Performance Evaluation of Public Sector Enterprises

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By

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DECLARATION

I, Ms Resham Kaur Amarpal Singh Bhambra, do hereby declare that this thesis titled “Performance Evaluation of Public Sector Enterprises” represents the work that has been carried out by me and that it has not been submitted, either in part or full, to any other University or Institution for the award of any research degree.

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CERTIFICATE

I hereby certify that the above Declaration of the candidate, Ms. Resham Kaur Amarpal Singh Bhambra is true and the work was carried out under my supervision.

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"Gratitude is an appreciation for every moment in your life. It is a feeling of abundance"

….. Brenda Nathan.

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CONTENTS

List of Tables

List of Figures

List of Abbreviations

AAGR	Average Annual Growth Rate
AHP	Analytical Hierarchy Process
ARI	Average Return on Investment
CA	Current Assets
CAG	Comptroller and Auditor General
CAGR	Compounded annual Growth Rate
CE	Contribution to Exchequer
CEO	Chief Executive Officer
CG	Corporate Governance
CI	Consistency Index
CL	Current Liabilities
COPRAS	Complex Proportional Assessment
CPSEs	Central Public Sector Enterprises
CR	Consistency Ratio
CR	Current Ratio
CVI	Content Validity Index
CW	Community Welfare
DEA	Data Envelopment Analysis
DEMATEL	Decision Making Trial and Evaluation Laboratory
DPE	Department of Public Enterprise
EDC	Economic Development Corporation
EG	Employment Generation
ELECTRE	Elimination and Choice Translating Reality
EVA	Economic Value Added
FAHP	Fuzzy Analytical Hierarchy Process
FINEVA	Financial Evaluation
GDP	Gross Domestic Product
GEL	Goa Electronic Limited
GFDCL	Goa Forest Development Corporation Limited
GHRSSIDCL	Goa Handicraft, Rural and Small-Scale Industries Development Corporation Limited
GIDC	Goa Industrial Development Corporation Limited
GITDCL	Goa Information Technology Developemnt Corporation Limited
GMCL	Goa Meat Complex Limited
GOG	Government of Goa
GSDP	Gross State Domestic Product
GSHCL	Goa State Horticulture Corporation Limited
GSIDCL	Goa State Infrastructure Development Corporation
GSSCOBCFDCL	Goa Schedule Caste and Other Backward Class Finance Development Corporation Limited
GSSTFDCL	Goa Schedule Caste and Schedule Tribes Finance Development Corporation Limited
GTDC	Goa Tourism Development Corporation
HRD	Human Resource Development
ICGL	Infotech Corporation of Goa Limited
ICT	Information and Communication Technology

I-CVI	Item Content Validity Index
IRG	Internal Resource Generation
IT	Information Technology
KTCL	Kadamba Transport Corporation Limited
LTD	Limited
MCDA	Multi Criteria Decision Analysis
MCDM	Multi Criteria Decision Making
MOU	Memorandum of Understanding
MVA	Market Value Added
NPAT	Net Profit After Tax
NTPC	National Thermal Power Corporation Limited
OLS	Ordinary Least Square
PCA	Principal Component Analysis
PSEs	Public Sector Enterprises
PSU	Public Sector Undertaking
R&D	Research and Development
RI	Random Index
ROA	Return on Asset
ROCE	Return on Capital Employed
ROE	Return on Equity
ROI	Return on Investment
RONW	Return on Net Worth
RPE	Relative Performance Evaluation
SAP	System Analysis Program
S-CVI	Scale Level Content Validity Index
SIDCL	Sewerage and Infrastructure Development Corporation Limited
SLPEs	State Level Public Enterprises
SOEs	State Owned Enterprises
TA	Total Asset
TI	Total Investment
TOPSIS	Technique for Order Preference by Similarity to Ideal Solution
UA	Universal Agreement
UTASTAR	Star additive utility method
VA	Value Addition
VAS	Value Added Statement
VIKOR	VIekriterijumsko KOmpromisno Rangiranje

Abstract

The public sector enterprises play a vital role in the development of the economy as well as the development of the masses. The main objective of setting up public sector enterprises in developing countries is to attain maximum social good and accelerate economic growth. The success of the Indian economy in terms of growth and social gain depends on the performance of public enterprises. Performance management of an enterprise aims to assess and improve its performance. Thus, periodic evaluation of the performance of public sector enterprises is important for the success of the enterprises as well as of the economic plans as both are interdependent. However, performance evaluation has been a challenging subject in the performance management of public sector enterprises due to its multiple conflicting objectives and multiple evaluating agencies with differing objectives of evaluation. Though the primary objective of these enterprises is not profit, the role of profit in public sector enterprise cannot be ignored and at the same time, profitability alone cannot be used to judge the performance of public sector enterprises in the presence of its multiple commercial and non-commercial objectives. This makes it imperative to focus on the multi-dimensional performance evaluation in light of the multiple objectives of public sector enterprises. The present study contributes in this context with a proposed framework to evaluate the overall performance of public sector enterprises using a multi-criteria decision-making approach (MCDM) with the application of the Analytical Hierarchy Process (AHP) technique. The proposed framework integrates multiple criteria to develop a unified performance evaluation model. Based on the literature the study has identified the suitable criteria and parameters under each criterion for objective performance analysis of public enterprises. The AHP analysis is applied to generate weights of the criteria and sub-criteria which is further used to develop a model to calculate the overall performance score of the enterprise. The developed model can be used as a tool to evaluate and improve the enterprise in the essential areas of its performance and thus enhance the objectivity of the performance evaluation system in public sector enterprises. The study also extends to present a methodology for relative performance analysis and ranking of the firms using another MCDM technique VIKOR analysis. The developed framework is demonstrated with a notional example of select state-level public enterprises in Goa. The performance analysis of the select state enterprises using the developed model provides the overall performance score of the enterprises as well as the performance score in four broad

criteria: financial performance, physical performance, contribution to the economy and contribution to society. The relative performance analysis done using the VIKOR method is found effective in performing the relative performance analysis of the firms and augments the objectivity of the concept of performance evaluation. The integrated AHP-VIKOR methodology used inthe study is a major contribution of the study to the literature. The developed frameworkis robust and can be conveniently used to evaluate the performance of enterprises in both the public as well as the private sector using relevant criteria. Based on the AHP analysis, the criterion *contribution to society* is the most important criterion for the overall performance evaluation of SLPEs with sub-criteria *community welfare being the most important contribution to the society*. The findings are in line with the mandate of setting up public sector enterprises. As per the aggregate performance score, the study evidenced that only two out of the eight SLPEs in Goa under study are rated "Good", four are rated "Fair" whereas one enterprise is rated "Poor".

The proposed framework can set guidelines to quantify the performance of public sector enterprises in terms of the results that a public enterprise is expected to achieve. Finally, the results of the study will also help policymakers in the proper planning and implementation of performance evaluation systems in public enterprises.

Keywords:

Performance evaluation system, Public Sector Enterprises, multi-criteria decision-making, Analytical hierarchy process, VIKOR, State Public Sector Enterprises.

Chapter One

Introduction

1.1 Background of the study

1.1.1 Public Sector Enterprises

Public sector enterprises occupy a vital position in the national economy almost in all countries in the world, irrespective of their political positioning. Public sector enterprises also termed as "Public sector undertakings" or "public enterprises" are transformers of our economy. Their contributions include infrastructure development, securing balanced regional development, creating skill and competence, fulfilling social obligations, developing backward regions, being model employers, promoting exports, etc. A public sector enterprise is an organization owned by public authorities, to the extent of 50 per cent or more, controlled and managed by the owning public authority, engaged in activities of business character and its output being in the shape of goods and services for a price (Beena, 2012). The terms "public sector" and "public sector enterprise" are not the same. The former includes all types of government activities and functions. It may or may not be of a business character. The latter refers to any activity of the government like industrial, agricultural, financial or commercial business. Public enterprises are owned by the state government or central government or jointly by both. The enterprises in which majority holding in terms of investment and administration is vested with the central government are termed as "Central Public Sector Enterprises" and those which are owned by the state government are termed as "State Public Sector Enterprises". The most important reason for setting up these enterprises is to accelerate economic growth in terms of social gain and create surplus to pave the way for further developmental activities in the economy (Chauhan, 2006). Public enterprise is an agency of government through which the government manages its commercial and economic activities. These enterprises are characterised by public purpose, public ownership and public control. The public purpose aims to attain broader developmental goals through various socio-development activities. Public ownership implies financing by the government and public control refers to being managed by the public authority (Gandhi, 2007).

According to a United Nations publication, "by public enterprise is meant economic undertaking especially industrial, agricultural or commercial concerns, which are owned (wholly or in part) and controlled by the state". According to A.H Hansen,

"public enterprise means state ownership and operation of industrial, agricultural, financial and commercial undertaking". Friedman defined public enterprise as "an institution operating a service of an economic or social character on behalf of the government, but as an independent legal entity, largely autonomous in its management, public accountability and subject to some directives by the government, equipped on the other with an independent and separate fund of its own and the legal and commercial authorities of a commercial enterprise".

In India, public sector organisations are established in three forms viz., Departmental Undertakings, Public Corporations and Government Companies. Departmental undertakings are the most traditional form of public sector organization that is similar to any government institution in terms of its organization, financing and governing. Its operations are controlled by a minister who is answerable to the legislature. A public corporation is a legal entity established by a special act of parliament or by either the national or state legislature. The act decides its power, objects, constraints and other parameters. Government companies refer to a business in which either the central or state government holds at least 51 per cent of the paid-up share capital. These companies, like other registered companies, are governed by the provisions of the Companies Act (Baa & Chattoraj, 2022). Thus, the public sector in a broader sense covers all the governmental activities which are commercial and social in nature whether at the central or state level.

1.1.2 Evolution of Public Sector Enterprises in India

The Public sector emerges as very significant in the Indian context. The entry of the public sector into the economic domain in India is a post-independence phenomenon. It came into existence due to the fact that the private capitalism which divided the entire society into "the haves" and "the have-nots" and the economic and social well-being of the masses was totally abandoned. Thus, to ensure the economic health and social well-being of the masses, the state intervention was anticipated and initiated. Another reason for the establishment of public sector enterprises was the private sector's reluctance to invest in ventures that have long gestation periods and low returns. The public sector enterprises were established in those areas which were not commercially viable but were important for the economic and social well-being (Beena, 2012). At the time of independence, the Indian economy was mainly dependent on agriculture and was characterized by weak industrial base, lack of infrastructure, low

GDP, low employment avenues, regional imbalance, inequalities of income, etc. The reason behind this condition of the economy was the industrial policy during the British regime was not intended to develop Indian industries, instead, it was aimed at retaining India as a permanent market for British products. To speed up economic growth a big push was needed. Thus, the independent India adopted planned economic development policies in a democratic liberal policy. India adopted a mixed economy to create two segments of the economy: public and private. The public sector was assigned a predominant role in the development of the economy on the recommendation of the then National Congress. The intervention of the government in various sectors was required as the private sector had neither the resources nor the will to operate in areas that required huge investment and had a low gestation period. The returns also were not commensurate with the investment and the period (Baporikar, 1999). In this socio-economic set-up, our visionary leaders drew up a roadmap for the development of the public sector for a self-reliant economic growth through industrial policy resolutions.

The Industrial Policy Resolution of 1948 envisioned to development of core sectors through public enterprises with the intention to correct regional imbalance, create employment and expand the production of agricultural and industrial products, especially the capital equipment, basic goods and goods that would bring foreign exchange. The industrial policy of 1956 gave importance to the role of the state as the engine to develop a strong agricultural and industrial base in the economy and overcome the economic and social backwardness (Chauhan, 2006). According to the resolution, the expansion of the public sector was essential for attaining the goal of the socialistic pattern of society and building a dynamic and diversified economy. Consequently, after the commencement of the five-year plans and declaration of the industrial policy resolution, the public sector was engaged in a varied and vast range of activities especially the basic and capital goods industries (Beena, 2012). Later new strategies were outlined in the policy statements in 1973, 1977, 1980 and 1991. This led to the spread of activities of public enterprise in all areas including the non-infrastructure and non-core areas. Since the 1980's the performance of the public enterprises in India has been undergoing scrutiny. These enterprises were found to be riveting huge portions of government funds in the form of subsidies resulting in massive fiscal deficits. In order to overcome this situation, the emphasis was put on the efficiency of these enterprises. The 1991 policy brought structural reforms that intended to increase the efficiency, accountability, decentralization and market orientation of these enterprises. Thus, this

year is referred to as a "watershed" year, prefiguring liberalization of the Indian economy.

1.1.3 Objectives of Public Sector Enterprises

The Government of India has set up public sector enterprises to attain various socio-economic objectives. The main objective of public sector enterprise is to attain maximum social good and accelerate economic growth (Chandra, 1975). The objectives of public enterprises are varied and as many as there are people who are concerned with public enterprise. Based on their nature, these objectives are broadly classified as commercial and non-commercial. However, both are complementary to each other and not conflicting. At the micro and macro levels, these objectives are classified into three classes such as financial, economic and social objectives.

Financial objectives: refers to earning a return on investment and generating resources for further expansion.

Economic objectives: are meant to accelerate the pace of economic growth and reduce regional disparities.

Social objectives: relates to the supply of essential goods and services to the people at reasonable prices and performs maximum social good (Gupta, 2005).

The specific list of objectives for setting up of public sector enterprises as specified in the industrial policy resolution of 1956 are

1. To help in rapid economic growth and industrialisation in the country
2. To create the necessary infrastructure for economic development.
3. To earn a return on investment and generate resources internally.
4. To promote redistribution of income and wealth.
5. To generate employment opportunities.
6. To reduce regional disparities.
7. To develop small-scale and ancillary industries.
8. To save and earn foreign exchange for the economy.
9. To uplift weaker sections of the society.

1.1.4 Role of Public Sector Enterprises

In a developing country like India, where the majority of the population belongs to the middle-income group or lives below the poverty line, public sector units play a

vital role in the development of the economy as well as the development of the masses. These enterprises are set up with two broad objectives: to achieve economic development and to fulfil the egalitarian aspirations of the society. The public sector is assigned an important role to play in the socio-economic transformation of the economy. The spectrum of activities of the public sector covers almost all segments of the economy including agriculture, industry, commerce, transport, defence, banking and finance, public utilities, cultural and social affairs, etc. Public sector enterprises are expected to achieve broader national goals with larger social gain and balanced development of the economy (Vaidyanathan & Sundar, 2011). Public sector enterprises have been levied more social obligations than their complements in the private sector through various national plans and different elements of its environment. Thus, the public sector plays a major role in uplifting the economic condition of society in various ways.

The major role of the public sector is explained below:

i. The public sector undertakings are the main source of capital formation in the Indian economy.
ii. The public sector plays an important role in generating employment opportunities in various sectors of the economy.
iii. The public sector's investment in developing infrastructure has led to the overall growth of the economy.
iv. The public sector units play a key role in developing a strong industrial base in the country.
v. The public sector firms in India significantly contribute to increase the country's exports and earn foreign exchange.
vi. The expansion of public sector units has helped in reducing the income and wealth inequalities.
vii. The establishment of public sector enterprises in backward areas has helped to reduce regional disparities.
viii. The contribution made by the public sector enterprises to the exchequer helps in financing further development plans in the economy.
ix. The constant involvement of the public sector units in research and development helps to improve the production and provision of services.

The public sector enterprises in India have always played an overriding character in determining the path of the development of the Indian economy. Since inception,

these enterprises have contributed towards developing a strong industrial base and scaling up the economy to emerge as an economic superpower ((John, 2019)

1.1.5 Public Enterprise Policy in India in Five-Year Plans

After independence, India initiated planning to develop the economy with the democratic political framework by establishing a planning commission. The planning commission was entrusted with the responsibility of planning the economic development of the nation through developing five-year plans, executing the plan and also monitoring the outcomes. A brief overview of the public enterprise policy in India in the five-year plans is explicated below:

First five-year plan (1951-56): The plan pointed out the need for expansion of the role of the state in the economic and social development of the nation and to satisfy the genuine needs of the masses.

Second five-year plan (1956-61): This plan mainly focused on the framework of a mechanism where the public and private sectors are to be viewed as fragments of a single mechanism. Thus, a system of mixed economy was built with equal roles assigned to both sectors in the development of the economy.

Third five-year plan (1961-66): The focus of this plan was to expand the role of the public sector by engaging these enterprises in developing basic industries and generating surplus for developing the economy. This was intended to prevent the concentration of economic power and restrict the growth of monopolistic tendencies.

Fourth five-year plan (1969-74): The plan envisioned the public sector as the dominant sector of the economy and expected to gain commanding heights in the production and distribution of basic consumer goods.

Fifth & Sixth five-year plan (1974-79 & 1980-85): The plan foresaw state-owned enterprises to steer the distribution of essential commodities and provision of basic infrastructural facilities to the masses.

Seventh five-year plan (1985-90): This plan supported the growth of the private sector as the ideology of the Industrial policy of 1956 was based on the complementary relationship between the public and private sector.

Eighth five-year plan (1992-97): During 1989-91, India faced economic instability, thus no five-year plan was rolled out in this period. To correct the crisis in the economy India took the risk of reforming the socialistic economy and launched free-

market reforms. The new industrial policy of 1991 was the dawn of privatization and liberalization in the Indian economy.

Ninth five-year plan (1997-2002): The plan showed joint efforts of both the public and private sectors to ensure the development of the economy. The implementation of the Special Action Plan (SAP) was the highlight of this plan. The focus of the plan was to bring rapid economic development and provide a better quality of life to the people with social justice and equity. The plan intended to reduce government interference provides freedom to State-owned enterprises to operate efficiently in the competitive market.

Tenth five-year plan (2002-07): The plan states that the role of the public sector is less dominant than before and it will decline relatively more as the government's ownership in public sector enterprises is expected to decline further. The industrial growth will mainly be dominated by the performance of the private sector. Thus, to provide a conducive environment for such growth, the plan proposed the disinvestment of public enterprises.

Eleventh five-year plan (2007-2012): The plan document outlines that the state-owned enterprises need not be provided with any de facto favourable treatment vis-a-vis the private sector. The plan envisaged greater autonomy and delegation of more powers to the management of public enterprise.

Twelfth five-year plan (2012-2017): This plan foresaw public enterprises to be self-reliant in terms of harvesting funding, becoming competitive, expanding their operations globally, etc. (De, 2014)

1.2 Performance Evaluation of Public Sector Enterprises

Performance evaluation is a vital facet of performance management. It is a mechanism to trail the enterprise's performance consistently and measurably to ensure improvement in organisational efficiency and to achieve better outcomes. This tradition is much adapted in the private sector but today, employing the same for the public sector is essentially needed. Internationally many of the problems of public enterprises are traceable to inadequacies in performance management (Jones et al., 1991). Performance evaluation is an assessment of the results of the activities of an enterprise towards the achievement of its defined objectives and the wealth added by the enterprise. Periodic evaluation of the performance of public sector enterprises is important for the success of economic plans in developing countries (Chandra, 1975). The public sector in India

has always played a vital role in the country in achieving socio-economic development. Public enterprise performance and performance evaluation have become important areas of discussion, especially in developing countries (John, 2019). The success of the Indian economy in terms of growth and social gain hinges on the performance of public enterprises (Baporikar, 1999). The public sector enterprises established as major instruments of government in various sectors of the economy have made significant contributions to society, economy and industry. However, the monetary ability of public sector enterprises was initially deliberately overlooked because the social gain was the need then and not the financial profits. The social gain has benefitted the masses in various ways but the continued financial losses have laid a huge financial burden on the government. These enterprises could not justify the rationale to attain broader development goals. In this scenario, the public sector enterprises have come under severe criticism both by the government and the society. This brought a fundamental change in the policy about the public enterprises and financial profitability along with social gain became the usual norm for the public enterprises. To improve the efficiency of public enterprises, it is essential to have continuous evaluation of their performance. However, the major constraint in the performance evaluation of public enterprises is the selection of suitable criteria. However, the problem of performance evaluation of public enterprises with suitable criteria both for central and state public enterprises has remained unsolved to a large extent (Mathew, 1997). Usually, the objectives of the enterprise themselves spell out the criterion for measuring its performance. However, it is difficult in the case of public enterprises as its main objective is to attain maximum social good and accelerate economic growth. Such an objective is difficult to define and even more difficult to put in any operational form (Chandra, 1975). The twin objectives of public enterprises of achieving economic growth and fulfilling social obligations are mutually conflicting in nature. The accomplishment of these objectives in practice is very difficult and makes performance evaluation difficult. Considering the multi-dimensional purview of public enterprise, the criteria for evaluating the performance should be a combination of multiple quantitative and qualitative indicators based on its multiple objectives (Kar, 1988). In fact, the process of performance evaluation should follow the sequential order of identifying the established objectives, constructing indicators to measure the degree of accomplishment of objectives and then measuring the performance. However, the difficulty in the whole procedure concerns the objectives which are hardly ever specified clearly and unambiguously. Moreover, the objectives of

the public enterprise are inconsistent, multiple and conflicting. A positive and scientific approach to measuring the performance of public enterprises is very important for the management of public enterprises, the government and the citizens. The most valuable outcome of performance studies is to explore the scope for improvement in the operations and management of public enterprises. Performance evaluation provides a valuable guideline for the control mechanism to the management (Fatta Bahadur K, 2000). According to (Jenkins, 1979), public enterprises are established with threefold objectives namely, financial, economic and social objectives. Thus, the performance of public enterprises should be evaluated within the framework of these objectives using suitable indicators.

