, retailers)		√		

**Figure 13: Mapping the stakeholders, strategic objectives, and agro-industry value chains in the Gezira Scheme. Source: Authors' own elaboration.**

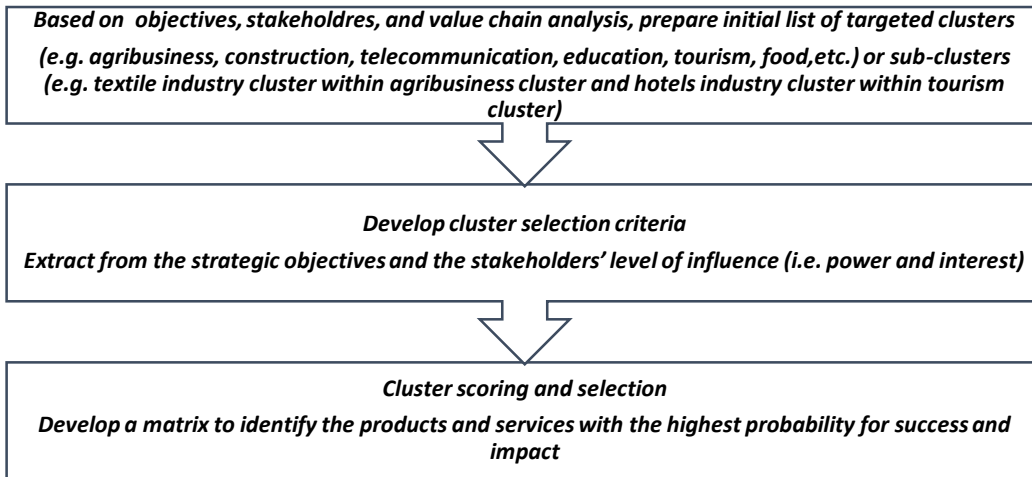
#### **Phase 4: Evaluating and selecting of potential business clusters and collaborations**

Phase 1 determines the organization's strategic objectives and goals (i.e. value to deliver). Phase 2 identifies the main stakeholders (i.e. providers of value) who provide the capital input (i.e. stores of value) and their interests, expectations, desires, and influences. Phase 3 identifies the value chains (i.e. value creation) that employ the capital inputs provided in pursuit of meeting stakeholders' expectations. Some value chains might not cover all activities or processes needed to provide the product or service in a competitive way. In this case, the management can look for other firms, corporations, institutions, universities, etc. to fill the gap in the value chain through collaboration and cluster formation. Collaborating and clustering can be developed horizontally or vertically. This strategy is known as cluster and collaboration selection, ICTSD 2016, and represents Phase 4 of the framework.

The cluster and collaboration selection and formation process aims to identify the most promising clusters in terms of ability to contribute to the effective development of the corporation.

Clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition.

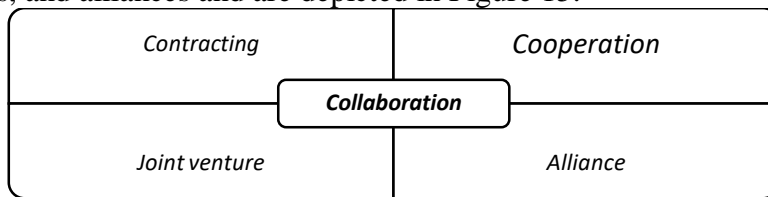
Figure 14 shows the steps to formulate and select the appropriate cluster



**Figure 14: The steps to formulate and select the appropriate cluster.**

Source: Authors' own elaboration.

There are many forms of collaboration that can be developed depending on the nature of value chain, clusters, and the type of capital input required. These include contracting, cooperation, joint ventures, and alliances and are depicted in Figure 15.



**Figure 15: Forms of business collaboration.**

Source: Authors' own elaboration.