Various agencies in India have been assessing the performance of public enterprises from a different perspective such as the Bureau of Public Enterprises assesses its performance based on its annual reports, Audit Boards that perform efficiency-cum-proprietary audit of these enterprises, the Parliamentary Committee on Public Undertakings assesses the managerial efficiency with commercial prospects. These agencies represent the interests of various groups to whom these enterprises are accountable. In the absence of well-defined objectives for the enterprise, it is difficult to identify appropriate criteria for performance evaluation and assess their overall performance. Thus, there is a need to develop a comprehensive performance evaluation framework (Mascarenhas, 1974).

The Indian government has made consistent efforts to enhance the performance of public sector enterprises through many reforms ushered from time to time. The most important among such reforms is the introduction of the MOU (Memorandum of Understanding) system in the 1980s as recommended by the Arjun Sengupta Committee which highlighted the importance of the MOU system for improving the performance of state public sector enterprises. The MOU system involves goal setting, evaluating the performance of these goals and rewarding the performance by rating the enterprises. In the case of Central Public Sector Enterprises (CPSEs) in India, their performance is regularly evaluated through the MOU system by the Department of Public Enterprises under the Ministry of Finance. The MOU framework assesses the efficacy of these enterprises towards the fulfilment of core objectives for which they have been constituted. The Arjun Sengupta Committee appointed by the Government of India to devise an instrument for performance evaluation of public sector enterprises

recommended that the government should manage public sector enterprises in a commercially viable manner and judge their performance taking into account both social and financial objectives into measurable parameters. As signing an MOU is not mandatory for state public sector enterprises, the problem of performance evaluation for state public sector enterprises has remained largely unresolved (Mishra Ram Kumar & Potaraju Geeta, 2016). Thus, performance evaluation of public sector enterprises is a necessity but challenging because of its multiple objectives, multiple stakeholders leading to greater conflict of interest, difficulty in measuring the output, difficulty in identifying quantifiable output and many metrics of qualitative nature are difficult to measure due to its subjectivity. The Department of Public Enterprises in India also issued guidelines on various aspects of corporate governance in public sector enterprises to protect the interest of stakeholders of public enterprises.

1.3 Research Gap

The public sector enterprises have been the driving force to promote economic growth in the developing economies and are vital to the economy. Thus, to recognize their contribution to the economy and enhance their efficiency, performance evaluation and management of the enterprise is gaining importance. Based on the literature review it is noticed that performance evaluation of public sector enterprises has been an attraction for many researchers and has been looked upon from different perspectives. Evaluating the performance using a financial dimension has been a common practice in many studies in the past and has increased both in volume and depth covering a wide range of issues relating to financial management in public sector enterprises. Specific studies reviewed based on financial dimension include (Gupta, 2005), (Baporikar, 1999), (Seetharaman, 2000), (Trivedi, 2010), (Pal, 2013), (Sharma & Das, 2016), (Ghuman, 2001), (George & Vinod, 2016), (Chauhan, 2018), (Yameen & Pervez, 2016), (Taqi et al., 2018), (Neshat, 2018), (Mushahid, 2018), (Maurya et al., 2015), (Dalayeen, 2017), (S. Gupta, 2010), (Bhunia, n.d.), (Jain et al., 2014), (Beena, 2012), (Bala, 1993), (Chauhan, 2006), (Kar, 1988), (Ajmal, 2016), (Gandhi, 2007), (Goel, 2000), (Manaickavasugi, 2011). The studies based on financial dimensions covered a wide range of areas including profitability analysis, liquidity analysis, analysis of leverage, the efficiency of asset management, financial statement analysis, management of finances, analysis of capital structure, management of working capital, etc.

In some studies, researchers have accompanied the financial dimension with other dimensions such as their economic performance, economic value added, cost efficiency, operational efficiency, etc. In the past, evaluation of the performance of public sector enterprises based on their social contributions has also caught the attention of many researchers such as (Sengupta, 1989), (Testi & Bellucci, 2011), (Quadeer, n.d.), (Bagnoli & Megali, 2011), (Garde-Sanchez et al., 2018), (Gupta, 2017), (Nandi, 2012). Few studies attempted to develop a framework for performance evaluation like (Mathew, 1997), (Chithran & Chandrasekar, 2019) and (Ramamurti, 1987). Studies relating to various functional areas of public sector enterprises such as research and development and growth in state-owned enterprises (González Álvarez & Argothy, 2019), public sector enterprises as model employers (Jha, 2015), corporate governance practices in public sector enterprises (Mishra Ram Kumar & Potaraju Geeta, 2016) and (Curi et al., 2016), value-added income concept (Sahoo & Pramanik, 2017) and (Nandi, 2011), role of public enterprises (Baa & Chattoraj, 2022) are also found in the literature.

Based on the literature review it can be summarised, that the role of profit in public sector enterprises cannot be unnoticed but at the same time profitability alone cannot be used to judge the performance of public sector enterprises in the presence of its non-commercial obligations. Many researchers have been influential in arguing that the traditional financial measures are insufficient to measure the performance of public sector enterprises and that broader measures are needed to assess their performance. The problem faced in the performance evaluation of public sector enterprises is with respect to determining the criteria because of the multiplicity and imperceptibility of its objectives. Various studies have been conducted in this area but still, there is no academic consensus on the uniform criteria and methodology to measure the performance of both central and state-level public enterprises. The absence of well-defined criteria for the performance evaluation of public sector enterprises and a well-established framework for the performance evaluation of public sector enterprises is a significant gap in the literature. Moreover, the performance of public sector enterprises is guided by multiple financial and non-financial objectives, so there is a need to have a comprehensive performance evaluation system based on its multiple objectives.

Also, there exists a research gap with respect to the methodology to evaluate the performance of public enterprises. Most studies have used financial ratios and statistical techniques such as correlation, regression, trend analysis, and ranking techniques, etc., to evaluate the performance. Some studies have introduced specific techniques like Data

Envelopment Analysis, Balanced Scorecard method, Altman's Z score model, etc. in performance evaluation of public sector enterprises. Suitably incorporating multiple performance indicators in a comprehensive performance evaluation system can be viewed as a multi-criteria decision-making (MCDM) problem. As it is evident from the literature review, the application of a multi-criteria decision-making approach to evaluate the performance of public sector undertakings is a hardly ever researched area. Hence application of a multi-criteria decision-making approach in this area of study adds uniqueness to the study.

1.4 Need of the Study

For improving the performance of public sector enterprises, it is necessary to have a continuous evaluation of their performance. As it is rightly said "what can be measured can be improved", thus it is essential to evolve a framework of performance evaluation of public enterprises which should be computable in terms of the outcomes that a public enterprise is expected to produce (Mathew, 1997). The framework for performance evaluation of public sector enterprises is both a challenge and a necessity for policymakers, academia and civil society (Ramona Lobonț, O & Bociu, 2021). Most studies have addressed problems in defining the indicators of performance measurement and a system for objective evaluation of the performance of public enterprises. Rarely any study covered multiple objectives of the establishment of public enterprise under one composite framework of performance evaluation. Thus, the study aims to present a framework of performance evaluation for public sector enterprises which includes identification of suitable criteria for measuring their performance and methodology for a comprehensive evaluation of the enterprise performance. The study focuses on multi-criteria performance measurement as an important aspect of the performance evaluation of public sector enterprises.

1.5 Scope of the Study

The study aims at identifying suitable criteria for measuring the performance of public enterprises and developing a composite model to calculate the performance score of the enterprise. The study assumes a multi-dimensional approach in developing the framework. The study also extends to performing relative performance analysis and ranking among the firms.

1.6 Objectives of the Study

The study covers two major facets of the performance evaluation of public sector enterprises. The first part of the study aims to develop a comprehensive generic model for the performance evaluation of public sector enterprises which can be replicated across India or abroad to evaluate the performance of any central or state-level public sector enterprise. The second part of the study aims to demonstrate the developed framework through a notional example of select state-level public sector enterprises. The study also extends to demonstrate an MCDM methodology for relative performance analysis and ranking among the firms.

The specific objectives of the study are

Objective 1: To develop a comprehensive framework to assess the performance of public sector enterprises.

1.1 To explicate the problem in performance evaluation of public sector enterprises.

1.2 To establish key performance indicators for an objective performance evaluation of public sector enterprises.

1.3 To develop a model for performance evaluation.

Objective 2: To evaluate the performance of select public sector enterprises using the developed framework.

Objective 3: To perform relative performance evaluation among the select enterprises

1.7 Research Questions

1. Can profitability alone be the suitable criterion for performance evaluation of public sector enterprises?
2. Does social performance override the financial performance of public sector enterprises?
3. Is contribution to the economy more important than the financial performance of public sector enterprises?
4. Is the physical performance of public sector enterprises a more significant indicator than the financial performance?

5. Can a multi-criteria decision-making approach be applied to evaluate the performance of public sector enterprises?

1.8 Research Methodology

This section briefly describes the design of the study which is broadly in two parts i.e., developing the framework for performance evaluation of public sector enterprises and demonstrating the developed framework by actually evaluating the performance of select state-level public enterprises. The methodology used in the study comprising of the period of study, sample design, data variables and data sources and various techniques used to achieve the objectives of the study is as follows:

Objective 1: To develop a comprehensive framework to assess the performance of public sector enterprises.

Sub-objectives:

1.1 To explicate the problem in performance evaluation of public sector enterprises.

To understand and explain the problem in the performance evaluation of public sector enterprises, a narrative approach is used based on the secondary data from books, research articles, working papers, etc.

1.2 To establish key performance indicators for an objective performance evaluation of State Level Public Sector Enterprises.

The performance indicators are established using the narrative approach based on the secondary data gathered from books, research articles, working papers, etc.

1.3 To develop a model for performance evaluation.

The study applies a multi-criteria approach to evaluate the performance based on both commercial and non-commercial objectives of the enterprise. In this study, the most widely used MCDM technique- conventional Analytical Hierarchy Process (AHP) developed by Thomas Saaty in 1977 (Saaty, 1977) is used to quantify the identified key performance indicators. The model for performance evaluation is developed based on the criteria weights. Primary data for generating criteria and sub-criteria weights for the performance evaluation model is obtained from the experts. Using the Delphi method, the input data on the qualitative scale

is collected from 20 experts who are the stakeholders of the public sector undertakings. In the Delphi method, it is often recommended to have a smaller group of between 9-18 participants in order to avoid the difficulty of reaching a consensus among experts. The expert panel is carefully built based on the sufficient knowledge and experience on the survey issue and their capacity, willingness & time to participate. A structured questionnaire developed on a nine-point preference scale suggested by Saaty is administered to all the experts selected for the survey. Before administering the questionnaire to the respondents, an inter-rater agreement (reliability), content validity and face validity were checked by 7 experts appropriately chosen from academic and practical fields. The quantitative approach is used to analyse the data collected from the respondents. The generated weights are considered for developing the model only after a satisfactory consistency check.

Objective 2: To evaluate the performance of select public sector enterprises using the developed framework.

This objective is the demonstration of the performance evaluation model developed in objective one. For analysis, state-level public sector enterprises in the state of Goa are taken as samples. The performance analysis is done both at the macro level and micro level.

For a macro-overview of the public sector in Goa, secondary data from CAG Reports for a period of 11 years (from 2008-09 to 2018-19) is used. Simple tools such as ratio analysis, CAGR and AAGR, percentage analysis, trend analysis and graphical representation are used to describe the data.

For performance analysis at the enterprise level, data is obtained from secondary sources (annual reports and records of the selected enterprises). The period of study considered is 12 years (from 2008-09 to 2019-20). The state-level public sector enterprises in Goa are selected based on the availability of data for the period under study. Only eight enterprises are considered as samples for analysis and demonstration of the developed framework. Techniques used for analysis are ratio analysis, descriptive statistics and the developed AHP model to ascertain the performance score.

Objective 3: To perform relative performance evaluation among the select enterprises.
This objective aims at relative performance evaluation among the observed units using the MCDM approach. Relative performance evaluation (RPE) is the evaluation of a firm's performance relative to a peer's performance. Relative performance evaluation of enterprises requires ranking the individual enterprise based on the absolute values of their performance parameters. The study has used the VIKOR method which is a commonly used MCDM technique for ranking alternatives. The period of study considered is 12 years (from 2008-09 to 2019-20) for the select state-level public sector enterprises in Goa. The input data for the VIKOR method is obtained in the form of ratios. To mitigate the difficulties associated with the ratios, simple modification or transformation of ratios is done. Ratio transformation is done by replacing each observation with its respective rank within the sample according to its level of superiority. These ranks are then converted into scores by adopting the scoring technique suggested by Garrett. The calculated scores are used as input data for the VIKOR method.

1.9 Organization of the Study

Chapter	Content
Chapter I	*Introduction* - includes the theoretical background, need of the study, scope of the study, research gap, objectives of the study, overview of the research methodology and organization of the study.
Chapter II	*Review of Literature* - presents an overview of relevant literature related to the theoretical propositions on performance analysis of public sector enterprises, studies on performance evaluation of public sector enterprises using various dimensions and also studies based on the application of the MCDM approach.
Chapter III	*Research methodology* - presents the detailed methodology used in the study for identifying the performance indicators, developing the performance evaluation model and for relative performance analysis among the firms.

Chapter IV	*Performance Evaluation Framework* - covers the identification of criteria for performance evaluation, their operational definitions and the AHP analysis for the development of the model.
Chapter V	*Performance of State Public Sector Enterprises in Goa– a macro view* - includes a brief overview of the public sector enterprises in the state of Goa.
Chapter VI	*Performance Analysis of Public Sector Enterprises* - covers the performance analysis of select public sector enterprises in Goa using the developed model and also relative performance analysis of select public sector enterprises in Goa followed by interpretation of the results.
Chapter VII	*Relative Performance Evaluation* - demonstrates the methodology for relative performance analysis and ranking of the firms using VIKOR analysis.
Chapter VIII	*Findings, Conclusion and Suggestion* - summarizes the findings, provides conclusion and suggestions, implications of the study, contribution of the study, limitations, and scope for further research.

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Chapter Two

Literature Review

Adequate research work has been done on the performance measurement of public sector enterprises at the central and state levels, in India and abroad. Past studies have evaluated the performance of public sector enterprises through varied dimensions and varied methodologies. The main consideration in reviewing the past literature in this field is to undergo a detailed assessment of the findings and propositions made in these studies and identify the research gap to formulate the present study.

The literature review is covered in three broad categories:

- The theoretical propositions made in the past studies on performance evaluation of public sector enterprises.
- Various methods and dimension used in the literature to evaluate the performance of public sector enterprises.
- Applications of MCDM approach.

2.1 Theoretical Propositions on Performance Evaluation of Public Sector Enterprises

Performance evaluation has been a challenging subject in the performance management of public sector enterprises due to its multiple conflicting objectives and multiple evaluating agencies with differing objectives of the evaluation. The evidence of the same is witnessed through the theoretical propositions in the existing literature.

According to Chandra (1975), the measurement of the performance of public sector enterprises is a complex question and should be done in relation to the objectives of the enterprise that spell out the criterion of measuring its performance. Pestieau (1989) said that the establishment of the public enterprise rests on the "Principal-Agent" relationship. Thus, the economic efficiency of public sector enterprises in terms of their contribution to the economy is one of the prime considerations in the performance evaluation of public enterprises. In the opinion of Ramamurti (1987) a large portion of public funds have been actually invested in these enterprises therefore while evaluating the performance of public sector enterprises it is necessary to consider the economic and social justification of these enterprises in terms of the value it adds to the economy and the society. Jones et al. (1991)

revealed that the construction of performance evaluation criteria for public sector enterprises is challenging not because its objectives are multiple but because some of the objectives are difficult or impossible to quantify. Smith (1995) suggested that the performance measures should be indicators of outcome of enterprise activity but there is no consensus as to how such outcome is to be evaluated. The problem faced by all evaluators is considering the financial and non-financial indicators in a single performance index. Sastry K.S. (1990); Mathew (1997) on examining various existing systems of performance evaluation for state-level public sector enterprises found that the yardstick of only profit miserably fails for public sector enterprises. It is necessary to consider the total additions these enterprises make to the economy. Supporting this proposition, Ahuja & Majumdar (1998) stated that contradictory perceptions of public interest and conflicting directions further compound the problem of performance evaluation and purely financial indicators of performance are inappropriate. Ghuman (2001) also suggested that there is a need to account for the resources spent by public sector enterprises on social obligations while measuring their performance. According to Chauhan (2006), profit maximization may not be the sole criterion to judge the performance of public sector enterprises, but it would be folly to ignore it altogether. According to Aharoni (1981), profit maximization is widely regarded as the appropriate goal for private firms, especially from the standpoint of their shareholders, in the case of public enterprises, it is one of the several goals and not the most important goal. Even Testi & Bellucci (2011) suggested that evaluating the performance of public sector enterprises with economic dimensions is necessary but not sufficient. Rather it should be done taking into account both its economic and social dimensions. Though profit-making of state-owned enterprises is important, focusing only on profitability as the assessment criteria will mislead the policymakers. Keeping in mind the nature of state-owned enterprises is to generate social welfare and not profit, improving social welfare rather than profit-making should be duly taken into account when evaluating their performance as suggested by Taghizadeh-hesary et al. (2019). Nandi (2010, 2011, 2012) found that it has been a long-standing practice to evaluate the performance of business enterprises based on financial measures. However, a change in evaluation methodology is needed for public sector enterprises that have not been established solely with a profit motive. The conventional performance measurement based on financial information fails to highlight the sharing of the firm's earnings among the stakeholders. Thus, the concept of value-added income is a most significant tool for appraising the performance of public

enterprises whose operations affect the social and economic well-being of the entire community. Also, the financial performance highlights the true and fair view of an enterprise but fails to highlight the contribution made by the organizations towards corporate social responsibility performance which is of great significance in the case of public sector enterprises. In the view of Bagnoli & Megali (2011), unlike other non-profit organizations, public sector enterprises are "enterprises" therefore their social goals are to be pursued only by respecting their economic and financial efficiency**.** The financial performance of public sector enterprises is not irrelevant but in India and many other countries government expects Public Sector Enterprises to promote the "Public Interest" rather than profit maximisation. As suggested by Diana (2014), the public organization's objectives are not only economic but are of a social nature. Therefore, measuring its performance based on only financial indicators has become an unsafe practice. The introduction of multi-dimensional models including financial and non-financial indicators of the performance of public enterprises are undeniable enhancements in the performance measurement practices. According to Klovienė & Gimžauskienė (2014), while performance measurement of state enterprises is a useful tool, there exist peculiarities in performance measurement such as no distinction of commercial and non-commercial activities the financial statement, lack of social responsibility information, lack of transparency, huge differences in the accounting practices, etc. To reduce these peculiarities there is a need to strengthen the performance reporting in these enterprises. A combination of economic and financial objectives with social and political arms invariably makes it difficult to devise an appropriate performance measurement instrument. In the view of Ogohi (2014), a mere profitability review is assumed to ignore the socio-economic objectives associated with the public sector enterprises. Moreover, according to Chauhan (2018), public sector enterprises have come under the scanner of many sections for their poor performance because their performance is usually judged by the yardstick of profit in terms, of business which can't be employed for the public sector as it has invested in sectors where profitability is low and gestation period is long. Ayub & Hegstad (1987) found that public enterprises are often expected to pursue social objectives as diverse as redistributing income, subsidising particular regions of a country and creating employment. The problem is not in the fulfilment of these objectives which can often be desirable. The problem is that the multiple objectives that are not prioritised allow the social goal to be an excuse for their poor performance. Chithran & Chandrasekar (2019) in an attempt to identify the relevant criteria for establishing an objective

performance evaluation system and develop a model for performance evaluation realised that total performance of public enterprise cannot be measured in terms of physical and financial performance indicators alone. A unified problem-solving approach could be a good solution to this problem. Ramona Lobonț, O. & Bociu (2021) revealed that the problem with regard to the performance measurement of public sector enterprises is to identify relevant methodologies and indicators to represent the barometer of its overall performance. According to Pardeshi & Thorat (2014), to measure the true efficiency of public sector enterprises, it is necessary to assess the achievement of the objectives assigned to them along with their profitability as public sector enterprises stand for social profit and not-for-profit. Nayar (1990) revealed that the performance of public enterprises has been notably below par as mere profitability review ignores the socio-economic objectives of the enterprise. Jenkins (1979) interprets that public enterprises are established with threefold objectives namely, financial, economic and social objectives. Thus, the performance of public enterprises should be evaluated within the framework of these objectives using suitable indicators. Mascarenhas (1974) suggested that while assessing the performance of public enterprises, a set of criteria examining the degree of fulfilment of its objectives should be identified rather than emphasizing on profit maximisation alone. Though profitability is an important indicator of an enterprise's performance, it has limited perspective when used as an exclusive criterion to evaluate the performance of public enterprises. When public enterprises perform multiple activities under varied economic conditions it is difficult to measure their performance using the criterion of profitability alone. Kar (1988) is of the opinion that the system of performance evaluation of public sector enterprises is complicated due to the existence of multiple dimensional purviews of its performance requiring enquiry into three distinct elements of performance efficiency, productive efficiency and response to social goals.

2.2 Varied Dimensions in Performance Evaluation of Public Sector Enterprises

During decades of research, studies have been done on performance evaluation of central and state public sector enterprises in India and abroad using different dimensions of performance. Most studies have used financial performance and related areas to evaluate the performance of public sector enterprises at the central or state level, at an enterprise level or sector-wise. In some studies, researchers have accompanied the financial dimension with the socio-economic contributions of public enterprises in accordance with the role and objectives of the enterprise. Therefore, an attempt has been

made to review studies and explore different dimensions used in the performance evaluation of public enterprises:

According to Mascarenhas (1974), the performance of public enterprises in India performing various activities should be assessed based on a set of criteria examining the degree of fulfilment of its objectives rather than emphasizing on profit maximisation alone. In this study, the author presented a systems approach to measure the performance of public enterprises in India taking into account the multiple objectives of the public enterprises and formulated a three-tier approach based on the broad national objectives which are further broken down into sectoral objectives and unit level objectives. The national-level objectives include a contribution to national wealth, distribution of national wealth, self-reliance, balanced regional growth and exports. Whereas sectoral-level objectives covered output targets, rate of return on investment, technical advancement, resource utilisation and employment. Unit-level objectives identified in the study include satisfying interests, producing output, efficient use of resources, and investment in the systems. It was found that performance at all three levels is interrelated and performance at one level affects the performance at other level.

Chowdhury (1984) analysed the performance of industrial and commercial central public sector enterprises based on their seven objectives treated as seven yardsticks to measure their performance. The parameters used in the study include growth per capita value added at fixed prices, return on investment, rate of creation in new employment, cost of creation of new employment, percentage increase in value of work done, and percentage increase in value of import substitution. The findings of the study reflected the inability of the top profit-making firms to achieve their objectives. The author recommends measuring the performance in a single comparative index that should be easy to understand for a layperson and should be based on the objectives of the enterprise.

Trivedi (1986) focused on the search for appropriate criteria for performance evaluation and application of incentive schemes. According to the author, like private enterprises, public enterprises must be evaluated but should not be evaluated on the basis of the same criteria as private enterprises. There are two prerequisites for producing superior performance from public enterprises. First, an appropriate criterion for evaluation of their performance and second, appropriate incentive schemes so that the managers will be willing to do their best of this criterion.

Mahmood et al. (1987) measured the operational performance of seven public enterprises in Pakistan using some economic indicators such as growth rate in value-added and employment, capital-output ratio, capital-labour ratio, and rates of return. Though these indicators were an improvement over the purely financial measures used for the performance evaluation of public enterprises but a broader framework is needed. The framework for evaluating the performance should take into account the wider objectives of the enterprise for which it is established. The article also stresses on decentralisation of decision-making to the directors and management and strengthening their capabilities.

Pestieau (1989) rightly argued on efficiency consideration in the public sector enterprises and stressed on measuring the economic performance of public sector enterprises. The study also outlined a method for measuring the performance of public sector enterprises and advocated its adoption at the time of sale or deregulatory regime of the firms. The study mainly focused on the nature of the public enterprise as "public" and its participation in the execution of the government's objectives. Thus, it recommends that the performance of public enterprise is to be evaluated by the degree to which it achieves its objectives.

Sankar et al. (1990) observed that the State Level Public Enterprises have had a spectacular growth in terms of number and investment in independent India. These enterprises however differ from the central public sector enterprises in terms of the diversity of operations, origins and objectives. The SLPEs are engaged in a variety of activities and specific sectors such as the development of industries, promotion of finances, contract and construction, trading and marketing, promotion of tourism, provision of transport, development of agro-industries, forest and fisheries, development of backward areas and weaker section of society, etc.

According to Cannon & Fry (1992) , since performance measurement has mounted to the top of the agenda of public sector performance management, the Government has acknowledged the link between the performance of the public sector and the performance of the national economy. Thus, at a global level, many governments are looking out for ways to improve their public sector. In this discussion paper, the authors have addressed the practical issues faced while developing the performance measurement system and examined the common obstacles in the performance

measurement. The authors have opined that measuring the performance in the public sector can be more difficult than in the private sector as the private sector is dominated by the profit motive but in the public sector performance measurement tends to be more complicated and multi-dimensional.

Shaikh (1992) evaluated the performance of Malaysia's public enterprises on the basis of profitability and cost efficiency and also compared it to private enterprises in Malaysia. It was found that the efficiency of public enterprises was relatively poor due to the absence of an adequate evaluation system, lack of clarity of objectives, plurality of principals and lack of transparency. Many public enterprises were created to meet socio-economic objectives. While pursuing these socio-economic objectives, these enterprises have to incur higher costs and thus appear worse in terms of profitability. Flawed investment decision also appears to be a reason for the poor performance of public enterprises due to a lack of feasibility study, technology-related problems and faulty debt structure. Other reasons for poor performance include their pricing policies, absence of incentives, etc.

Bala (1993) evaluated the capital structure, financial health and profitability of state-level public sector enterprises in Haryana using ratio analysis and t-test. The profitability of enterprises was far from satisfactory. It was suggested by the author that the returns of the enterprises can be increased by treating them as commercial undertakings and by seeking the help of financial experts. The study also propagates the necessity of financial appraisal of public sector enterprises as it not only helps in pinpointing the deviations from the achievement of its goals but also ensures efficient utilisation of available resources.

Ahuja & Majumdar (1998) in their article assessed the performance of Indian state-owned enterprises in the manufacturing sector to examine the determinants of their performance using Data Envelopment Analysis and pooled cross-sectional regression analysis. They found that the performance of firms in the Indian state-owned sector is characterized by both, low performance, as well as significant and systematic variations in the performance parameters. It was also observed that the size of the firm is positively associated and the age of the firm is negatively associated with the efficiency of the enterprise. Smaller and older manufacturing firms can be candidates for privatization.

Baporikar (1999) conducted a study on some select central public sector enterprises to analyse their financial performance and study the inter-relationship between different aspects of performance indices which have a bearing on the financial management and an influence on profitability. It was observed that no systematic financial management, inefficient working capital management especially inventory management, high debtor's collection period, improper cash management, overdependence on trade credit and current liabilities for financing working capital, and imbalance in debt-equity ratios resulted in escalated losses. Social objectives overriding the objective of profit and improper management of working capital have affected the profitability and liquidity of PSEs. The author suggested public enterprises that are beyond repair to be considered for privatization, especially commercial undertakings.

Seetharaman (2000) assessed the operating and financial performance of select central public sector enterprises in India belonging to the Heavy and Medium Engineering Sector. He aimed to evaluate the value added by these enterprises, relative changes in their managerial efficiency and the determinants of capital formation and mobilisation of funds in these enterprises. The operating efficiency was measured in terms of capital-output ratio, factor productivities and operating cost ratios using Kendrick, Solow and Divisia productivity indices and Cobb Douglas Model. The financial performance was assessed based on the financial ratios using principal component analysis and multiple regression. He made the observation that the quantum of investments in inventories was influenced by capital formation and liquidity considerations. Poor financial performance and poor returns have resulted in poor generation of internal sources of funds. The profitability of the enterprise is positively associated with the better management of funds. Optimal use of resources would enable the firms to generate sufficient cash flows and surpluses.

According to Ghuman (2001), the significance of public enterprises is not just to the development of the Indian economy, but likewise to the social well-being of the community. Thus, he assessed the contribution of public sector enterprises in India towards social and economic development using parameters- a ratio of gross profit to capital employed, ratio of net profit to capital employed, internal resource generation and contribution to exchequer into two sub-periods- the pre-reform period from 1983-91 and the post-reform period from 1992-2000. The study shows that the public

enterprises showed remarkable contributions to national income, capital formation, industrialization, and the provision of economic and social infrastructure. Their performance in terms of return on capital employed, internal resource generation and contribution to the exchequer has improved in the post-reform period even though the Indian economy was undergoing a downturn. The decreased budgetary support from the government has enabled them to improve their ability to generate resources internally.

Bahadur (2003) in his study reviewed the overall performance of public enterprises in Nepal based on the established objectives of the enterprise which were classified into six groups namely, general performance, financial performance, economic performance, physical performance, management performance and investment performance. Also, an attempt was made to identify the cause of their poor performance and suitable measures for improving the performance. The findings of the study show that though the public enterprises in Nepal have assisted in the development of the economy, their functioning is not efficient nor are able to achieve their financial, social and economic goals. The study identified that excessive political interference, inadequate autonomy and accountability, absence of professionalism, financial indiscipline and conflicting goals are responsible for the inefficiency of public enterprises in Nepal. The author suggests for improvement of their performance by allowing greater autonomy and accountability and introducing a reward and punishment system linked with performance. In the opinion of the author, the performance of public enterprise should be interpreted in terms of success in achieving its stated objectives and the process should follow the chronological order of identifying the established objectives, constructing indicators to measure the degree of accomplishment of objectives and then measuring the performance. However, the difficulty in the whole process is with respect to the objectives of public enterprise that are inconsistent, multiple and conflicting.

In the opinion of Jain P. K & Yadav S. S. (2005), financial management of resources in terms of profitability is the most important aspect of the operational efficiency of an enterprise. The study assessed the financial performance of central public sector enterprises in terms of profitability based on the rate of return on capital employed, return on shareholders' equity and return on total assets. All the units showed satisfactory rates of returns, thereby contradicting the popular belief that public enterprises are not profitable. The improved profitability of public enterprise is due to various steps of the

government such as professionalism of the boards, periodic performance review, signing of MOUs, rationalisation of manpower, technological upgradation, etc. The study suggests that profitability alone should not be a measure of performance evaluation of public enterprises. It would be appropriate to take into consideration their total contribution to the government.

Jain & Yadav (2005) assessed the financial management of public sector enterprises in India in terms of profitability. The sample public sector enterprises showed satisfactory rates of return on capital employed signifying that the funds of owners and lenders are used efficiently. They stressed that profitability alone should not be a measure of performance evaluation of the public sector enterprises, it would be appropriate to take into account their total contribution to the government for this purpose.

Gupta (2005) conducted a financial appraisal of Himachal Pradesh State Forest Corporation to analyse overall growth, financial performance, financial omissions and commissions and assess the socio-economic contributions of the corporation. Applying financial analysis tools and statistical tools like correlation and factor analysis, it was observed that the corporation is facing financial difficulties such as high operating costs, unsatisfactory profitability and long-term financial strength, adequacy of working capital but huge investment in inventories, violation of some of the accounting standards, etc. The author strongly opined a need to change the bureaucratic outlook of the corporation and make it autonomous to improve the overall performance.

According to S. Gupta (2010), given the role of overcoming socio-economic problems, the performance of public sector enterprises in India is not guided solely by commercial principles. The poor performance of the large number of public sector enterprises in India to some extent is attributable to their social responsibilities, withdrawal of financial assistance and competitive environment. Their non-profitable operations have led them to the burden of borrowings, high incidence of interest and escalating losses. The Government of India in 1991, introduced strategic and economic policy reforms to make the public sector enterprises financially viable and self-reliant while at the same time meeting their social responsibilities efficiently. The author has made an attempt to assess the impact of the liberalization and disinvestment policies and the signing of MOUs on the financial performance of the public sector enterprises. The study was conducted on 209 central public sector enterprises in three phases- the initial reform period, the

intermediate reform period and the matured reform period. The analysis of the financial performance revealed that the liberalization has yielded a positive impact on the performance of the enterprises under study.

Trivedi (2010) analysed the financial viability of the state transport corporation in Gujarat. The study identified that the corporation suffers from poor financial performance, underutilization of resources, operational inefficiencies, inadequate growth in activity, over-dependence on borrowings, etc. It is also observed that the increased cost of operations and decreased profit together contribute to the financial weakness of the corporation. Thus, to improve efficiency in the operation and restore the financial health of the corporation, appropriate measures should be taken to increase revenue, control costs and improve its service quality.

According to Nandi (2010), financial performance analysis of public sector enterprises reveals the true and fair view of the enterprise but it fails to reveal the contribution of the enterprise towards social responsibility which is the primary objective of public sector enterprise. Thus, the study attempted to critically evaluate the financial and social performance of select central public sector enterprises with specific indicators of profitability, internal resource generation, contribution to the exchequer, employment generation and foreign exchange earnings. The findings showed improved performance of the selected enterprises in terms of their social contribution and have squashed the criticisms of their performance by keeping far away the essential profit motive of business enterprises in the better interest of the common mass.

Nandi (2011) stated that the traditional financial ratios are generally used to measure the performance of an enterprise but progressively it is realised that the Public Sector Enterprises (PSEs) are expected to contribute towards value addition in the society rather than earning financial income. Thus, their performance measurement should shift from the financial income concept to the value-added income concept. This paper evaluated the performance of 20 selected PSEs in India, taking five each from four core public sectors based on the amount of value addition and eight important ratios relating to the value-added statement and a combined rank. The 'final ranking' arrived at a comprehensive measure of performance in which the ultimate rank of eight selected ratios has been combined in a point score. The author concludes that VAS is a very useful measure for evaluating the productivity and performance of both public and private

sector enterprises for managerial decision-making and for interfirm comparisons. He also suggested that the Companies Act of different countries should make provisions for preparing the VAS and highlight the importance of value-added statements and standardization of the arrangement of the data in the VAS.

Singh & Chittedi (2011) noticed that due to the unsatisfactory performance of public sector enterprises, the Government of India took some policy measures in the early 1990s, i.e., the New Industrial Policy, 1991. These policy measures have been adopted to improve the performance of PSEs. Thus, the study aimed to analyse the impact of liberalisation on the performance of central public sector enterprises using the indicators of profitability, the share of the enterprise in GDP, the share of enterprise in gross domestic capital formation, investment in research and development activities, share of internal resource generated to plan outlay and number of employees. The findings suggest that the performance of public sector enterprises has improved in response to the liberalization measures. The financing has undergone a shift from budgetary support to internal resources. The research and development expenditure which is the key indicator of the competitiveness and innovation behaviour of the enterprises was a bit high in the pre-reform period.

Hester & Meyers (2012), found that in spite of decades of significant research done to explore systems of measuring the performance of public sector enterprises, still there is no concrete consensus among the practitioners and academicians with regard to the system for performance evaluation of public enterprises. In this study, the authors have led a forward-thinking by developing a systemic approach to evaluate the performance of public enterprises through operational tests and evaluation through multi-criteria decision analysis. The combined approach facilitates decisions regarding organizational performance and potential for improvement irrespective of whether public or private sector. The study also demonstrated the framework with a hypothetical example of the transport industry.

Avadhanam & Mishra (2013) attempted to evaluate the performance of public sector enterprises by applying the technique of EVA for 46 companies quoted at the Bombay Stock Exchange using two models- capital asset pricing model to calculate the cost of equity and EVA. It is found that, central public sector enterprises under study were able to generate positive EVA from 2005-06 to 2008-09. Also, there is a need for these

enterprises to increase the capital turnover by paying more attention to capital employed and to excess working capital.

Sarkar (2013) assessed the financial performance of selected Public Sector Oil and Gas Companies in terms of their financial structure, capital structure, solvency, liquidity management and efficiency in total cost management, profitability, internal resource generation, contribution to central exchequer and value addition. Based on the calculated performance index, utilization index and efficiency index of the enterprises it is observed that there exists a close relationship of long-term solvency with the capital structure and operating results, cost management and asset management significantly contribute towards overall profitability and there is a need to stabilize the rate of value addition in order to add more value to internal resource generation and contribution to the exchequer. The select oil and gas companies have been rendering laudable performance in the overall economic development of India. However, the enterprises are expected to operate in a more compact manner and significantly contribute to the exchequer thereby helping in funding developmental policies and accelerating the pace of socio-economic development in the country.

Pardeshi & Thorat (2014) examined the performance of CPSEs on the basis of their financial and social contributions. Financial contribution is assessed in terms of gross profit, net profit, investment and turnover of the enterprise. Social contributions are assessed using the parameters such as contribution to economic development in terms of share of output in GDP, formation of capital and savings in terms of share of public sector enterprise in gross domestic capital formation and gross domestic savings at market price, contribution to the exchequer in the form of taxes duties and insurance, export promotion measured through foreign exchange earnings, raising internal resources through retained profits and depreciation, total employment generation and average annual per capita emolument, infrastructure development measured through investment in expenditure on infrastructure projects, developing strong industrial base measured through share of industrial sector in GDP at factor cost, regional development through location of public sector enterprises in undeveloped regions, development of ancillary and small scale industries assessed through the steps taken to accelerate the growth of ancillary industries. The study concludes that, measuring true efficiency of public sector enterprises is necessary to assess the achievement of the objectives

assigned to them along with their profitability. Thus, public sector enterprises stand for social profit and not for profit.

G. Singh (2014) examined the impact of disinvestment on the financial and operating performance of public sector enterprises in the fertiliser and chemical & pharmaceutical sectors. The operational performance is measured based on sales, investment and employment. The financial performance is measured based on financial strength, corporate liquidity and asset usage. Post disinvestment, decline in the operating performance, increase in dependence on outside funds, inefficient utilization of assets etc. are noticed. He suggested that to improve the performance of public enterprises there is a need to focus on providing professional management and full autonomy, efficient use of resources and generating internal resources for expansion and provide for research and development.

Rao (2014) analysed the aspect of profitability of the public sector chemical and fertilizer units in India by examining the relation between different variables like profits, capital and sales. It was found that there is a direct correlation between capital investments and profits. Thus, more and more cash generation for the investment in such types of public sector chemical and fertilizer plants is the need of the hour.

Sur & Chakraborty (2015) analysed the performance of a Maharatna Status Central Public Sector Enterprise BHEL using financial ratios measuring the liquidity, working capital turnover ratio, fixed asset turnover ratio and profitability ratios of the enterprise. To support the social objective of the enterprise, along with financial ratios, the study also analysed the value added to capital employed ratio and the influence of the financial ratios on the value-generating capability of the enterprise. Based on the analysis it was observed that only the earning per share ratio of profitability showed an upward trend and is statistically significant in influencing the value-generating capability of the enterprise. Working capital management also showed a noticeable contribution towards enhancing its value-generating capability.

Koley & Chakraborty (2015) comprehensively examined the overall financial performance of the select central public sector enterprises in India measuring their liquidity, efficiency of asset management and profitability of the firms. A comprehensive rank test was applied for each aspect of financial performance and a composite rank was

obtained for each enterprise. At the same time, the study also assessed the influence of liquidity and efficiency of asset management on the profitability of public enterprises using Spearman's rank correlation. No significant influence of liquidity and efficiency of asset management on the profitability of the public enterprise was noticed.

Maurya et al. (2015) analysed the financial performance of state-level public enterprises in Uttar Pradesh using financial and operating ratios. The authors stated that financial self-dependence along with a certain level of profitability or surplus is quite essential to serve the larger objectives of socio-economic development. Due to poor financial planning, the enterprises reflected poor financial performance. The leverage analysis of the enterprises showed heavy dependence upon the state Government for the capital needs. Thus, on a financial note, the state-level public enterprises in Uttar Pradesh are financial burden on the state budget and are not serving the purpose for which they were set up.

Mohd. Ajmal (2016) evaluated the financial performance of Cement Corporation of India Ltd analysing the performance in terms of liquidity, solvency, efficiency and profitability using common size and comparative statements and Du Pont analysis. Also, the financial health of the corporation was assessed using the Altman's Z score model. The Du Pont analysis revealed that the corporation was not able to fetch adequate profit during the study period due to low leverage, low turnover and low sale volume. The Z score showed financial distress of the company.

Kumar & Das (2016) examined the overall efficiency of public sector steel companies using a non-parametric approach- the Shannon entropy method. The efficiency scores were calculated based on cost, revenue and profit models. The comprehensive performance measure is obtained by combining the efficiency scores of all the three models and the enterprises are ranked based on the comprehensive score. The study shows that the profit model has a larger value of discriminating ability and weight compared to cost and revenue models.

Gupta (2017) conducted a study to evaluate the social costs and social benefits of the public sector undertakings. The study also tried to relate the benefit-cost ratio to the social cost-benefit ratio. Relating the profitability of an enterprise to its contribution to society, the study reveals that profitability is the key factor of social welfare. Profitable

and financially sound enterprises can make a significant contribution to the society and will be more conscious about their responsibility towards society.

Chakrawal & Goyal (2018) analysed the holistic performance of NTPC- a Maharatna company using a balanced scorecard to assess the effectiveness of NTPC in attaining its objectives which are classified into four perspectives business performance, financial performance, customer orientation and R&D. The findings of the study indicates that there is a positive association between the company's objectives and its performance. Overall NTPC shows progressive financial growth and is dynamically engaged in performance improvisation through a feedback system, technological upgradation, collaborations and global initiations and understanding of customer needs and expectations. The performance management system of NTPC meets all its strategic goals. According to the authors, public sector enterprises in India have always portrayed themselves as a benchmark model of performance for sustainable development through social upliftment and at the same time achieving economic goals.

According to Heo (2018), the state-owned enterprises often suffer from inefficiency and poor performance as compared to some private sector enterprises due to agency issues, soft budget constraints, lack of competition and multiple competing objectives. Their underperformance can impede competitiveness and growth and render a fiscal burden and a source of fiscal risk for the state. In response to these problems, many countries have taken measures to improve the performance of state-owned enterprises by including mechanisms for performance monitoring and evaluation. In this direction, corporate governance reforms are gradually well thought-out as important vehicles in improving the performance of state-owned enterprises. Through this study, the author attempted to understand the influence of corporate governance practices on the performance of public sector enterprises using performance indicators such as Return on assets, debt ratio and customer satisfaction and indicators of corporate governance assessed through the board size, board independence, CEO duality, corporatisation and disclosure. It was observed that several aspects of corporate governance practices have a significant association with the firm performance. Thus, improving corporate governance practices could improve the firm's performance.