Figures 16 and 17 illustrate the potential agro-industry clusters that could be formed within Gezira based on the crops. Cotton contributes to textiles and cooking oil. Wheat contributes to the mills and the bakeries. Dura to the mills. Groundnut to cooking oil, bakeries. Sunflower to cooking oil. Horticulture to fruits and vegetables. Livestock to meat, dairy, and poultry. Forestry to wood and bee breeding.

After identifying the value chains, value networks, agro-business clusters, and the end products initially aligned with Gezira's strategic objectives, follows identifying the most promising clusters and collaborations in terms of their ability to capacity building. Hence, contribute to the objectives.

SN	Gezira potential crops and value Chains	Gezira potential industry clusters									Industries involved
		Textile	Mills	Cooking oil	Meat	Dairy	Poultry	Bakery	Wood and bee breeding	Vegetables and fruits	
1	Cotton	√		√							2
2	Wheat		√					√			2
3	Dura (Sorghum)		√								1
4	Groundnuts			√				√			2
5	Sunflower			√							1
6	Horticulture									√	1
7	Livestock				√	√	√				3
8	Forestry								√		1
	Gezira's potential products	<ul style="list-style-type: none"> <li>• Spinning</li> <li>• Yarn</li> <li>• Cloth</li> <li>• Animal feed</li> </ul>	<ul style="list-style-type: none"> <li>• Flour</li> <li>• Animal feed</li> </ul>	<ul style="list-style-type: none"> <li>• Cooking / food oil</li> <li>• Animal feed</li> </ul>	<ul style="list-style-type: none"> <li>• Meat</li> <li>• Live sheep</li> <li>• Live goats</li> <li>• Live cattle</li> <li>• Leather</li> </ul>	<ul style="list-style-type: none"> <li>• Milk</li> <li>• Butter</li> <li>• Yoghurt</li> <li>• Cheese</li> </ul>	<ul style="list-style-type: none"> <li>• Chicken</li> <li>• Egg</li> <li>• Live chicks</li> </ul>	<ul style="list-style-type: none"> <li>• Packed food</li> <li>• Bread,</li> <li>• Pastries</li> <li>• Biscuits</li> <li>• Sweets</li> </ul>	<ul style="list-style-type: none"> <li>• Wood</li> <li>• Furniture</li> <li>• Gum</li> <li>• Honey</li> <li>• Canned food</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetables</li> <li>• Fruits,</li> <li>• Canned vegetables</li> <li>• Canned fruits</li> <li>• Juice</li> </ul>	

Figure 16: Gezira Scheme's crop value chain, agro-industry clusters, and final products .  
Source: Authors' own elaboration

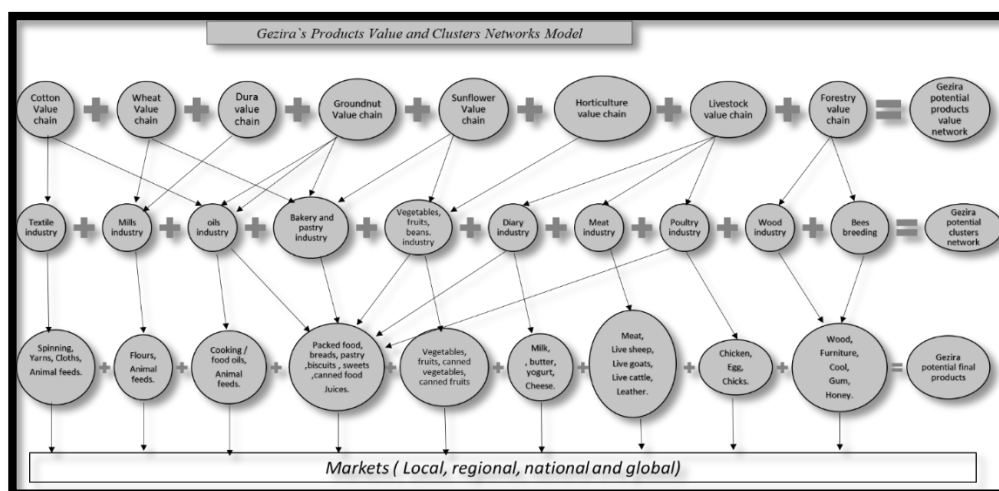


Figure 17: Map of crop value chains, agro-industry clusters, and final products in the Gezira Scheme.