Neshat (2018) stated that the majority of the public sector units are suffering from inefficiency due to heavy investment in social overheads, inefficient management and

underutilization of capacity. These enterprises need critical and diagnostic approaches to appraise and improve their performance. The study includes the performance appraisal of central public sector enterprises in the Maharatna category in general and the Steel Authority of India Limited in particular. The study also assessed the impact of liquidity, solvency and turnover ratios on the profitability of the enterprise using regression analysis.

Taqi et al. (2018) conducted a study to evaluate the operational efficiency, profitability and financial soundness of the Indian Tourism Development Corporation based on the financial ratios applying correlation and ordinary least square regression method for analysis. The findings of the study show that, though the performance of the corporation was improving day by day but it was still poor like other public sector enterprises. Thus, the government should take the necessary steps to improve its performance.

Salmah (2018) attempted to analyse the EVA and MVA of state-owned enterprises in the Pharmaceutical sub-sector of the Indonesia Stock Exchange. Also, the study tried to find the difference in the EVA and MVA of state-owned enterprises. Measuring EVA and MVA helps investors to analyse the company's financial performance.

Singh (2019) evaluated the contribution of central public sector enterprises towards balanced regional development by examining the trends in investment in Gross Block in various industrially backward states in India. The study revealed that the investment in Gross block increased in the range of 6% to 13% during the FY 2008-09 to 2016-17 except in the FY 2015-16. The investment has increased in most of the states. Thus, it indicates a significant contribution of the central public sector enterprises in the balanced regional development of the country and making the nation self-sufficient in various economic activities.

González Álvarez & Argothy (2019) were of the opinion that investment in research and development is essential for the survival and growth of organisations in the public or private sector. It is a key factor in the innovation process in public enterprises and one of the drivers of the growth of the enterprise and consequently the growth of the economy. Through this study, the authors attempted to estimate the effect of investment in research and development on sales growth in the public enterprises in Ecuador using

OLS. The results showed a positive relationship between the investment in research and development and sales growth in public enterprises.

Deepa (2019) evaluated the financial performance and financial health of select Maharatna status central public sector enterprises using select financial ratios and Altman's Z score model. The analysis of the financial performance of seven central public sector enterprises under study showed better liquidity and solvency positions. Based on the results of Altman's Z score, only 3 out of 7 units under study were financially safe and the remaining units were in grey and distress zone. In view of the crucial role of public sector enterprises in the growth and development of the economy, the failure of these enterprises may affect the socio-economic balance of the country. Hence, it is a cautioning sign to improve the performance of these enterprises.

According to Taghizadeh-hesary et al. (2019), state-owned enterprises play a key role in the economy of many countries. They are usually thought to be in charge of increasing social welfare. At the same time, their relatively low performance poses several problems, including slowing down economic growth. Therefore, it is crucial to implement a comprehensive evaluation method to assess the performance of state-owned enterprises. The study provided an all-inclusive framework for evaluating the performance of state-owned enterprises with the combination of various factors of profitability, operational, structural and per-employee indicators. In total 15 indicators of the performance of 1148 state-owned enterprises in Europe were subjected to principal component analysis and were reduced to five factors that includes profitability, per capita employee productivity, per capita costs, debt due days and solvency. Regression analysis was performed to assess the most deterministic factor among the five factors. The findings showed that solvency and employee variables were more deterministic than other factors. The authors have made a wide-ranging view that profit making of state-owned enterprises is important but, concentrating on profitability as the sole assessment criteria will deceive the policymakers. As state-owned enterprises focus on improving the social welfare rather than profit-making, such objectives should be duly taken into account when evaluating their performance.

Baa & Chattoraj (2022) investigated the role of the public sector in creating financial resources for economic growth and employment generation. According to the study, the public sector is mainly responsible for the provision of basic services like infrastructure,

health, education, security services, etc. This ensures that people have access to a good standard of living. The public sector organization can make it possible through the financial aid it receives from the government from the money from taxes.

2.3 Application of MCDM Approach

Performance evaluation of public sector enterprises is a complex phenomenon as it is governed by multiple conflicting criteria and affects multiple stakeholders. Thus, the problem of performance evaluation of public sector enterprises can be regarded as a multi-criteria decision-making problem and an MCDM approach can be applied. The MCDM approach is widely used in various disciplines for complex decision-making problems using different techniques. Some of the areas of its application and the technique applied are reviewed in this study.

Table 2.1: Literature on the Application of MCDM Approach

Author and year	**MCDM Technique**	**Discipline of research**
Guru & Mahalik (2018)	AHP and VIKOR	Performance of public sector banks
Saleh (2016)	AHP and VIKOR	Personnel selection
Fu et al. (2011)	VIKOR	Benchmarking analysis in the hotel industry
Canco et al. (2021)	AHP	Quality decision-making in the business
Ahmad et al. (2017)	FAHP and VIKOR	Supplier selection in an automotive spare parts manufacturing company
Dincer & Hacioglu (2013)	Fuzzy VIKOR and AHP	Performance Evaluation of the Turkish banks based on customer satisfaction competencies
Rezaie et al. (2014)	FAHP and VIKOR	Performance analysis of Iranian Cement Firms based on their financial ratios

Sennaroglu & Varlik Celebi (2018)	VIKOR and PROMETHEE	Ranking and selection of location for military airport**.**
Alimohammadlou & Bonyani (2017)	Best Worst method and PROMETHEE II	Financial performance analysis of the companies
Zhu et al. (2015)	AHP and VIKOR	Enhancing the objectivity of the decision under a subjective environment.
Jayachitra (2019)	AHP and TOPSIS	Evaluation of profitability and risk management performance of public sector banks in India.
Lin & Ma (2011)	AHP	The problem of evaluation in public decision making.
Ghadikolaei & Esbouei (2014)	Fuzzy AHP and Fuzzy VIKOR	Evaluation of the financial performance of automotive and spares manufacturing companies traded in TSE.
Panagiotis et al. (2018)	AHP	Assessment system for municipalities in Greece in the era of austerity due to economic crisis.
Baydaş & Elma (2021)	PROMETHEE, TOPSIS and WSA	Measuring financial performance of manufacturing companies in Borsa, Istanbul
Lu & Zhu (2018)	AHP	Performance evaluation system for insurance companies using financial and non-financial indicators of performance.

Ameemi (2018)	AHP	Developing an evaluation model for government services based on quality dimensions
Dulange et al. (2014)	AHP	Determining priority weights of the performance measures for Power Loom Textiles based on financial, non-financial and process measures.
Ertuğrul & Karakaşoğlu (2009)	FAHP & TOPSIS	Performance evaluation and ranking of Turkish Cement firms using financial ratios
Demir et al. (2019)	FAHP & VIKOR	Analysis of the best location of Bank Investment in the Kurdistan region of Iraq.
Leal (2020)	AHP-express	Simplified method for the application of AHP based on the assumption of evaluation consistency.
Ishizaka & Labib (2011)	AHP	Review developments of AHP since its inception.
Jayant & Singh (2015)	AHP & VIKOR	Evaluation and selection of 3PL for the mobile manufacturing industry.
Ansari et al. (2011)	FAHP & VIKOR	Selection of distributed electricity generation through renewable energy in India.

Beheshtinia & Omidi (2017)	AHP- Fuzzy TOPSIS & AHP-Fuzzy VIKOR MDL-Fuzzy TOPSIS & MDL- Fuzzy VIKOR	Performance evaluation in the Banking Industry, pilot study of evaluation and ranking of four Banks in Iran.
Zhang et al. (2021)	AHP and its fuzzy-based versions.	Comparative study of traditional AHP and its fuzzy-based versions.
Büyüközkan & Görener (2015)	AHP&VIKOR	Selection and ranking of PD partners.
Aktan & Samut (2013)	FAHP & VIKOR, Sensitivity analysis	Analyse the agricultural performance in Turkey.
H. Singh & Kumar (2011)	AH & VIKOR	Two-phase methodology approach for effective utilization of AMTs and ranking the alternatives.
Sari (2017)	AHP & VIKOR with Monte Carlo Simulation	Evaluation of green supply chain management practices under fuzzy environment.
Ksenija et al. (2017)	FAHP & TOPSIS	Assessment of the Financial Performance of the Serbian Banks.
Mahapatra et al. (2015)	AHP-DEA model	Developed a model for appraisal of organizational performance.
Das et al. (2012)	FAHP-COPRAS model	Measure the relative performance of Indian Institutes of Technology in India
Th & Doumpos (2000)	FINEVA (a combination of PCA and UTASTAR)	Evaluation of the financial performance of Greek Public Enterprises.

Abdel-Basset et al. (2020)	AHP-TOPSIS & VIKOR	Performance evaluation and ranking of steel manufacturing companies.
Ikram et al. (2020)	AHP-Fuzzy VIKOR	Developing IMS and identify the criteria that guide the development of IMS.
Gul et al. (2016)	VIKOR and its extensions	Literature review discussion on VIKOR and its extensions.
Özdağoğlu & Özdağoğlu, (2007)	AHP and Fuzzy AHP	Comparative study of AHP and Fuzzy AHP
Ranjan et al. (2016)	DEMATEL-VIKOR	Performance evaluation and ranking of Indian railway zones.
Moghimi & Anvari, (2014)	Fuzzy AHP and TOPSIS	Evaluation of financial performance of Iranian cement companies and rank them.
Shahnazari et al. (2021)	AHP and VIKOR	Ranking of organic fertilizer production from solid municipal waste systems.
Shaverdi et al. (2,014)	Fuzzy AHP	Evaluation of financial performance of Iranian Petrochemical Sector using financial ratios.
Shaverdi etal. (2016)	Fuzzy AHP and Fuzzy TOPSIS	Developing framework for evaluating the financial performance of Iranian petrochemical companies and ranking the companies.

Guru & Mahalik (2019)	AHP-TOPSIS and AHP-Grey relational analysis	Measuring the efficiency of public sector banks in India and also rank them.
Suganthi (2018)	AHP-VIKOR AHP-DEA	Evaluation of sectoral investments for sustainable development and ranking the alternatives based on sustainability criteria.
Sun (2010)	FAHP-VIKOR	Developing framework for measuring the performance of Notebook Computer Manufacturing companies.
Goyal et al. (2022)	Hybrid model using AHP-VIKOR, TOPSIS and ELECTRE	Developing framework for performance evaluation and ranking of public transport sector in Rajasthan.
Tian et al. (2016)	AHP-VIKOR	Developed a framework to evaluate the green design alternatives.
Manoj et al, (2022)	AHP- TOPSIS, VIKOR	Performance evaluation of Hydro Power Projects in India.
Jiao (2022)	Fuzzy Neural Network system and BP Neural Network system	Performance evaluation of State-Owned Enterprises.
Yain et al. (2012)	FAHP-TOPSIS FAHP-VIKOR	Financial performance evaluation and ranking of companies in the manufacturing sector in Turkey.

Solangi et al. (2019)	FAHP-VIKOR	Assessing solar PV power project site in Pakistan,
Zhu et al. (2015)	AHP-VIKOR Sensitivity analysis	Systematic evaluation of design concepts.
Panagiotis et al. (2018)	AHP	Developing an assessment system for municipalities in Greece based on their public accounting data.

2.4 Research Gap

The public sector enterprises have been the driving force to promote economic growth in developing economies and are vital to the economy. Thus, to recognize their contribution to the economy and enhance their efficiency, performance evaluation and management of the enterprise is gaining importance. Based on the literature review it is noticed that performance evaluation of public sector enterprises has been an attraction for many researchers and has been looked upon from different perspectives. Evaluating the performance using a financial dimension has been a common practice in many studies in the past and has increased both in volume and depth covering a wide range of issues relating to financial management in public sector enterprises. Specific studies reviewed based on financial dimension include (Gupta, 2005; Baporikar, 1990; Seetharaman, 2000; Trivedi, 2010; Pal, 2013; Sarma & Das, 2016; Ghuman, 2001; George & Vinod, 2016; Chauhan, 2018; Yameen & Pervez, 2016; Taqi et al., 2018; Neshat, 2018; Mushahid, 2018; Maurya et al., 2015; Dalayeen, 2017; S. Gupta, 2010 Bhunia, n.d; Jain et al., 2014; Beena, 2012; Bala, 1993; Chauhan, 2006; Kar, 1988; Ajmal, 2016; Gandhi, 2007; Goel, 2000; Manaickavasugi, 2011). The studies based on financial dimensions covered a wide range of areas including profitability analysis, liquidity analysis, analysis of leverage, the efficiency of asset management, financial statement analysis, management of finances, analysis of capital structure, management of working capital, etc.

In some studies, researchers have accompanied the financial dimension with other dimensions such as their economic performance, economic value added, cost efficiency, operational efficiency, etc. In the past, the evaluation of the performance of

public sector enterprises based on their social contributions has also caught the attention of many researchers (Sengupta, 1989, Testi & Bellucci, 2011; Quadeer, n.d.; Bagnoli & Megali, 2011; Garde-Sanchez et al., 2018; Gupta, 2017; Nandi, 2012) Few studies attempted to develop a framework for performance evaluation like (Mathew,1997; Chithran & Chandrasekar, 2019; Ramamurti, 1987). Studies relating to various functional areas of public sector enterprises such as research and development and growth in state-owned enterprises (González Álvarez & Argothy, 2019), public sector enterprises as model employers (Jha, 2015), corporate governance practices in public sector enterprises (Mishra Ram Kumar & Potaraju Geeta, 2016) and (Curi et al., 2016), value-added income concept (Sahoo & Pramanik, 2017) and (Nandi, 2011), role of public enterprises (Baa & Chattoraj, 2022) are also found in the literature.

To summarise, the role of profit in public sector enterprises cannot be unnoticed but at the same time, profitability alone cannot be used to judge the performance of public sector enterprises in the presence of its non-commercial obligations. Many researchers have been influential in arguing that the traditional financial measures are insufficient to measure the performance of public sector enterprises and that broader measures are needed to assess their performance. The absence of well-defined criteria for performance evaluation of public sector enterprises and a well-established framework for performance evaluation systems for public sector enterprises is a significant gap in the literature. Moreover, the performance of public sector enterprises is guided by multiple financial and non-financial objectives, so there is a need to have a comprehensive performance evaluation system based on its multiple objectives. In the case of Central Public Sector Enterprises (CPSEs) in India, their performance is regularly evaluated through the MOU system by the Department of Public Enterprises under the Ministry of Finance to assess their efficacy towards the fulfilment of core objectives for which they have been constituted. However, the problem of performance evaluation of State-level public enterprises is still with selecting suitable parameters that affect the outcomes and specific methodology, for which there is no academic consensus

Also, there exists a research gap with respect to the methodology to evaluate the performance of public enterprises. Most studies have used financial ratios with statistical techniques such as correlation, regression, trend analysis, and ranking techniques to evaluate the performance or some specific techniques like Data Envelopment Analysis,

Balanced Scorecard method, Altman's Z score model, etc. in performance evaluation of public sector enterprises. However, incorporating multiple performance indicators in a comprehensive performance evaluation of the public sector undertakings with application of a multi-criteria decision-making approach used in this study is a hardly ever researched area that makes the study unique.

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Chapter Three
Research Methodology

Research methodology is an organized approach used in the study to investigate the research problem. This chapter describes in detail the methodology used in this research work including the research design, data source, sample selection, tools and techniques used, development of research instrument, data collection procedure and data analysis procedure.

3.1 Research Design and Approach

Performance evaluation of public sector enterprises is a complex phenomenon as it is governed by multiple conflicting criteria and affects multiple stakeholders. Thus, the performance evaluation of public sector enterprises can be regarded as a multi-criteria decision-making problem and the MCDM approach can be applied. The MCDM approach is widely used in various disciplines for complex decision-making problems using different techniques. The study aims to present a framework for performance evaluation of public sector enterprises with a focus on a multi-criteria performance measurement approach. The developed framework can be used to monitor the performance of public enterprises at an individual entity level over a period of time or a group of entities to evaluate their performance and rank them. This section elaborates on the entire research design and methodology used in the study for performance analysis of public sector enterprises and measuring their relative performance. This study is divided into two parts:

1) Developing the framework for performance evaluation of public sector enterprises at the enterprise level and for relative performance analysis.
2) Demonstration of the framework with its application for select state-level public enterprises.

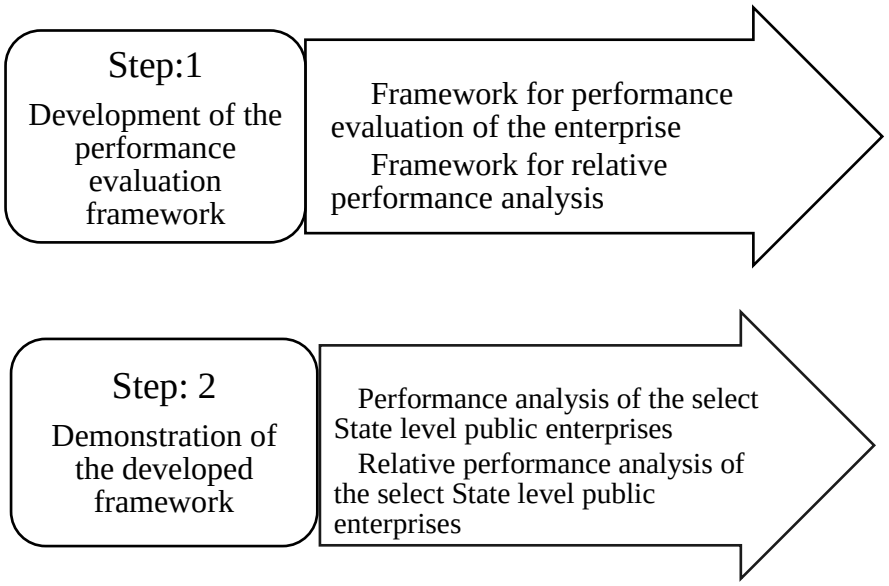

Figure 3.1: Design of the study

3.2 Development of the Performance Evaluation Framework

An enterprise can be effective in the long run if it achieves its goals and performance evaluation of an enterprise aims to assess how well an enterprise attains its goals. Public enterprises are mandated with multiple conflicting objectives/goals. Thus, to evaluate its performance, there is a need to develop a methodology that can aid the coordination and synthesis of its multiple objectives. The study aims to develop a multi-dimensional analysis framework to evaluate the performance of public sector enterprises based on the parameters instrumental in their performance balancing both commercial and non-commercial objectives of the enterprise. The development of the framework includes the identification of suitable criteria as key performance indicators and methodology for a comprehensive evaluation of the enterprise's performance. The study adopted the most widely used MCDM technique-the conventional Analytical Hierarchy Process (AHP) developed by Thomas Saaty in 1977 (Saaty, 1977) to quantify the identified key performance indicators by generating their weights. The model for performance evaluation is then developed based on the criteria weights. Among various MCDM techniques, AHP has wide acceptance and has stimulated the development of many other decision-making techniques. Its most important contribution to performance evaluation is that it provides a systematic approach for weighting performance to provide a comprehensive performance measure. AHP was developed by Saaty in 1977

to solve decision-making problems in various contexts from simple everyday problems to complex problems dealing with multiple criteria. AHP was criticised by many researchers (Belton & Gear, 1983), (Dyer, 1990) for its deficiency and other variants of AHP were proposed. Later in 1994, the original AHP was accepted and is now called Ideal Mode AHP. However, the original AHP is considered as the most reliable MCDM Technique (Triantaphyllou & Mann, 1995). The AHP can also be used in combination with Fuzzy sets when the fuzziness or vagueness of the decision-maker is taken into account. Fuzzy AHP is an advanced version of traditional AHP as it outperforms by ease of use. To develop the model for performance evaluation, AHP is used taking into consideration the subjective judgements of the experts for generating weights for the identified criteria and sub-criteria. Application of the AHP technique enables us to discover the comparative importance of the identified criteria. The method helps in comparing and ranking different criteria according to their importance to each other. The steps followed in developing the model:

1. Identify the key performance indicators
2. Prepare the hierarchical structure of the criteria and sub-criteria.
3. Design an AHP questionnaire for pairwise comparison of the indicators using the nine-point preference scale of AHP developed by Saaty.
4. Select the panel of experts for obtaining expert judgements.
5. Administer the survey questionnaire to the experts.
6. Develop a pairwise comparison matrix and normalised comparison matrix for individual expert's judgement.
7. Conduct consistency check.
8. Develop the aggregate matrix of the panel.
9. Conduct aggregate consistency check.
10. Generate weights for the indicators

As this is descriptive research, both qualitative and quantitative approaches are used in the AHP for collecting and analysing the data.