Source: Authors' own elaboration.

#### 4.1 Cluster selection criteria

Based on the main strategic objective of Gezira, the following impact criteria can be applied towards selecting and prioritizing the agro-industry clusters for the Scheme to enhance value:

1. Contribution to tenants' income level.
2. Contribution to GDP.

3. Contribution to exports and its diversity.
4. Contribution to job creation.
5. Contribution to food security.
6. Enhancing introduction of manufacturing industries.
7. Encouraging private sector participation.
8. Less risk with regard to price (price fluctuation).
9. Less risk with regard to production (production fluctuation).
10. Water consumption.
11. Use of fertilizers.
12. Use of insecticides and plant pesticides.
13. Reducing or minimizing air pollution.

Figure 18 summarizes the responses on a short questionnaire obtained from participants well acquainted with Gezira. The aim is to illustrate how the crops and the related agro-industry clusters could be selected and prioritized rather than to reach a solid conclusion about what should be grown and processed. This figure pinpoints the top three most impactful crops for each strategic objective. However, deciding which should be produced and processed depends on the strategic objectives chosen for emphasis. The priority of the objective(s) depends on internal and external factors surrounding the Scheme. Therefore, the following initial findings might be stated:

1. **To increase tenants' income:** produce and process beans, vegetables, and cotton.
2. **To increase and diversify exports:** produce and process cotton, livestock, and beans.
3. **To achieving food security:** produce and process wheat, livestock, and groundnuts.
4. **To minimize market risk:** produce cotton, livestock, groundnuts, and wheat.
5. **To minimize operation/production risk:** produce livestock, wheat beans, and cotton.
6. **To minimize water consumption:** produce sorghum, livestock, and beans.
7. **To maintain environment (less air pollution):** produce groundnuts, beans, livestock, and forestry
- **To encourage private sector and manufacturing industry involvement:** produce cotton, groundnuts, sunflower, vegetables, and livestock.

SN	Prioritization criteria	Crops ranking		
		First	Second	Third
1	Increase tenants' income	Beans	Vegetables	Cotton
2	Increase and diversify exports	Cotton	Livestock	Beans
3	Increase GDP	Livestock	Wheat	Cotton
4	Create jobs	Cotton	Vegetables	Livestock
5	Achieve food security	Wheat	Livestock	Groundnuts
6	Less risk in production (production fluctuation)	Livestock	Wheat	Beans/Cotton
7	Less risk in price (price fluctuation)	Cotton	Livestock	Groundnuts/Wheat
8	Less water consumption	Sorghum	Livestock	Beans
9	Fewer insecticides and plant pesticides	Groundnuts	Livestock	Beans

10	Fewer fertilizers	Beans	Groundnuts	Livestock
11	Less environmental impact (less air pollution)	Groundnuts	Beans	Livestock/ Forestry
12	Introduce to manufacturing industries	Cotton	Groundnuts	Sunflowers
13	Encourage private sector participation	Cotton	Groundnut	Vegetables/ Livestock

**Figure 18: Mapping crop ranking relative to the strategic objectives.**

**Source: Authors' own elaboration.**

Figures 19 and 20 further rank the crops based on the weighted average of the number of times cited in the questionnaire (weight 3 for first, 2 for second, and 1 for third). The top three crops/products contributing to achieving Gezira's strategic objectives more effectively and efficiently are livestock, cotton, and groundnuts, which scored 11, 8, and 7 respectively.