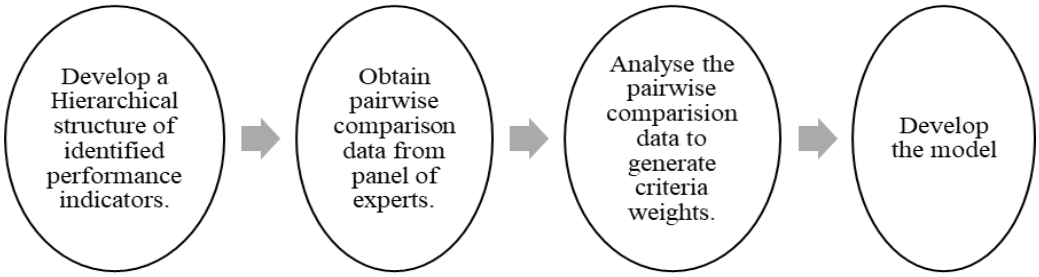

Figure 3.2 Steps in developing the framework

3.2.1 Developing the Hierarchical Structure

In this context, firstly the performance indicators are identified based on the careful analysis of various performance indicators used in the literature and also keeping in mind the commercial and distributional role of public sector enterprises. For the analytical hierarchy process, the identified performance indicators are presented in a hierarchical structure at three levels.

Level One: Goal (Performance evaluation)

Level Two: Performance evaluation criteria

Level Three: Parameters/ Sub-criteria

3.2.2 Pairwise Comparison of Performance Indicators

The first step in the AHP methodology is to obtain pairwise comparison of criteria and sub-criteria by the experts in order to calculate the criteria weights. To obtain pairwise comparisons from the experts, a structured questionnaire is developed on a nine-point preference scale suggested by Saaty. Expert judgement is obtained by administering the questionnaire for pairwise comparison of the performance indicators and also face-to-face interviews. The process of obtaining the pairwise comparison data is as follows:

3.2.2.1 Composition of the Expert Panel

The size of the panel is not vital in AHP analysis as this methodology is not statistically based; rather, it is important that the available observations establish a precise representation of the field under analysis (Fu et al., 2011). Thus, the Delphi method is used to form the expert panel to provide the input data for the AHP. The Delphi method is a process used to arrive at a group opinion or decision by surveying a

panel of experts through several rounds of questionnaires. The experts can adjust their answers in each round provided to them till the ultimate consistency in responses of the group is obtained. The Delphi survey group size appears to be very different in the literature. It is often recommended to have a smaller group of between 9-18 participants in order to avoid the difficulty of reaching a consensus among experts. A panel of 20 experts consisting of representatives from public sector undertakings in Goa and the general public representing the beneficiaries of these enterprises was formed. The expert panel was carefully built based on sufficient knowledge and experience on the survey issue and their capacity, willingness & time to participate. The expert panel consisted of higher level, functional level and employees of the public sector enterprises and also academicians representing the general public as beneficiaries of public enterprises. The experts were from varied disciplines including IT, engineering, accounting, management and economics**.**

3.2.2.2 Development of the Questionnaire

After an extensive literature review, the performance indicators were identified and an AHP questionnaire was prepared using a nine-point preference scale of AHP developed by Saaty. The questionnaire includes pairwise comparisons for each criterion and sub-criteria. Before administering the questionnaire to the experts, the reliability and validity of the survey questionnaire were performed. Based on the suggestions, necessary alterations to the questionnaire were made.

3.2.2.3 Reliability and Validity of the Questionnaire

The Reliability of data collection is a component of overall confidence in a research study's accuracy. It helps to minimise the possibility of errors in the research and gives confidence in the study's findings and conclusion (McHugh, 2012). The validity of the questionnaire means to verify what we are intending to measure. It is usually done before administering the questionnaire to the samples for construction. The main aim of questionnaire validity is to check that the developed tool is valid for its content, structure, proper responses and expected results. (Desai & Patel, 2020). It explicates how well the collected data covers the actual area of investigation (Field, 2005).

Based on the requirement of the study, an Inter-rater agreement was conducted to test the reliability of the draft questionnaire. Face validity and content validity were also carried out to validate the draft questionnaire.

3.2.2.3a Results of Inter-rater Agreement/Reliability

Inter-rater agreement measures the degree of agreement between different observers observing or assessing a similar item. Inter-rater agreement of the survey instrument helps to refine it based on the agreement of the experts for the statements included in the instrument. The degree of agreement between the experts was calculated using the Kappa Statistics which is used to measure reliability/agreement. Fleiss Kappa, an adaptation of Cohen's Kappa, was used as there were more than two experts. Kappa is similar to the correlation coefficient as it lies between +1 and -1.

Table 3.1 Kappa Statistics

Category	K (Fleiss Kappa)
Criteria for Performance evaluation	0.987
Parameters of Financial performance	0.989
Parameters of physical performance	0.968
Parameters of contribution to economy	0.989
Parameters of contribution to society	0.991

Source: Author's computation

Table 3.2 Interpretation of Fleiss' Kappa (κ)

K	Interpretation
<0	Poor agreement
0.0-0.20	Slight agreement
0.21-0.40	Fair agreement
0.41-0.60	Moderate agreement
0.61-0.80	Substantial agreement
0.81-1.0	Almost perfect agreement

Source: (Landis and Koch, 1977)

Result: Almost perfect agreement

3.2.2.3b Results of Face Validity

In establishing face validity, the questionnaire is evaluated based on feasibility, readability, clarity of language, consistency of style and formatting. Face validity is an unstandardized and non-statistical approach, so the best way to quantify the responses is to calculate the percentage of agreement for each question and overall agreement (Lynn Mary, 1986).

Table 3.3 Percentage of Agreement

Question number	Total agreement	Percentage of agreement per question	Percentage of overall agreement
Q.1	7	100	
Q.2	7	100	
Q.3	4	57	
Q.4	7	100	
Q.5	7	100	
Q.6	6	86	
Q.7	5	71	
Q.8	6	86	
Q.9	6	86	
Q.10	6	86	
Q.11	7	100	
Q.12	7	100	89

Source: Author's Computation

Percentage of agreement per question = (Number of agreed raters per question/ Total number of rates per question) x 100

Percentage of overall agreement = Sum of percentage of agreement of all questions/ Total number of questions.

Table 3.4 Interpretation and Acceptability of Percentage of Agreement

Percentage of agreement	Strength of agreement per question or overall	Action required
< 80	Poor	Restructure
80 - 90	Substantial	Revise
90 - 100	Full	Retain

Source: (Desai & Patel, 2020)

Result: Percentage of overall agreement = 89 per cent (Minor revision required)

3.2.2.3c Results of Content Validity

Content validity aims at providing assurance that the research instrument measures the content area as it is expected to measure. The Lawshe's CVI was calculated in two forms: ICVI and SCVI. SCVI is again calculated in two ways: SCVI/Ave and SCVI/UA. Before calculating the CVI the scale of 1-4 is dichotomized based on "0 for 1-2 ratings = not favourable" and "1 for 3-4 ratings = favourable".

Table 3.5 Result of Content Validity- CVI

Category	SCVI/Ave	SCVI/UA
Relevance		
Parameters of financial performance	0.96	0.75
Parameters of physical performance	0.91	0.50
Parameters of contribution to economy	0.93	0.75
Parameters of contribution to society	0.98	0.67
Clarity		
Parameters of financial performance	0.96	1.00
Parameters of physical performance	0.93	0.67
Parameters of contribution to economy	0.93	0.75
Parameters of contribution to society	0.95	0.67
Suitability		
Parameters of financial performance	0.93	0.50
Parameters of physical performance	0.95	0.67
Parameters of contribution to economy	0.93	0.75
Parameters of contribution to society	0.98	0.83

Source: Author's computation

Interpretation: S-CVI Average >= 0.90 is acceptable OR, S-CVI /UA >= 0.90 is acceptable.

Result: As the S-CVI Average for all the parameters is > 0.90, it is acceptable.

3.2.3 Analysis of the Pairwise Comparison Data

AHP involves pairwise comparison as it is more precise and easier to express opinion between two options than concurrently on many alternatives. The pairwise

comparison is essential in the use of AHP as the priorities for the criteria are established by comparing the relative importance of two alternatives and the judgements are represented in numbers based on the 9-point scale (Saaty, 1988). Thus, the first step for AHP analysis is to construct a pairwise comparison matrix for each expert's judgement which is further normalised to obtain the relative weights and the consistency check was performed to filter the inconsistencies. The normalized matrix helps to compare the criteria with each other and the consistency check determines the reliability of the results obtained. The consistency of the scores is determined by calculating the consistency ratio (C.R.) and the consistency index (C.I). The scores are considered consistent when the value of the consistency index (C.I.) is less than 0.1. Upon successful consistency check, all the expert's scores are then accepted for analysis. The geometric mean of the scores of 20 experts is calculated and entered in the aggregate comparison matrix to find out the global weights and relative weights of the criteria and sub-criteria. The generated weights are considered for developing the model only after a satisfactory consistency check.

Steps in the analysis of the pairwise comparison

i. Development of Pairwise Comparison Matrix

In order to compute the weights for the different criteria, the AHP starts with creating a pairwise comparison matrix A. The matrix A is a (*m x m)* square matrix, where *m* is the number of evaluation criteria considered.

In the Pairwise comparison matrix (A), the scores are taken as follows:

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1j} \\ a_{21} & a_{22} & \cdots & a_{2j} \\ \vdots & \vdots & \ddots & \vdots \\ a_{i1} & a_{i2} & \cdots & a_{ij} \end{bmatrix}$$

In matrix A, a_{ij} is the degree of preference of element *i* to element *j*. The matrix **A** is $a_{mxm}a$ square matrix, where *m* is the number of evaluation criteria considered. Each entry a_{ij} of the matrix **A** represents the importance of the i^{th} criterion relative to the j^{th} criterion. If $a_{ij} > 1$, then the i^{th} criterion is more important than the j^{th} criterion, while if $a_{ij} < 1$, then the i^{th} criterion is less important than the j^{th} criterion. If two criteria have the same importance, then the entry a_{ij} is 1. The relative importance between the two criteria is measured according to a numerical scale from 1 to 9.

The entries a_{ij} and a_{ji} satisfy the following constraint:

$$a_{ij}.\ a_{ji} = 1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(I)}$$

The pairwise comparison matrix is constructed for each expert's score and the geometric mean of scores of 20 experts is calculated at each level to obtain the related consensus.

ii. Development of Normalised Comparison Matrix

Once the matrix **A** is built, the normalized pairwise comparison matrix A_{norm} is derived by making the sum of the entries on each column equal to 1. Each entry of the matrix $A_{norm}$is calculated by dividing each entry in the comparison matrix by its corresponding column sum.

$$A_{norm} = \begin{bmatrix} \frac{a_{11}}{\sum a_1} & \frac{a_{12}}{\sum a_2} & \cdots & \frac{a_{1j}}{\sum a_j} \\ \frac{a_{21}}{\sum a_1} & \frac{a_{22}}{\sum a_{12}} & \cdots & \frac{a_{2j}}{\sum a_j} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{a_{i1}}{\sum a_1} & \frac{a_{i2}}{\sum a_2} & \cdots & \frac{a_{ij}}{\sum a_j} \end{bmatrix} = \begin{bmatrix} a_{i1} \\ a_{i2} \\ \vdots \\ a_{ij} \end{bmatrix}$$

iii. Calculation of Eigen Vectors and Maximum Eigenvalue

The Eigenvectors also known as Priority Vectors and Maximum Eigenvalue are computed as follows:

a) The relative vector weights (*W*) also known as eigenvectors among the items are obtained by averaging row entries in the normalised matrix. The sum of all the elements of eigenvectors should be equal to 1.
b) The eigenvalue (*AW*) is obtained by multiplying the comparison matrix and the relative weights column.
c) Lamda (λ) is obtained by dividing the eigenvalue by the eigenvector for each element (*AW/W*)
d) The average of the Lamda (λ) column is the Lamda (λ) max.

iv. Consistency Check

In AHP, the results are subject to inconsistencies due to unintentional errors, lack of concentration during the comparison process or even misunderstandings. But AHP allows us to check, explore and correct these inconsistencies. The consistency of

the scores can be determined by calculating the consistency index (C.I) and consistency ratio (C.R.).

The CI is calculated using the formula:

$$CI = \frac{(\lambda_{max} - n)}{(n-1)}$$ (Where n is the number of criteria considered for evaluation)

The CR is calculated using the formula:

$$CR = \frac{CI}{RI}$$

RI refers to a random consistency index, which is derived from a large sample of randomly generated reciprocal matrices using the scale 1/9, 1/8, ..., 1, ...,8, 9.

Table 3.6 Random Index Values for different size matrices (Saaty)

N	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

Saaty (1980) suggested that the value of the CR should not exceed 0.1 for a confident result.

Therefore, CR< 0.10 is acceptable.

v. Generating Priority Weights

Priority weights refer to the weights generated for each evaluation criterion based on the decision maker's/ expert's pair-wise comparison. The priority weights for each criterion and sub-criterion thereby help to identify, assess and review which criteria or sub-criteria have more weightage in the performance of the public sector enterprises. Thus, it can help the decision makers to identify the influence of each performance indicator on the performance and identify the areas that require improvement.

3.2.4 Development of the Performance Evaluation Model

The overall weighing in the hierarchy is presented in an equation as a function of the performance model for evaluating the performance of public sector enterprises. The robust model so framed helps to compute the overall performance score of the enterprise based upon multiple criteria.

3.3 Framework for Relative Performance Evaluation

Relative performance evaluation (RPE) is the evaluation of a firm's performance relative to a peer's performance. Relative performance evaluation of enterprises requires ranking the individual enterprise based on the absolute values of their performance parameters. For relative performance analysis of the firms, the study employs the AHP-VIKOR-based MCDM approach, where the weights obtained by AHP are used in the VIKOR analysis to obtain final ranking outcomes. VIKOR is one of the well-known MCDM methods that is used to determine the final ranking of the alternatives. In the literature, most studies have used AHP in combination with the VIKOR method. The VIKOR method was developed for multicriteria optimization of complex systems. This method focuses on ranking and selecting from a set of alternatives in the presence of conflicting criteria. Vlsekriterijumska Optimizacija lKOmpromisno Resenje method (the Serbian name of VIKOR) means multi-criteria optimization and compromise solution. It is a multi-criteria decision-making method developed in 1990 by Serafim Opricovic to solve decision problems with conflicting criteria. This method ranks the alternatives and determines the compromise solution that is the closest to the "ideal solution". The unique approach presented in the study is combining Garette scoring with VIKOR to modify the input data for the analysis. The original input data available in the ratio form is first converted into a score before using it in the VIKOR analysis in order to overcome the difficulties in the use of ratios and make the data easier to use.

3.3.1 The VIKOR Method

Step 1: Establish a decision matrix of criteria and different alternatives.

$$f_{ij} = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{ccccc} A & C_{X1} & C_{X2} & \cdots & \cdots & C_{Xn} \end{array} \\ \begin{bmatrix} X_{11} & X_{12} & \cdots & \cdots & X_{1n} \\ X_{21} & X_{21} & \cdots & \cdots & X_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ X_{m1} & X_{m2} & \cdots & \cdots & X_{mn} \end{bmatrix} \end{array}$$

$f_{ij}\ is\ the\ decision\ matrix$ with "m "alternatives and n" criteria. Here, A represents i_{th} alternative, i =1,2, ……., m; C_X represents the j_{th} criterion, j=1,2, …, n; X_{ij} is the score of each alternative with regard to each criterion.

Step 2: Obtain weights for the criteria (as derived using AHP)

Step 3: Determine the best and worst rating score w.r.t each criterion.

For Beneficial criteria (Higher value is better):

Best rating score: $f_i^+ = max\,(f_{ij})$

Worst rating score: $f_i^- = min\,(f_{ij})$

For Non-beneficial criteria (lower value is better):

Best rating score: $f_i^+ = min\,(f_{ij})$

Worst rating score: $f_i^- = max\,(f_{ij})$

Step 4: Compute the distance for each alternative.

$$S_{ij} = W_j \frac{(f_i^+ - f_{ij})}{(f_i^+ - f_i^-)}$$

Here W_j is the weight of the j_{th} criterion.

Step 5: Calculate the Utility measure (S_i), Regret measure (R_i) and VIKOR Index (Q_i)

$$S_i = \sum_{j=1}^{n} W_j \frac{(f_i^+ - f_{ij})}{(f_i^+ - f_i^-)}$$

$$R_i = max\left[\sum_{j=1}^{n} W_j \frac{(f_i^+ - f_{ij})}{(f_i^+ - f_i^-)}\right]$$

$$Q_i = v\left[\frac{(S_i - S_i^-)}{(S_i^+ - S_i^-)}\right] + (1 - v)\left[\frac{(R_i - R_i^-)}{(R_i^+ - R_i^-)}\right]$$

Here $S_i^+ = max\,(S_{ij})$, $S_i^- = min\,(S_{ij})$, $R_i^+ = max\,(R_{ij})$ and $R_i^- = min\,(R_{ij})$

Q_i represents the i_{th} alternative VIKOR value, i = 1, 2, …., m and v is the weight of the maximum group utility usually to be set to 0.5.

Step 6: Rank the VIKOR Index (Q_i) in the descending order (The alternative having the smallest VIKOR value is determined to be the best alternative).

3.3.2 Input Data for VIKOR Analysis

For the purpose of analysis, the secondary data from the annual reports and records of the select enterprises is used in the form of ratios calculated as per the parameters chosen for the study. Most practitioners and researchers use accounting-based financial

ratios to draw inferences about the efficiency of the enterprises. However, the cross-sectional differences and time series changes in ratios pose difficulty in interpreting the observations and doubts about the usefulness of the ratios in such evaluations. Problems with accounting-based financial ratios in statistical analysis are the non-normal distribution for many ratios, the ratio “blow-up phenomenon", the outliers, the non-linear relationship among the ratios, difficulty in interpreting and using the negative ratios within the distribution, etc., (Lev & Sunder, 1979). The difficulties associated with the ratios can be mitigated with the simple modification of the ratio or transformation of ratios. Ratio transformation can be done by replacing each observation with its respective rank within the sample. This methodology has been successfully applied in competitive analysis and proves to be less biased than the untransformed ratios. The transformation of ratios to rank makes data easier to analyse and interpret. Thus, the use of relative rank transformation of the ratios provides a conceptual and methodological solution to many problems associated with the use of ratios (Kane & Meade, 1998). The study introduces a novel method of ratio transformation based on the ranking of the absolute values of the performance parameters of observed units according to their level of superiority. These ranks are then converted into scores by adopting the scoring technique suggested by Henry Garrett.

The steps involved in ratio transformation are as follows:

i. In the first step, the absolute or ratio values of the performance parameters of observed units are ranked.

ii. The per cent position of each rank is calculated using the Garett scoring technique formula:

$$Percent\ position\ =\ [100(R_i\ -\ 0.5\ )]/n$$

(Where R_i refers the rank given to the i^{th} value and n refers to the number of items ranked)

iii. The per cent position estimated is converted into scores by referring to the table given by Garrett and Woodworth (1969).

iv. The Garrett scores are then used as input data for relative performance analysis and ranking of the observed units each criterion-wise and also based on overall performance.

The methodology used in the study provides insights into the application of the MCDM approach in evaluating the performance of an enterprise with special reference

to public sector enterprises and also the ranking of the firms based on their relative performance scores. This methodology is hardly ever used in the context of public enterprises. The research design can form a basis for further studies using different parameters based on the requirements of the study. The MCDM techniques employed in this study are the most commonly adopted techniques which can be replaced with other MCDM techniques.

3.4 Demonstration of the Developed Framework

In this section of the study, basically the developed performance evaluation framework is demonstrated with a notional example. For the purpose of analysis, state-level public sector enterprises in Goa are taken as samples. The performance analysis is done both at the macro level and micro level. Also, the relative performance analysis is done to rank the enterprises based on their performance.

3.4.1 Macro Overview of State Public Sector Enterprises in Goa

The macro-level analysis aims at understanding the public sector enterprises position in Goa based on secondary data obtained from the CAG Reports for 11 years (from 2008-09 to 2018-19). Techniques used for analysis include Ratio analysis, CAGR and AAGR, percentage analysis, trend analysis and graphical representation.

3.4.2 Performance Evaluation of Select State Public Sector Enterprises

The performance evaluation of the select state-level public enterprises is performed using the developed framework. For the purpose of analysis, the enterprise data is obtained from secondary sources i.e., annual reports and records of the selected enterprises for a period of 12 years (from 2008-09 to 2019-20). The sample considered for analysis includes 8 state-level public sector enterprises in Goa selected based on the availability of data. Ratio analysis and descriptive statistics are used to understand the performance of the select enterprises and the performance scores are ascertained using the developed AHP model. The same data is further used to perform the relative performance analysis using the framework developed based on the VIKOR method.