SN	Crop	Frequency of ranking (times)			Times-cited
		First	Second	Third	
1	Livestock	2	5	4	11
2	Cotton	5	0	3	8
3	Groundnuts	2	3	2	7
4	Beans	2	1	4	7
5	Wheat	1	2	1	4
6	Vegetables	0	2	1	3
7	Sorghum	1	0	0	1
8	Sunflowers	0	0	1	1
9	Forestry	0	0	1	1
10	Fruits	0	0	0	0
11	Poultry	0	0	0	0

**Figure 19: Distribution of crops according to rank and times-cited.**

**Source: Authors' own elaboration.**

SN	Crop	Frequency of ranking (times)			Weighted average	Ranking
		First	Second	Third		
1	livestock	6	10	4	20	First
2	Cotton	15	0	3	18	Second
3	Groundnut	6	6	2	14	Third
4	Beans	6	2	4	12	Fourth
5	Wheat	3	4	1	8	Fifth
6	Vegetables	0	4	1	5	Sixth
7	Sorghum	3	0	0	4	Seventh
8	Sunflower	0	0 22	1	1	Eight

9	Forestry	0	0	1	1	Ninth
10	Fruits	0	0	0	0	Tenth
11	Poultry	0	0	0	0	Tenth

Figure 20: Weighted ranking of crops.

Source: Authors' own elaboration.

#### 4.2 Selecting collaboration:

There are many forms of collaborations depending on the nature of the value chain, clusters, the capital input, capacity building, and capabilities required. These forms of business collaboration include contracting, cooperation, joint venture, and alliance (Figure 21). Some forms might be more appropriate at the value chain core activity level in the upper and lower stream rather than at the cluster level.

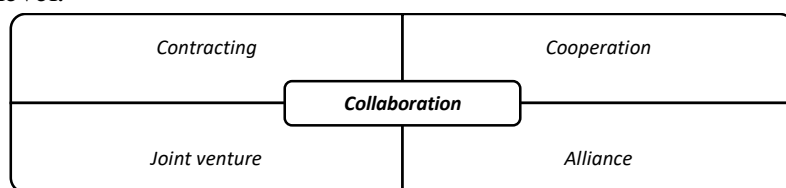


Figure 21: Forms of business collaboration.

Source: Authors' own elaboration.

Figure 22 maps of the agro-industry value chain, types of collaboration, and stakeholders in the Gezira Scheme.

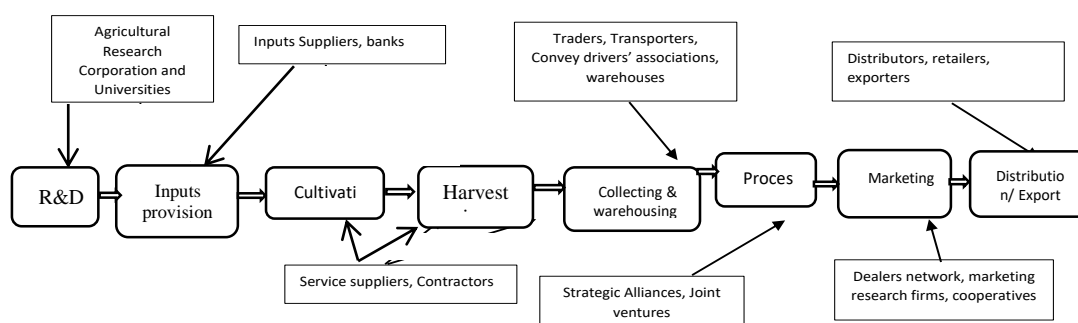


Figure 22: Map of the agro-industry value chain, types of collaboration, and stakeholders in the Gezira Scheme. Source: Authors' own elaboration.

#### Putting the SDAPS framework in an environmental context

To provide context, the proposed framework's components and processes should be studied and analyzed in light of the following internal and external factors of the business environment. These factors are identified in the literature as the main variables that determine and shape the strategic management planning and control systems of the organization, Abdala 1992.