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Chapter Four
Performance Evaluation Framework

4.1 Conceptual Issues in Performance Evaluation of Public Enterprises

The measurement of performance is an important component of good strategic management that aids good decision-making and in turn improves utilisation and control of resources. It is often said that "What gets measured gets managed" (Cameron, 2011). For improving the efficiency of an enterprise, it is essential to continuously evaluate its performance. Public sector enterprises in India have always described themselves as a benchmark model of performance for sustainable development through social upliftment and at the same time achieving economic goals (Chakrawal & Goyal, 2018). A proficient performance evaluation system in public sector enterprises will ensure economic, efficient and effective use of public money. Globally, many of the problems of public enterprises are perceptible to inadequacies in performance evaluation. It is difficult to specify the goals of a public enterprise due to the multiplicity of its objectives and multiple organisational units having multiple perceptions of its goals. Moreover, public enterprises are hybrid, sharing characteristics of government institutions with their non-commercial goals which are difficult to quantify and private enterprises with their commercial goals which are quantifiable (Jones et al., 1991). Thus, it is essential to evolve a framework for performance evaluation of public enterprises which should be computable in terms of the outcomes that a public enterprise is expected to produce. Public sector enterprises stand for social profit and not for profit. Hence to measure the true efficiency of public sector enterprises, it is necessary to assess the achievement of the objectives assigned to them along with their profitability (Pardeshi & Thorat, 2014). Mere profitability review, however, is assumed to ignore the socio-economic objectives of the enterprise (Nayar, 1990). Due to the multiple goals structure of public enterprises, performance evaluation of public enterprises necessarily should take into account all the relevant objectives of public enterprises (Fatta Bahadur K, 2000). The public enterprise in India performs various activities such as producing goods, providing services, promotional and development activities, etc. Thus, while assessing its performance a set of criteria examining the degree of fulfilment of its objectives should be identified rather than emphasising on profit maximisation alone (Mascarenhas, 1974). The problem of performance measurement of Public Sector Enterprises seems more complex in

pursuance of multiple conflicting criteria having a high stake and affecting multiple stakeholders. These reasons necessitate a robust framework of performance evaluation for public sector enterprises taking into account the multiple objectives of the enterprise. The study has attempted to develop a unified model to evaluate the performance of public enterprises through the MCDM approach. Multiple-criteria decision-making (MCDM) also known as multiple-criteria decision analysis (MCDA) is explicitly used in operations research to evaluate multiple conflicting criteria in the decision-making problem. If the problem is complex, having high stakes and affecting multiple stakeholders, it is important to structure the problem and evaluate it explicitly. MCDM helps a decision-maker to quantify particular criteria based on their importance in the presence of other objectives. Among various MCDM techniques used in the literature in varied areas of research, AHP is a widely used technique. In this study, the conventional Analytical Hierarchy Process developed by Thomas Saaty (1977) is used for generating weights for the established key performance indicators in accordance with the expert judgement.

4.2 Development of the Framework using Analytical Hierarchy Process

The study adopted the most widely used MCDM technique-the conventional Analytical Hierarchy Process (AHP) developed by Thomas Saaty in 1977 to quantify the identified key performance indicators. The model for performance evaluation is then developed based on the criteria weights. The analytical hierarchy process is an effective multi-criteria decision-making tool used to set priorities and generate weights for each evaluation criterion based on the decision maker's pair-wise comparison. AHP can be used in any management domain and explicitly in operations research to evaluate multiple conflicting criteria in the decision-making problem. This section deals with the process of development of the framework in the following steps:

4.2.1 Identification of Key Performance Indicators

Performance measures are quantified descriptions of output that accurately describe the aspect of performance being measured. Whereas performance indicators are proxy measures that provide relevant information for measurement of performance (Cannon & Fry, 1992). Performance indicators provide a means to measure and monitor the quantitative and qualitative aspects of the performance of the enterprise. The performance indicators of public sector enterprises are multiple and complex. Some

indicators of performance allow monitoring and assessment while some are not readily measurable. The study focuses on only those parameters that can be quantified and can be put into any operational form. Most studies conducted on the performance evaluation of public sector enterprises are associated with the financial performance of the enterprise. Though evaluating the performance of public sector enterprises with financial dimension is necessary but not sufficient. Based on the extensive literature review of related studies, it is understood that the performance of the public enterprise needs to be evaluated based on the parameters instrumental in performance not only from a narrow commercial angle but from a broader perspective balancing both commercial and non-commercial objectives of the enterprise. The focus of the study is mainly on developing a common set of parameters to evaluate the overall performance of public sector enterprises integrating the financial performance with the economic and distributional role of the enterprise. The objectives of the enterprise are vital in identifying the performance indicators. In the case of public enterprises, their objectives are broadly classified into commercial and non-commercial/social objectives. However, these objectives are not conflicting but are complementary to each other. Commercial viability enables the enterprise to fulfil its non-commercial obligations more effectively and vice-versa. As stated by (Troung Duong, 2013) when profit maximisation is not the main goal of public enterprises, economic growth is negatively impacted. An enterprise that is not financially viable will not be able to contribute significantly to the economy as well as society. At the same time, the activity of the enterprise in the form of its physical performance also has a significant impact on the financial performance of the enterprise (Jenkins, 1979). With reference to this interrelationship, both commercial and non-commercial objectives are essential elements to determine the overall performance of the public enterprise. Thus, considering the commercial and the non-commercial objectives of the public enterprise and the performance indicators used in the literature, the study identified fifteen parameters and categorized them into four broad criteria as follows:

4.2.1.1 Financial Performance

Financial performance of public sector enterprises is of wide interest and concern as they are set up at a huge cost to the exchequer. The growth of the economy largely depends on the public and private sectors. Therefore, evaluating the financial performance of public enterprises on a continuous basis is essential to accelerate

economic growth (Neshat, 2018). In a country like India which strives for rapid socio-economic transformation, financial appraisal of public enterprise is of added importance. A financial appraisal is a scientific evaluation of the financial performance and financial health of an enterprise (Bala, 1993). Analysis of financial performance is the process of recognizing the financial strengths and weaknesses of the firm by establishing the relationship between the items of the financial statement (Dhanalakshmi & Siddik, 2016). In a complex business environment, the sound financial performance of an enterprise is essential for its survival in the long run (Yameen & Pervez, 2016). The financial performance of an enterprise depends on its financial management i.e., liquidity, solvency and asset management measured through accounting ratios. Public enterprises need to be strengthened financially in order to justify their growing investment with increased returns (Bala, 1993).

Parameters of Financial Performance

i. Profitability

Profitability is the centre of attraction for those who are interested in an enterprise as it reflects on the efficiency and effectiveness of the enterprise. Thus, analysis of profitability is of prime importance in the performance analysis of any business enterprise. In the case of public enterprise which operates with a mandate of social well-being, it may not be the sole criteria to judge its performance but it cannot be denied that it would be folly to ignore it (Chauhan, 2006), (Gupta, 2005). Profitability strengthens the ability of a public sector enterprise to discharge its social obligations in a better way (Jain & Yadav, 2005). Measuring profitability refers to calculating the financial returns on an investment. Rates of returns are the commonly used metrics of profitability of an enterprise computed in three ways: return on equity, return on capital employed and return on assets. Return on capital employed and return on assets are a type of return-on-investment metric that indicates how well the financial resources of the enterprise have been deployed whereas the return on equity indicates the returns provided to the owners. Return on capital employed is one of the most important financial indicators of the performance of public enterprises from the society's point of view. In the case of public enterprises, the returns are to be assessed in terms of society as a whole instead of shareholders as in the case of private enterprises. The return on capital employed is the ratio of earnings before interest and tax to total capital employed which is the sum of equity and total debts or the sum of fixed assets and working capital. But in cases

where companies have negative income, negative equity or negative working capital it may reflect exceptionally high return of capital employed. Thus, to avoid this the study uses ROA to measure the financial performance of the enterprise. Return on assets is the ratio of profits generated to total assets of the enterprise, it reflects the managerial efficiency in using its assets to generate profits.

ii. Liquidity

The liquidity position of an enterprise is an important aspect of its financial management. It refers to the balance of assets in the form of cash or readily convertible into cash and the current liabilities. It reflects the short-term financial position of the enterprise. Classically the current ratio is used as a powerful barometer of the liquidity of a firm. It serves as a first line of test of liquidity for timely corrective action. If the ratio works out 2:1 or more, the enterprise is assumed to be justly liquid.

iii. Solvency

Solvency refers to the ability of the enterprise to meet its long-term obligations and accomplish its long-term expansion and growth. The progress and prosperity of an enterprise depends upon its sound capital structure. Solvency can be measured using various ratios such as solvency ratio which is a ratio of total debt to total assets, net worth ratio which is a ratio of total equity to total assets, leverage ratio which is measured as debt to equity, etc. based on the requirement of the study. In this study, the solvency ratio is used as an indicator of the solvency position of the firm. The ratio indicates the portion of the firm's assets owned by the creditors. A high ratio indicates high leverage and high financial risk.

4.2.1.2 Physical Performance

Each public sector enterprise contributes in different ways to the quality of life of its country's citizens and to the overall growth and development of the economy. The goods and services delivered by these enterprises reflect their significance in the overall social and economic progress of the country. Therefore, it is necessary to monitor their performance based on how effectively each of these enterprises are managed and their relative performance in contributing to the economy. Thus, measuring the physical performance of these enterprises based on the output, impact of each enterprise's activity and the efficiency of its operation is an important and integral part of the overall performance evaluation of public sector enterprises.

Parameters of Physical Performance

i. Output

Output is the immediate level of physical results/outcomes on which an enterprise's performance is gauged. Output can be measured in physical or monetary units. Output implies deliverables of the enterprise's activity in the form of goods or services provided. For public sector performance analysis, one should restrict the analysis to outcomes and not relate to inputs (Pestieau, 2009). The efficiency of an enterprise depends on transforming inputs into outputs (Troung Duong, 2013)

ii. Impact

Impact refers to the consequence of the activity beyond the immediate effects on its direct beneficiaries. It provides a tool to monitor the enterprise's performance based on its significant contribution to the economy.

iii. Efficiency of operation

The cost-revenue ratio is a measure of efficiency that compares a company's expenses to its earnings. It becomes a basis for analysing the performance based on the efficiency of operations.

4.2.1.3 Contribution to the Economy

Public sector enterprises in developing countries are the important contributors to the development processes. Their contribution to the economy determines their economic efficiency. The economic efficiency of public enterprises relates to the net contribution made by the enterprise to the output and growth of the economy. These enterprises contribute to the economy in various ways justifying its existence such as providing citizens with vital goods and services at affordable prices, accelerating industrialisation, supporting vulnerable social groups via employment and smoothing of business, generating resources for further development, etc. Thus, assessing the efficiency of these enterprises in contributing to the growth of the economy is an important component of its overall performance analysis.

Parameters of Contribution to the Economy

i. Internal Resource Generation

The public enterprises in India have been established with an important mandate to generate resources for re-investment as well as for investment in developmental

projects in the economy (Ghuman, 2001). Internal resources generated by the enterprise reflect its ability to support its own expansion and reduce the financial dependence on the state and pave the way for further development. In the context of the resource crunch faced by India, internal resource generation by public enterprises assumes significant importance (P. Palanichamy, 1992). Internal resource generated by an enterprise is the aggregate of depreciation written off, deferred revenue expenditure written off and retained profits. To measure the ability of the enterprise to generate internal resources, the study uses the ratio of total internal resource generation to total investment (capital employed) in the enterprise.

ii. Contribution to Exchequer

Regular returns to the exchequer are the tangible returns made by the public enterprise on the amount invested by the government. Apart from internal resource generation, the public enterprise augments the resources of the government by contributing to the exchequer by way of dividends, corporate taxes, excise duties, customs and other duties thereby helping in the mobilisation of resources for the planned development of the economy (Gupta, 2005). The public enterprises are expected to operate in a more significant manner in order to contribute to the exchequer for funding various developmental programmes and accelerate the pace of economic development in the country (Sarkar, 2013). To assess the contribution to the exchequer, the ratio of contribution to the exchequer (Net contribution after deducting subsidies received from Govt) to total investment (capital employed) is assumed.

iii. Employment Generation

Setting up of public enterprises is a vital step taken by the government which has extended opportunities for more employment both direct and indirect. Direct employment opportunities include employment within the public organisations and indirect employment opportunities are created through the public organisations. Public enterprises are expected to generate employment opportunities and also act as model employers (P. Palanichamy, 1992). It reflects the improved employment situation in the state due to their operations. In the study, direct employment generated within the enterprises is considered as the parameter of the economic contribution of the enterprise. The study considers the growth rate in the number of employees as a measure of employment generation.

iv. Value Addition

The value addition made by an enterprise to the economy is the economic as well as social justification of its existence (P. Palanichamy, 1992). It reflects the efficiency of the enterprise in the use of resources and shows the wealth generated for its stakeholders. Value added concept of income highlights the sharing of a firm's earnings among different stakeholders. The value-added income is a significant parameter in the overall performance appraisal of public enterprises reflecting its contribution to the social and economic well-being of the entire community (Nandi, 2009). Based on the modern corporate philosophy, the beneficiaries of an enterprise include capital providers, employees, government, and the general public. Thus, value addition by an enterprise as per the income concept refers to the wealth created by the enterprise for these beneficiaries. It includes remuneration to capital providers, remuneration to the employees, taxes to the government and profits retained for the growth and maintenance of the business (Sarkar, 2013). The ratio of value addition to capital employed is considered as an appropriate measure of value addition by an enterprise.

4.2.1.4 Contribution to Society

The traditional role of business to generate only profit has now undergone a transformation. Business corporations are now seen as social creatures and are expected to assume social responsibility (Sengupta, 1989). In the case of public sector enterprises, society's stake is more than its owners. Along with pursuing their commercial objectives, public enterprises play an important role in meeting their social obligations. The social objectives of public enterprises are also termed as distributional objectives as it relates to the way in which the surplus of the enterprise is distributed among the sub-groups of the society. The performance evaluation of public enterprises must attempt to quantify what has been done by way of expenditure to attain social objectives (Jenkins, 1979). While measuring their performance, it is necessary to account for the resources spent on social obligations (Ghuman, 2001). Their social efficiency can be analysed in terms of their contribution towards social obligations benefitting various stakeholders.

Parameters of Contribution to Society

i. Promoting Research and Development and Technological Self-reliance

Public sector enterprises are expected to help the country to attain a degree of industrial and technological self-reliance (Gandhi, 2007). It refers to efforts made by the enterprise to improve technology which includes expenditure on generating new

knowledge, products and process development, expenditure on development of technology for efficiency improvement and cost reduction, expenditure on use of time and energy saving devices, expenditure incurred on automation and up gradation, developing patents and copyrights, innovative ICT solutions, quality improvement, any other. It will be measured using the ratio of expenditure on research & development, innovations and technological upgradation to total revenue.

ii. **Protection and Conservation of Environment**

As per the guidelines of the Department of Public Enterprises in India on sustainable development, the enterprise's effort to conserve environmental resources is necessary to protect the livelihoods and well-being of the community. Also, as per the national voluntary guidelines from the Ministry of Corporate Affairs with regard to social, environmental and economic responsibilities of business, reporting by businesses on environmental, social and governance aspects is considered to drive improvements in their performance. It can be in the form of small efforts such as expenditure incurred on waste management, expenditure incurred on energy conservation, expenditure on reduction of environmental impact due to introduction of new technology, expenditure incurred on relieving urban congestions and reduction of noise level, expenditure incurred on reduction of emissions, the amount spent on an innovative solution for energy efficiency, any other. The study defines this parameter as the ratio of expenditure on protection and conservation of the environment to total revenue.

iii. **Community Welfare**

Public sector enterprises are expected to use their surplus on development and welfare programmes for the community. It includes the welfare of society by way of subsidies on essential goods and services, amount spent on developing social infrastructure, expenditure incurred to enlarge and improve the physical resources of the state, expenditure incurred to improve knowledge skills and productivity of people in the state, expenditure on community welfare, expenditure on education, health and other social overheads, expenditure on development of small scale and ancillary industries, amount spent on infrastructure for growth of industries, amount spent for promoting balance regional development, as such. In the study, it is measured using the ratio of **e**xpenditure on social overheads to total revenue.

iv. Human Resource Development

Human resource development is an integral area of social obligation of public enterprise which is concerned with the well-being of the employees. Public sector enterprises are expected to act as a model employer by providing the workers with better wages and salaries, training and development and spending on providing better working conditions. Human resource practices and their management are needed in order to achieve professional human resource standards (Jha, 2015). To measure human resource development in the enterprise the study considers the ratio of expenditure on the development of human resources to total revenue. The expenditure on human resources includes expenditure on the improvement of working and living conditions of employees, expenses on training, upgrading the skills of the employees, coaching, mentoring and career development of employees, expenditure on health and safety of employees and any other expenses on employee wellness.

v. Corporate Governance

Public enterprises are the assets of the citizens managed by the government. Professional and transparent management of these assets of the society will ensure value creation for the society. Thus, public enterprises need to establish strong governance practices in order to maximise their contributions to development (Kane & Christiansen, 2015). The Department of Public Enterprises in India has issued guidelines on various aspects for public enterprises to follow the guidelines in their functioning in order to protect the interest of the shareholders and relevant stakeholders such as the composition of the board, independence of the board, annual reporting, internal audit, disclosures, etc., (Mishra Ram Kumar & Potaraju Geeta, 2016). The study considers strong corporate governance in public enterprises as a benefit to society and measures it on the basis of practices such as the optimum number of board members, the optimum number of independent directors, the prescribed number of board meetings in a year, submission of accounts of the time, Internal audit.

Table 4.1 below lists out the parameters identified for developing a comprehensive framework for the performance evaluation of public sector enterprises:

Table 4.1: Performance Indicators and Measurement

Criteria	Parameter (sub-criteria)	Measurement	Related Studies
Financial performance (Jenkins, 1979)	**Profitability**	$Return\ on\ assets = \frac{Net\ profit\ after\ tax}{Total\ assets}\ x\ 100$	(Kar N. C., 1988) (Jiang et al., 2018)
	Liquidity	$Current\ Ratio = \frac{Current\ assets}{Current\ liabilities}$	(Taqi et al., 2018) (Koley et al., 2014)
	Solvency	$Solvency\ Ratio = \frac{Total\ debts}{Total\ Assets}$	(Trivedi, 2010) (Navneetha et al., 2018)
Physical Performance (Enterprise specific)	**Output/ Deliverables**	Growth rate in output of goods or services provided	(Margarita,2004) (Margarita, 2005)
	Impact of the activity	$Turnover\ share\ of\ GSDP = \frac{Turnover}{GSDP}$	(Margarita,2004) (Margarita, 2005)
	Efficiency of operation	$Cost\ of\ revenue\ ratio = \frac{Cost\ of\ revenue}{Total\ Revenue}$	(Margarita,2004) (Margarita, 2005)
Contribution to Economy (Jenkins, 1979a)	**Internal Resource Generation**	Ratio of Internal Resource Generation to Total Investment (IRG= Depreciation + Deferred Revenue Expenditure Written off + Retained earnings)	(Nandi, 2012) (Nandi, 2010) (Sarkar Aniruddha, 2013) (Ghuman, 2001)
	Contribution to Exchequer	Ratio of Contribution to Exchequer to Total Investment (Contribution=Taxes & Duties + Dividend + Interest) (Net contribution after deducting subsidies received from Government)	(Sarkar Aniruddha, 2013) (Jain, 2018) (Ghuman, 2001)
	Employment Generation	Growth rate in the number of employees.	Based on the criterion issued by the Indian Bureau of Public Enterprises (Sarkar Aniruddha, 2013)
	Value Addition	Ratio of Value addition to Total Investment	(Nandi, 2010) (Kar, 1988) (Bagnoli & Megali, 2011)

		(Value addition= Interest+ Dividend+ Taxes+ wages+ Retained Profits)	(Sarkar Aniruddha, 2013) (Jatinder & Chittedi, 2015)
Contribution to the Society (Jenkins, 1979)	**Promoting Research & Development, Innovation and technological up-gradations**	Ratio of expenditure on Research & Development, Innovation and Technological advancement to Total Revenue	Based on MOU criteria for SOEs issued by Indian Bureau of Public enterprises. (Sastry K.S., 1990) (Singh & Chittedi, 2011)
	Protection and conservation of environment	Ratio of expenditure on Conservation of the Environment to Total Revenue.	Based on MOU criteria for SOEs issued by the Indian Bureau of Public Enterprises.
	Community Welfare	Ratio of **e**xpenditure on Social Overheads (like education, health, sports, etc.) to Total Revenue.	(Mathew, 1997)
	Human Resource Development	Ratio of expenditure on development of a Human Resource to Total Revenue.	(Sastry K.S., 1990) (Mathew, 1997)
	Corporate Governance	**Board Size** Optimum number of board members. (Yes=1, No=0) **Board independence** Optimum number of independent directors. (Yes=1, No=0) **Prescribed number of board meetings in a year**. (Yes=1, No=0) **Internal audit.** (Yes=1 & No=0) (Total score out of 4)	Based on MOU criteria for SOEs issued by the Indian Bureau of Public enterprises.

4.2.2 Hierarchical Structure of the Performance Indicators

After identifying the key performance indicators, the hierarchical structure of the identified parameters is constructed with three levels. The first level is the goal, which is performance evaluation. At the second level, we have four major performance indicators/criteria and at the third level, we have the sub-criteria/ parameters under each of the major criteria. Altogether there are fifteen performance indicators identified for the developing the framework. The levels and the hierarchical structure are shown below in table 4.2.

Level One: Goal (Performance evaluation)

Level Two: Performance evaluation (Criteria)

Level Three: Parameters (Sub-criteria)

Table 4.2: Hierarchical Structure of the Performance Indicators

Level 1 Main Objective	**Overall Performance**			
Level 2 Decision Criteria	**Financial performance (C1)**	**Physical performance (Enterprise Specific) (C2)**	**Contribution to the economy (C3)**	**Contribution to the society (C4)**
Level 3 Sub-criteria	Profitability	Output/ Deliverables	Internal Resource generation	Promoting research & development, innovation and technological up-gradation
	Liquidity	Impact of activity	Contribution to exchequer	Protection and conservation of environment
	Solvency	Efficiency of operation	Employment generation	Community welfare
			Value addition	Human resource development
				Corporate governance

4.2.3 Profile of the Expert Panel

After constructing the hierarchical structure, the next step is to collect the pairwise comparison data for the pairwise comparison matrix. The data is captured from the experts by selecting an expert panel and administering them the developed AHP questionnaire. The composition of the expert panel is shown below in table 4.3.

Table 4.3: Profile of the expert panel

Details of the respondent	Number of respondents
Designation	
Higher level manager	5
Functional level manager	7
Employee	3
Representation from General Public/Beneficiaries (Academicians)	5
Total	**20**
Educational background	
Computer/IT	1
Engineering	2
Management	7
Economics	1
Accounting	10
Other discipline	2

Source: Author's computation

Delphi method is used to select the expert panel to obtain input data for the AHP. A panel of 20 experts consisting of representatives from public sector undertakings in Goa and the general public representing the beneficiaries of these enterprises was formed. The expert panel was carefully built based on the sufficient knowledge and experience on the survey issue and their capacity, willingness & time to participate. The expert panel consisted of higher level, functional level and employees of the public sector enterprises and also academicians represented the general public as beneficiaries of public enterprises. The experts were from varied disciplines including IT, engineering, accounting, management and economics**.**

4.2.4 Scale for Pairwise Comparison

The pairwise comparison of the indicators is a very important step based on which the performance indicators are quantified for the overall performance evaluation framework. The pairwise comparison means taking two criteria at the same time and

asking the experts to compare them on the scale especially meant for AHP. The AHP scale developed by Thomas Saaty ranges from "1 to 9" which is stated below in table 4.4.

Table 4.4: Scale for pairwise comparison between the criteria and sub-criteria

Scale	Definition	Explanation
1	Equal importance	Two criteria contribute equally to the objective
3	Moderate importance	Judgement moderately favoured one criterion over another.
5	Essential or strong importance	Judgement Strongly favoured one criterion over another.
7	Very Strong importance	Judgment very strongly favoured dominance of one criterion over another.
9	Extreme importance	Judgment favoured one criterion over another with the highest order of affirmation.
2,4,6,8	Intermediate values between two adjacent judgements	When compromise between two scales of judgement is needed

Source: (Saaty, 1977)

The scale has extreme values "1,3,5,7 and 9" in the increasing order of the degree of importance of one criterion over another and there are intermediate values "2,4,6 and 8" to compromise between two extreme values.

4.2.5 Analysis of Pairwise Comparison Data

Pairwise comparison data is required to prepare the decision matrix with the help of which the criteria weights can be calculated. For pairwise comparison, a questionnaire is drafted in such a manner that for each time the respondent has to compare between two criteria which one is more important than the other. In the question, one criterion is placed on the left-hand side and the other one is placed on the right-hand side. In between there is the scale "1 to 9" to the left-hand side and "1 to 9" to the right-hand side. If the respondent feels the criterion on the left-hand side is more important than the criterion on the right-hand side, the respondent has to mark the response on the scale towards the left-hand side on the numerical judgement depending upon the degree of importance. This procedure is done for all the pairs of criteria used in the study. The scoring pattern is explained below in Figure 4.1.

Judgement scale																
LHS: A ⟸									⟹ **RHS: B**							
9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**

Figure 4.1: Scoring pattern

If 'A' is more important, use the left-hand side (LHS) of the scale.

If 'A' and 'B' are equally important, put a tick mark on the centre portion (MIDDLE) of the scale.

If 'B' is more important, use the right-hand side (RHS) of the scale.

On the basis of the data collected from the experts through the questionnaire, the data is presented in a square decision matrix (A) which consists of the same number of rows and columns. The decision matrix is prepared for criteria and for each respondent separately. After preparing the decision matrix, it is necessary to first normalise the matrix so that the criteria can be compared with each other. To normalise the matrix, each entry in the matrix is divided by the sum of the corresponding column. Based on the normalised matrix, criteria weights (W) are obtained by averaging each row of the normalised matrix. After obtaining the weighted results of all the criteria and sub-criteria it is necessary to check whether the weights can be applied or not. For this consistency check is done as there may be issues of inconsistency in a few cases due to the subjective opinions of the experts. Thus, to check the consistency level of the responses, the consistency ratio is calculated for each matrix and for each response. To calculate the consistency ratio, first of all, the (AW) matrix is created by multiplying the decision matrix (A) with the weight matrix (W). The next step is creating the vector Lambda (λ) by dividing the (AW) by Weights (W). The maximum eigenvalue "Lambda (λ) max" is calculated by averaging the Lambda (λ) value. The consistency index is then calculated by using the formula:

$CI = \frac{(\lambda_{max} - n)}{(n-1)}$ (Where n is the number of criteria considered for evaluation)

Thereupon, CR is calculated using the formula:

$$CR = \frac{CI}{RI}$$

RI refers to a random consistency index suggested by Saaty. RI is derived from a large sample of randomly generated reciprocal matrices using the scale 1/9, 1/8, ..., 1...,8, 9.

Random Index values for different size matrices suggested by Saaty:

Table 4.5: Random Index Values for different size matrices

N	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45

Depending on the "N" value the RI value can be picked. Saaty suggested that the value of the CR should not exceed 0.1 for a consistent result.

Therefore, CR< 0.10 is acceptable.

The consistency ratio is calculated for all the criteria and for all the individual responses. If the consistency ratio is not within the acceptable limits the data needs to be revised till the consistency is obtained. In the case of this study, only two experts had to revise the data once for a few criteria. Lastly, all the 20 respondents' data is aggregated by taking the Geometric Mean of the decision matrix (A) and performing the whole AHP analysis process for the aggregate matrix. Based on the aggregation results, the priority weights of the criteria and sub-criteria are obtained. The priority weights obtained are of two types: relative weights and overall weights. The overall weights are considered for understanding the degree of importance of each performance indicator in the overall performance evaluation of the enterprise. The overall performance evaluation model is constructed in the form of an equation using the overall weights. This generic model can be used to calculate the overall performance score of any enterprise by substituting the parameter value from the records of the enterprise. Table 4.6 to 4.23 below, shows the results of the aggregated AHP analysis.

4.2.5.1 Aggregate Pairwise Comparison Matrix

(Geometric mean of all 20 responses)

a. Criteria for Overall Performance Evaluation

Table 4.6: Aggregate pairwise comparison matrix for Criteria

Criteria	Financial performance	Physical performance	Contribution to the economy	Contribution to the society
Financial performance	1	1	$\frac{2}{5}$	$\frac{3}{8}$
Physical performance	1	1	$\frac{2}{7}$	$\frac{2}{7}$
Contribution to the economy	$\frac{24}{9}$	$\frac{32}{5}$	1	$\frac{2}{3}$
Contribution to the society	$\frac{23}{5}$	$\frac{31}{2}$	$\frac{11}{2}$	1

Source: Primary data

b. Parameters of Financial Performance

Table 4.7: Aggregate pairwise comparison matrix for Financial Performance

Financial performance	Profitability	Liquidity	Solvency
Profitability	1	$\frac{5}{8}$	$\frac{2}{3}$
Liquidity	$\frac{13}{5}$	1	$\frac{11}{8}$
Solvency	$\frac{11}{2}$	$\frac{8}{9}$	1

Source: Primary data

c. Parameters of Physical Performance

Table 4.8: Aggregate pairwise comparison matrix for Physical Performance

Physical performance	Output/ Deliverables	Impact of activity	Efficiency of operation
Output/Deliverables	1	$\frac{11}{2}$	$\frac{6}{7}$
Impact of activity	$\frac{2}{3}$	1	$\frac{3}{5}$
Efficiency of operation	$\frac{11}{6}$	$\frac{12}{3}$	1

Source: Primary data

d. Parameters of Contribution to the Economy

Table 4.9: Aggregate pairwise comparison matrix for Contribution to Economy

Contribution to the economy	Internal Resource generation	Contribution to exchequer	Employment generation	Value addition
Internal Resource generation	1	$\frac{11}{2}$	$\frac{4}{7}$	$\frac{11}{7}$
Contribution to exchequer	$\frac{2}{3}$	1	$\frac{1}{3}$	$\frac{5}{6}$
Employment generation	$\frac{13}{4}$	3	1	2
Value addition	$\frac{7}{8}$	$\frac{11}{5}$	$\frac{1}{2}$	1

Source: Primary data

e. **Parameters of Contribution to Society**

Table 4.10: Aggregate pairwise comparison matrix for Contribution to Society

Contribution to the society	Promoting research & development, innovation & technological up-gradation	Protection and conservation of environment	Community welfare	Human Resource development	Corporate Governance
Promoting research & development, innovation and technological up-gradation	1	$\frac{4}{5}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{4}{5}$
Protection and conservation of environment	$\frac{11}{4}$	1	$\frac{2}{5}$	$\frac{4}{9}$	1
Community welfare	$\frac{24}{5}$	$\frac{23}{5}$	1	$\frac{11}{5}$	$\frac{24}{9}$
Human Resource development	$\frac{21}{2}$	$\frac{22}{7}$	$\frac{5}{6}$	1	$\frac{17}{8}$
Corporate Governance	$\frac{11}{4}$	1	$\frac{2}{5}$	$\frac{1}{2}$	1

Source: Primary data

4.2.5.2 Normalised Matrix

a. Criteria of Performance Evaluation

Table 4.11: Normalised matrix for Criteria

Criteria	Financial performance	Physical performance	Contribution to the economy	Contribution to the society
Financial performance	0.14167	0.11311	0.12831	0.16309
Physical performance	0.14084	0.11251	0.09274	0.12208
Contribution to the economy	0.34738	0.38169	0.31463	0.28873
Contribution to the society	0.37012	0.39269	0.46432	0.42610

Source: Author's computation

b. Parameters of Financial Performance

Table 4.12: Normalised matrix for Financial Performance

Financial performance	Profitability	Liquidity	Solvency
Profitability	0.24209	0.24980	0.23390
Liquidity	0.38610	0.39841	0.40686
Solvency	0.37181	0.35178	0.35924

Source: Author's computation

c. Parameters of Physical Performance

Table 4.13: Normalised matrix for Physical Performance

Physical performance	Output/ Deliverables	Impact of activity	Efficiency of operation
Output/Deliverables	0.35359	0.36160	0.34902
Impact of activity	0.23192	0.23717	0.24184
Efficiency of operation	0.41449	0.40123	0.40913

Source: Author's computation

d. Parameters of Contribution to Economy

Table 4.14: Normalised matrix for Contribution to Economy

Contribution to the economy	Internal Resource generation	Contribution to exchequer	Employment generation	Value addition
Internal Resource generation	0.23336	0.22492	0.23751	0.23036
Contribution to exchequer	0.15370	0.14815	0.13774	0.16632
Employment generation	0.40847	0.44715	0.41574	0.40149
Value addition	0.20446	0.17979	0.20900	0.20184

Source: Author's computation

e. Parameters of Contribution to Society

Table 4.15 Normalised matrix for Contribution to Society

Contribution to the society	Promoting research & development, innovation and technological up-gradation	Protection and conservation of environment	Community welfare	Human Resource development	Corporate Governance
Promoting research & development, innovation and technological up-gradation	0.11358	0.10415	0.12013	0.11101	0.11302
Protection and conservation of environment	0.14250	0.13067	0.12893	0.12273	0.14348
Community welfare	0.31682	0.33960	0.33508	0.33642	0.34224
Human Resource development	0.28682	0.29846	0.27921	0.28032	0.26169
Corporate Governance	0.14027	0.12712	0.13665	0.14951	0.13957

Source: Author's computation

4.2.5.3 Vector Weight and Maximum Eigenvalue

a. Criteria of performance evaluation

Table 4.16: Vector weights and Max. eigenvalue of Criteria

Criteria	Vector weights (W)	(AW)	Lambda (λ)	Max. eigenvalue Lambda (λ) max
Financial performance	0.137	0.548	4.015	4.026
Physical performance	0.117	0.469	4.010	
Contribution to the economy	0.333	1.345	4.038	
Contribution to the society	0.413	1.670	4.041	
	1.000			

Source: Author's computation

b. Parameters of Financial Performance

Table 4.17: Vector weights and Max. eigenvalue of parameters of Financial Performance

Financial performance	Vector weights (W)	(AW)	Lambda (λ)	Max. eigenvalue Lambda (λ) max
Profitability	0.242	0.726	3.0006	3.001
Liquidity	0.397	1.192	3.0010	
Solvency	0.3	1.083	3.0009	
	1.000			

Source: Author's computation

c. Parameters of Physical Performance

Table 4.18: Vector weights and Max. eigenvalue of parameters of Physical Performance

Physical performance	Vector weights (W)	(AW)	Lambda (λ)	Max. eigenvalue Lambda (λ) max
Output/Deliverables	0.355	1.064	3.0004	3.0003
Impact of activity	0.237	0.711	3.0002	
Efficiency of operation	0.408	1.225	3.0004	
	1.000			

Source: Author's computation

d. Parameters of Contribution to the Economy

Table 4.19: Vector weights and Max. eigenvalue of parameters of Contribution to Economy

Contribution to the economy	Vector weights (W)	(AW)	Lambda (λ)	Max. eigenvalue Lambda (λ) max
Internal Resource generation	0.232	0.927	4.005	
Contribution to exchequer	0.151	0.606	4.003	
Employment generation	0.418	1.676	4.008	
Value addition	0.199	0.796	4.003	
	1.000			4.005

Source: Author's computation

e. Parameters of Contribution to Society

Table 4.20: Vector weights and Max. eigenvalue of parameters of Contribution to Society

Contribution to the society	Vector weights (W)	(AW)	Lambda (λ)	Max. eigenvalue Lambda (λ) max
Promoting research & development, innovation and technological up-gradation	0.112	0.562	5.004	
Protection and conservation of environment	0.134	0.669	5.004	
Community welfare	0.334	1.672	5.007	5.005
Human Resource development	0.281	1.409	5.008	
Corporate Governance	0.139	0.694	5.004	
	1.000			

Source: Author's computation

4.2.5.4 Consistency Check

Table 4.21: Consistency Ratio of the pairwise comparison matrix

Comparison Matrix	Consistency Ratio
Criteria for performance evaluation	0.009721*
Parameters of financial performance	0.000721*
Parameters of physical performance	0.000289*
Parameters of contribution to economy	0.001728*
Parameters of contribution to society	0.001159*

***CR< 0.10 is acceptable**

Source: Author's computation

Since the CR of all the comparison matrices is less than 0.10, the generated weights are accepted.

4.2.5.5 Priority Weights of Performance Indicators

Table 4.22: Relative and Overall Weights of Performance Indicators

Criteria	Parameter	Relative weights		Overall weights	Overall weight in percentage	Type of parameter
C1: Financial performance		**0.14**			**14**	
	P1: Profitability		0.24	0.03	3	Beneficial
	P2: Liquidity		0.4	0.06	6	Beneficial
	P3: Solvency		0.36	0.05	5	Non-beneficial
		0.12			**12**	
C2: Physical performance	P4: Output/ Deliverables		0.35	0.04	4	Beneficial
	P5: Impact of activity		0.24	0.03	3	Beneficial
	P6: Efficiency of operation		0.41	0.05	5	Non-beneficial
		0.33			**33**	
C3: Contribution to Economy	P7: Internal Resource generation		0.23	0.07	7	Beneficial
	P8: Contribution to exchequer		0.15	0.05	5	Beneficial
	P9: Employment generation		0.42	0.14	14	Beneficial
	P10: Value addition		0.20	0.07	7	Beneficial
		0.41			**41**	
C4: Contribution to Society	P11: Promoting research & development, innovation and technological up-gradation		0.11	0.04	4	Beneficial
	P12: Protection and conservation of environment		0.13	0.05	5	Beneficial
	P13: Community welfare		0.33	0.14	14	Beneficial
	P14: Human resource development		0.28	0.12	12	Beneficial
	P15: Corporate Governance		0.14	0.06	6	Beneficial
				1.00	**100**	

Source: Author's computation

As observed in Table 4.22, the overall weights of the performance indicators indicate the level of importance of the indicator in the overall performance evaluation

of the enterprise. The table shows that among the four major criteria used in the framework, the contribution to the society has the highest weightage of 41 per cent followed by the second important criterion contribution to the economy which has 33 per cent weightage and then follows the financial performance with 14 per cent and physical performance with 12 per cent weightage in performance of public sector enterprises. This supports the theoretical proposition that for performance evaluation of public sector enterprises, contribution to society is the most important criterion and that public enterprises are established for social profit and not for financial profit.

Among the sub-criteria, the most important parameters of performance having more than 10 per cent weightage are employment generation and community welfare with 14 per cent weightage followed by human resource development with 12 per cent weightage. Thus, the priority of a public enterprise should be generating employment for the masses and also being a model employer and contributing towards the well-being of the community.

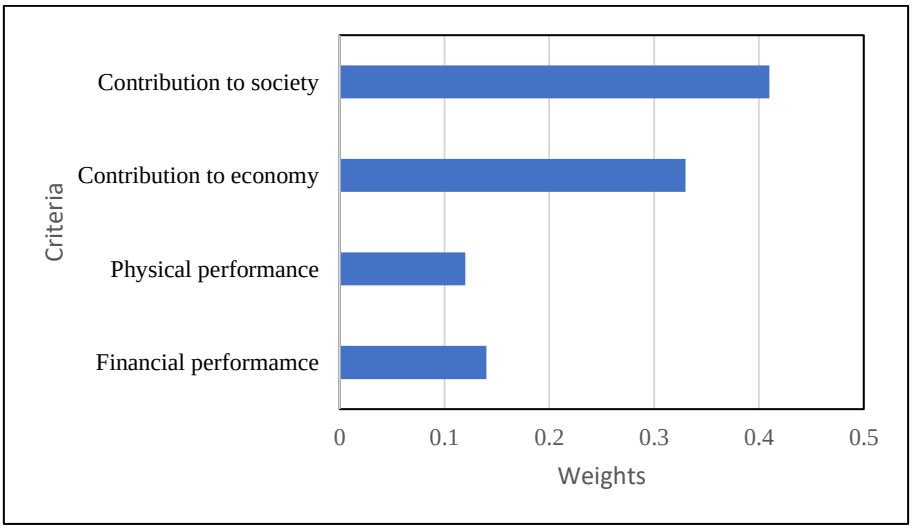

Figure 4.2 Criteria weights

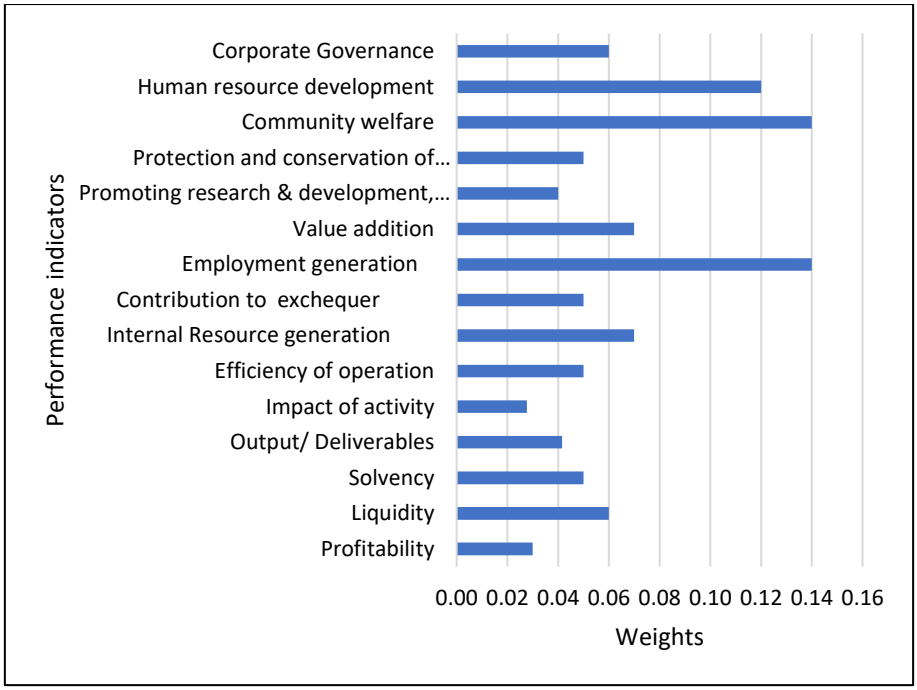

Figure 4.3: Overall Weights of the performance indicators

4.2.6 Developed Performance Evaluation Model

Table 4.23: Performance Evaluation Model

$$\boldsymbol{Performance\ Score} = 0.03P_1 + 0.06P_2 + 0.05P_3 + 0.04P_4 + 0.03P_5 + 0.05P_6 + 0.07P_7 + 0.05P_8 + 0.14P_9 + 0.07P_{10} + 0.04P_{11} + 0.05P_{12} + 0.14P_{13} + 0.12P_{14} + 0.06P_{15}$$

Source: Author's computation

4.2 Major Findings

- ✓ Contribution to society holds the highest weightage for overall performance evaluation of SLPE.
- ✓ Among the financial performance parameters, liquidity holds the highest importance followed by solvency and then profitability.
- ✓ Among physical performance parameters, the efficiency of operations holds higher weightage followed by output and then impact.
- ✓ Among the parameters to assess the contribution made by the SLPE to the economy, experts have given the highest weightage to employment generation.
- ✓ In terms of the contribution of the SLPE towards society, the highest-ranked parameter is community welfare.