Internal business environmental factors:

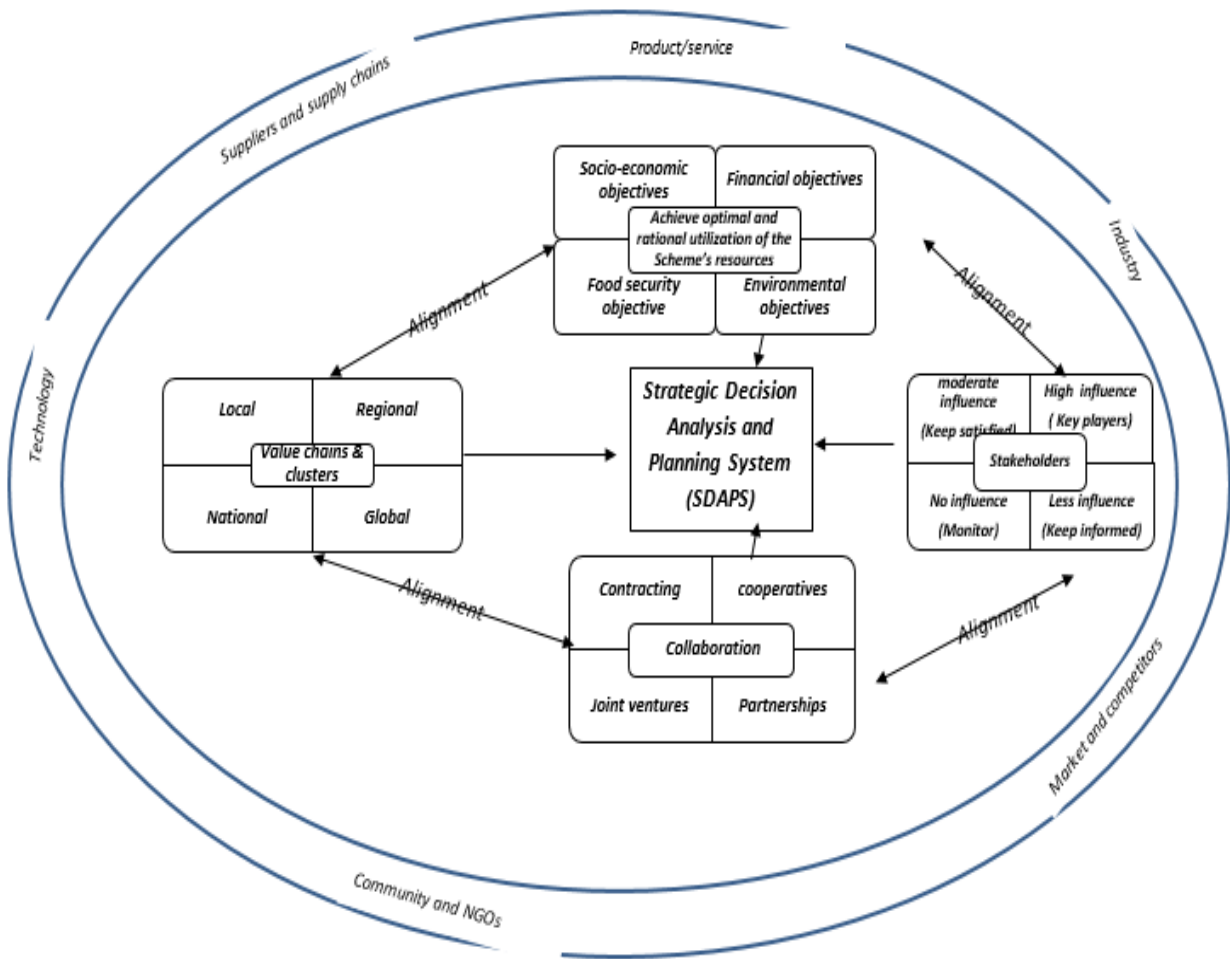
1. Product/service
2. Technology
3. Culture, tradition, and values

External business environmental factors:

1. Economy

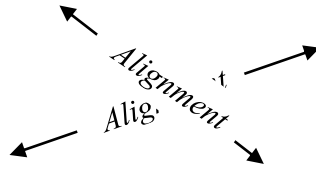
2. Industry
3. Market and competitors
4. Community and NGOs
5. Government regulations
6. Suppliers and supply chain

Figure 23 depicts the interrelation and interaction between the components of the proposed framework and the internal and external determining factors.



**Figure 23: The integrated value-based framework for developing SDAPS put into environmental context.**

Source: Authors' own elaboration.



## 8. Findings and discussion.

- The main outcome of this study is an integrated value-based framework mainly for modeling strategic decision analysis (i.e. identifying and improving strategic options) in corporations with multiple stakeholders and multiple strategic objectives. Much of the literature focuses on evaluating options already given and a predefined set of alternatives. While this is important, most decisions - particularly at the strategic level in developing countries - do not start with a well-defined set of options and, therefore, the identification and development of optimal options is crucial to the successful decision-making process.
- The proposed framework for strategic decision analysis and planning includes four main phases: first, identify and analyze strategic objectives (i.e. value to deliver); second, determine stakeholders and their expectations {i.e. providers of capital inputs (value stores) and receivers of value delivered}; third, determine and analyze value chains (i.e. value creation); fourth, select appropriate collaborations and clusters (i.e. value co-creation and aggregation).
- This study shows that value-focused thinking can be used to develop useful, balanced and straight forward models for tackling the issues facing large public agricultural corporations in Sudan. Value-focused thinking employs useful concepts such as value chain, value network, value creation, value co-creation, and value delivery. The integration of these concepts would assist in identifying and designing options as well as toward developing evaluation and rank criteria.
- Value-focused thinking is useful for aligning the SDAPS with the strategic objectives of corporations, stakeholders' expectations, value chains, clusters, and collaborations.
- This study establishes that the integration of macro (e.g. business clustering) and micro concepts (e.g. strategic objectives, stakeholders, value chain, etc.) in large corporations would enhance the development of appropriate models for strategic decision analysis and decision making.

## 9. Conclusions and policy implication:

- From a methodological standpoint, it could be argued that the way the research problem has been defined and tackled supports an interdisciplinary, interrelated, and interacting approach.
- The "value-focused" thinking used in this study could be applied to any situation to develop appropriate models or systems for strategic management, planning, and control.

- The joint consideration and integration of strategic planning and economic concepts and tools facilitate developing appropriate strategic decision analysis and decision making models for large public corporations in Sudan and in organization with similar attributes in other developing countries.
- The introduction of a new concept, “Value Network” to describe the proposed framework that enables integration of PACs to value chain analysis.
- The type of collaboration and partnership depends on the position of the targeted activities within the value chain or the cluster. The win-win principle should be the goal of every collaboration.
- The clustering concept frequently used at the national and macroeconomic levels can be adopted and applied within a large public corporation.
- This study shows how complex and broad are (some are conflicting) the strategic objectives assigned to be pursued by the management of the Scheme. These objectives as stated by Gezira Act 2014 cover national, regional and local aspects. Hence, they reflect macro-economic, financial, social and environmental strategic objectives. Having acknowledged such a special situation where multiple values are provided to various stakeholders, policy makers should consider these facts when talking about finance facilities, export and import incentives. If such special policies can't be adopted with regard to the scheme, policy makers should consider changing and reducing the scope of the Scheme's strategic objective to be aligned with current national policies.
- The multiplicity of the strategic objectives supposed to be pursued by the management of the scheme might be achieved through adopting (zoning) approach. That is dividing the Scheme into zones or regions based on natural, economic and social factors such as: soil characteristic, climate, access to markets, financial capital available through collaboration, current industry within the area etc. Such zoning would help allocating the objectives among the Scheme regions. Hence, each region (zone) should concentrate on producing, processing and marketing specific crop and related products through adopting the appropriate value network and chains whether local, regional, natural or global value chains.

#### **Further research:**

- Test the applicability of the proposed framework in other PACs in Sudan.
- Test the applicability of the proposed framework in other large public and private sectors.
- Examine the impact of the environmental factors surrounding an organization on the development of SDAPS.
- Examine the applicability of the ZONING approach suggested by this study.
- Examine the socio-economic impacts of reducing the strategic objectives assigned to the Gezira Scheme and their scope.

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