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Chapter Five

Performance of State Public Sector Enterprises in Goa – A Macro View

5.1 State Public Sector Enterprises

The public sector also plays a very important role in the development of the state. There has been spectacular growth in the state-level public enterprises in India in terms of investment and also in number. The state-level public enterprises differ from central public enterprises in terms of diversity of operations, origin and objectives. (Sankar et al., 1990). As envisioned in Article 246 of the Indian Constitution, the state level public enterprises were set up as a tool of public policy to accomplish their socioeconomic objectives (De, 2015). These enterprises established in the state for increasing social welfare are engaged in a variety of activities such as tourism, transport, agriculture, forest and fishing, marketing, industrial development, finances, construction, development of weaker sections of society, etc. The importance of state enterprises in the economy and their potential to move other policy outcomes makes it imperative that these enterprises are efficiently governed and maximise their value to the society (Kane & Christiansen, 2015). But at the same time, their notable low performance poses several problems for the state and slows down the economic growth creating a fiscal burden and fiscal risk for the state (Taghizadeh-hesary et al., 2019), (Heo, 2018). At the state level, the public sector includes statutory corporations, departmental undertakings and the government companies. The statutory corporations established under the state legislature are free from government control with respect to internal management but are accountable to the legislature. The statutory corporations overlook the commercial approach in managing their affairs due to less competition. The departmental undertakings that are managed and financed by the state government are subject to budgetary, accounting and audit control. These undertakings suffer from bureaucratic functioning, excessive control and lack of flexibility. A government company registered under the Companies Act in which not less than 51 per cent of the paid-up capital is held by government(s), operates with a commercial approach and offers healthy competition to the private sector. The state public sector enterprises are not the same as departmental undertakings as these enterprises depend on their own rather than the budgetary support from the government.

5.2 An overview of State Public Sector Enterprises in Goa

Goa is the smallest and wealthiest state located in the western India. The rudiments of the state's economy are very strong with a high GDP, the highest per capita income in India, well-known as one of the fast-growing states, very good basic infrastructure and the best socio-economic indicators in the country. Traditionally Goa was a rural economy with a strong mining base. With fast developments taking place, it is transformed into a fast-growing Industrial hub. After liberation and with the planned economic development, the state has made rapid signs of progress in industrial development Special boost in the Industrial sector of Goa was witnessed after 1991 due to the special income tax status conferred upon the state by the Government of India and the sales tax holiday from the Government of Goa. At present the secondary sector alone contributes around 40% of the State's GDP. Mining is the major economic activity and tourism creates a multiplier effect across the sectors in the State. The tertiary sector in the State has also shown significant growth. The Public sector in Goa also plays a very important role in the development of the state occupying a moderate place in the economy. The state-level public sector enterprises in Goa consist of government companies, statutory corporation and departmental undertakings which include public utilities. These enterprises have been set up in the areas of transport, tourism, handicrafts, financial services, forest and fisheries development, etc. These enterprises are set up with social and economic objectives such as generating direct or indirect employment, leading to the development of the region, creating wealth for the society, etc. These objectives can be achieved only when these enterprises generate profits on a sustainable basis. As owners, the Government of Goa has a financial stake in these enterprises by way of share capital, loans, grants and subsidies. Besides financial support, the state government also guarantees the repayment of the loans with interest availed by the state public sector enterprises from the financial institutions.

5.3 Macro Analysis of the State Public Sector Enterprises in Goa

To understand the overall situation of the public sector enterprises in the state of Goa, a macro-level analysis is performed based on secondary data obtained from the CAG reports for 11 years (from 2008-09 to 2018-19). The analysis is done using simple techniques such as ratio analysis, CAGR and AAGR, percentage analysis, trend analysis and graphical representation.

5.3.1 Composition

The State's public sector undertakings include government companies and statutory corporations established in the state to carry out commercial activities while keeping in view the well-being of the society. The composition of the state public sector undertakings can be seen in tables 5.1 and 5.2 given below:

Table 5.1: Number of Public Sector Undertakings in Goa as of 31st March 2019

Sector	Government Company		Statutory Corporation		Total
	Working	Non-working	Working	Non-working	
Social Sector	9	Nil	Nil	Nil	**9**
Competitive environment	2	Nil	Nil	Nil	**2**
Others	3		1	1	**5**
Total	**14**	**Nil**	**1**	**1**	**16**

Source: CAG Report 2018-19

The government of Goa has invested in some enterprises which function as an instrument of the state government to provide certain services which the private sector may not be willing to extend and also there are some enterprises which operate in a competitive environment with the private enterprises. Based on this, since 2017-18 these enterprises have been categorised into three sectors- Social Sector, Enterprises operating in Competitive Environment and Others. Prior to this, these enterprises were functionally classified as Commercial, Commercial-cum-promotional and Promotional enterprises and for administration purposes classification of SLPEs was done into five sectors- infrastructure, finance, service, agriculture and allied, and miscellaneous (manufacturing). As per the CAG Report for the year ended 31st March 2019, there are 16 state public sector undertakings other than the Power Sector. These undertakings incorporated between 1965 to 2016 include 14 Government Companies (including one subsidiary company GEL) and 02 Statutory Corporations (GIDC and GITDCL). Of these public sector undertakings, the State Government invested funds in 15 undertakings excluding one active subsidiary company. The majority of the enterprises are concentrated in the social sector, only two are operating in the competitive environment and the rest 5 belong to other sectors out of which 1 enterprise is non-working. Table 5.2 presents the detailed list of state public sector enterprises in Goa

Table 5.2: Sector-wise list of State Public Sector Enterprises in Goa as on 31st March 2019

Sector	Working Status	Name of the PSU
Social Sector	Working Government Company	Goa Forest Development Corporation Ltd (GFDCL)
		Goa Meat Complex Limited (GMCL)
		Goa State Horticultural Corporation Ltd (GSHCL)
		Goa Handicraft, Rural and Small-Scale Industries Development Corporation Limited (GHRSSIDCL)
		Goa State Scheduled Castes and Other Backward Classes Finance and Development Corporation Limited (GSSCOBCFDCL)
		Goa State Scheduled Tribes Finance and Development corporation Limited (GSSTFDCL)
		Goa State Infrastructure Development Corporation Limited (GSIDCL)
		Sewerage and Infrastructural Development Corporation of Goa Limited (SIDCGL)
		Imagine Panaji Smart City Development Limited
Competitive Environment Sector	Working Government Company	Goa Tourism Development Corporation Limited (GTDC)
		Kadamba Transport Corporation Limited (KTCL)
Other Sector	Working Government Company	Economic Development Corporation Limited (EDC)
		Info Tech Corporation of Goa Limited (ICGL)
		Goa Electronics Limited (GEL)
	Working Statutory Corporation	Goa Industrial Development Corporation Limited (GIDC)
	Non-Working Statutory Corporation	Goa Information Technology Development Corporation Limited. (GITDCL)

Source: CAG Report No. 2 of 2020 - Government of Goa for the year ended 31st March 2019.

5.3.2 Role of Government and the Legislature

The State Government exercises control over the affairs of these enterprises through its administrative departments. The Chief Executive and Directors to the Board are appointed by the Government. The State Legislature also monitors the accounting and utilisation of Government investment in these enterprises. The annual reports together with the statutory auditors' reports and comments of the CAG, in respect of Government Companies and Separate Audit Reports in case of Statutory Corporations are to be placed before the Legislature under Section 395 of the Act 2013 or as stipulated in the respective Acts. The Audit Reports of the CAG are submitted to the Government under Section 19A of the CAG's (Duties, Powers and Conditions of Service) Act, 1971.

5.3.3 Financial Reporting Framework and Audit of Accounts

The financial statements of the government companies are required to be prepared in the format laid down in Schedule III of the Companies Act 2013 and also in adherence to the mandatory accounting standards prescribed by the Central Government in consultation with the National Advisory Committee on Accounting Standards. The statutory corporations are required to prepare their accounts in the format prescribed under the rules framed in consultation with the CAG and any other specific provision relating to accounts in the Act governing such corporations. The prime responsibility for the preparation of financial statements in accordance with the prescribed financial reporting framework is with the management of the company.

The audit of accounts of the government companies is done by the statutory auditors appointed by the CAG under section 139 of the Companies Act 2013. The statutory auditors are responsible for expressing an opinion on the financial statements of the government companies under section 143 of the Companies Act 2013 based on independent audits conducted in accordance with the Standard Auditing Practices of ICAI and the directives of the CAG. The statutory auditors are required to submit the audit report to the CAG under section 143 of the Companies Act 2013. The certified accounts of the government companies along with the statutory auditor's report is reviewed by the CAG by carrying out a supplementary audit and the significant observations if any are reported under section 143(6) of the Companies Act 2013 to be placed before the Annual General Meeting. Thus, the CAG plays an oversight role by monitoring the performance of the statutory auditors in the audit of government

companies with the overall objective of issuing directions to the statutory auditors under section 143(5) and conducting supplementary audit or comment on statutory auditor's opinion under section 143(6) of the Companies Act 2013. The audit of the statutory corporation is conducted by the CAG as per the provisions of the respective Acts. A Separate Audit Report (SAR) of the CAG on the accounts of Statutory is to be laid before the Legislature as per the provisions of the respective Acts.

5.3.4 Submission of Accounts

The accounts of the companies for every financial year are required to be finalised within six months from the end of the relevant financial year as per the provisions of the Companies Act and that of Statutory Corporations, their accounts are finalised, audited and presented to the Legislature as per the provisions of their respective Acts. Table 5.3 below provides the status of arrears of accounts by working public sector enterprises as of 31 October 2020 based on the CAG Report 2019-20.

Table 5.3: Status of Arrears of Accounts as on 31 October 2020

Name of the PSU	Years for which accounts are in arrears	Number of accounts in arrears
Goa Forest Development Corporation Ltd	2016-17 to 2019-20	4
Goa Meat Complex Limited	Nil	0
Goa State Horticultural Corporation Ltd	2015-16 to 2019-20	5
Goa Handicraft, Rural and Small-scale Industries Development Corporation Ltd	2019-20	1
Goa State Scheduled Castes and Other Backward Classes Finance and Development Corporation Ltd	2009-10 to 2019-20	11
Goa State Scheduled Tribes Finance and Development corporation Ltd	Nil	0
Goa State Infrastructure Development Corporation Ltd	2019-20	1
Sewerage and Infrastructural Development Corporation of Goa Ltd	2019-20	1
Imagine Panaji Smart City Development Ltd.	2017-18 to 2019-20	3
Goa Tourism Development Corporation Ltd.	2019-20	1
Kadamba Transport Corporation Ltd.	2019-20	1
Economic Development Corporation Ltd.	2019-20	1
Info Tech Corporation of Goa Ltd	2013-14 to 2019-20	7
Goa Electronics Ltd.	2019-20	1
Goa Industrial Development Corporation Ltd	2019-20	1
Goa Information Technology Development Corporation Ltd.	2006-07 to 2019-20	14

Source: CAG Report - Government of Goa for the year ended 31st March 2020.

The arrears of accounts of the state public sector enterprises range from 1 to 14 years. Only two out of sixteen state public sector enterprises have submitted their accounts for the financial year 2019-20. Among the defaulting enterprises, GITDC has not submitted its accounts since its inception in 2006-07. In the absence of finalisation of accounts and their subsequent audit, it becomes difficult to ensure whether the investments and expenditure incurred had been properly accounted for and the purpose for which the amount invested was achieved. The arrears of accounts may also result in the risk of fraud and leakage of public money apart from violation of the provision of the relevant statutes. Moreover, due to arrears of accounts, the actual contribution of the

state public sector enterprises to State GDP for the year cannot be ascertained and their contribution to the State exchequer cannot be reported to the State Legislature.

5.3.5 Profile of State Public Sector Enterprises

Table 5.4: Profile of the State Public Sector Enterprises

(Amount in crores)

Year	Number of units	Number of active units	Number of units earning profit	Profit earned (₹)	Number of units sustaining loss	Loss sustained (₹)
2008-09	17	17	5	109.71	10	16.75
2009-10	17	17	4	47.91	11	21.72
2010-11	17	17	5	31.55	10	21.24
2011-12	17	17	6	29.18	10	22.25
2012-13	17	17	9	47.72	7	32.14
2013-14	16	14	8	48.31	6	29.99
2014-15	16	14	8	35.72	6	28.99
2015-16	16	14	10	54.25	4	1.4
2016-17	16	14	11	53.93	3	4.41
2017-18	17	15	9	67.56	6	17.41
2018-19	16	15	11	78.13	4	23.32
CAGR (%)				**(3)**		**3**

Source: CAG Report No. 2 of 2020 - Government of Goa for the year ended 31st March 2019.

As observed in table 5.4, from 2008-09 till 2018-19, there was an increase in the number of profit-making enterprises over the period which is a positive sign but there was no stability in the profit earned by these profit-making enterprises. The profit earned shows a CAGR of (3) per cent whereas the loss sustained over the period shows a CAGR of 3 per cent. Over the years EDC, GIDC, GSIDCL, and SIDCGL were the major contributors of profit among the profit-making units and KTCL, GTDC, and GFDCL were incurring heavy losses among the loss-making units.

5.3.6 Investment Structure

As owners, the Government of Goa has a huge financial stake in these enterprises. This stake is of three types:

- ✓ **Share Capital and Loans**- In addition to the Share Capital Contribution, the State Government also provides financial assistance by way of loans to these enterprises from time to time.
- ✓ **Special Financial Support-** The State Government provides budgetary support by way of grants and subsidies to the public sector undertakings as and when considered necessary.
- ✓ **Guarantees-** In order to provide financial assistance to the public undertakings, the state government also gives guarantees under the Goa State Guarantees Act 1993 subject to the limits fixed by the State Legislature from time to time. State Government guarantees the repayment of loans with interest availed by the public sector undertakings from financial institutions with no payment of guarantee commission.

Table 5.5: Total Investment in the State Public Sector Enterprises as of 31st March.

(Amount in crores)

Year	Equity (₹)	Loans (₹)	Total (₹)
2008-09	267.41	224.73	492.14
2009-10	284.87	242.69	527.56
2010-11	295.84	212.48	508.32
2011-12	315.24	139.27	454.51
2012-13	356.99	314.07	671.06
2013-14	350.80	367.15	717.95
2014-15	346.27	329.45	675.72
2015-16	360.01	347.50	707.51
2016-17	360.56	546.32	906.88
2017-18	369.72	1,070.11	1439.83
2018-19	372.29	975.37	1347.66
CAGR (%)	**3**	**14**	**10**
AAGR (%)	**3.45**	**24.29**	**12.70**

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

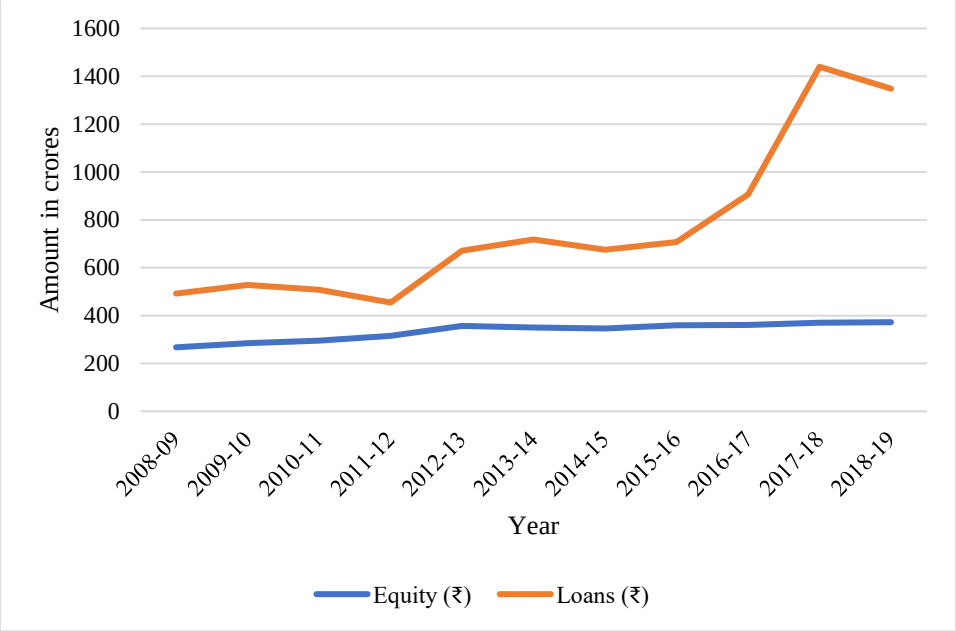

Figure 5.1: Investment in the State Public Sector Enterprises

Table 5.5 shows the total investment in the State Public Sector Enterprises over the period from 2008-09 to 2018-19. The above analysis shows the investment in equity and loans provided to the SPSEs. The investment in the form of equity has increased from ₹267.41 crores in 2008-09 to ₹ 372.29 crores in 2018-19 showing a compounded annual growth rate of 3 per cent and an average annual growth rate of 3.45 per cent. The investment in the form of loans has also increased from ₹ 224.73 crores in 2008-09 to ₹1070.11 crores in 2017-18 and further decreased to ₹ 975.37 crores showing a compounded annual growth rate of 14 per cent and average annual growth rate of 24.29 per cent. The total investment which was ₹492.14 crores in 2008-09 has grown to ₹ 1347.66 crores in 2018-19 recording a compounded annual growth rate of 10 per cent and an average annual growth rate of 12.70 per cent. The total investment in 2018-19 as compared to 2017-18 shows a decline due to the disinvestment of one inactive government company GAAL.

Table 5.6: Investment of Government of Goa in the State Public Sector Enterprises as of 31st March

(Amount in crores)

Year	Equity (₹)	Loans (₹)	Grants & Subsidy (₹)	Total (₹)
2008-09	210.63	1.71	81.54	293.88
2009-10	223.48	8.10	85.92	317.50
2010-11	235.95	8.10	133.01	377.06
2011-12	255.35	7.50	183.57	446.42
2012-13	293.11	6.17	216.83	516.11
2013-14	293.61	6.17	314.82	614.60
2014-15	293.61	5.64	406.44	705.69
2015-16	299.11	5.11	530.28	834.50
2016-17	300.11	4.39	642.01	946.51
2017-18	300.11	3.84	755.81	1059.76
2018-19	312.08	3.3	893.88	1209.26
CAGR (%)	**4**	**6**	**24**	**14**
AAGR (%)	**4.11**	**28.99**	**27.81**	**15.25**

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

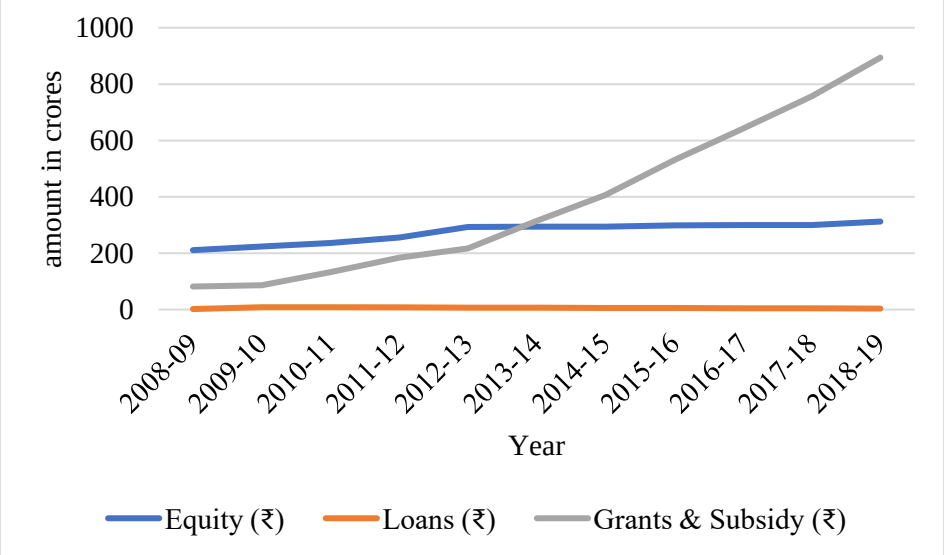

Figure 5.2: Investment of Government of Goa in the State Public Sector Enterprises

Table 5.6 shows the year-wise statement of investment of the Government of Goa in the State public sector enterprises during the period from 2008-09 to 2018-19.

The Government of Goa invests in the SPSEs in the form of equity, interest-free loans and grants & subsidies. The investment in the form of equity has grown from ₹210.63 crores to ₹312,08 crores recording a compounded annual growth rate of 4 percent and annual average growth rate of 4.11 percent. The outstanding interest-free loans provided to the SPSEs that stand to be ₹3.3 crores in 2018-19 record a compounded annual growth rate of 6 per cent and an average annual growth rate of 28.99 per cent. The grants and subsidy provided to the SPSEs has increased from ₹81.54 crores in 2008-09 to ₹ 893.88 crores in 2018-19. The compounded annual growth rate of grants and subsidies to SPSEs has been 24 per cent against the average annual growth rate of 27.81 per cent. The total investment of the state government in the SPSEs over the period has grown from ₹293.88 crores in 2008-09 to ₹1209.26 crores in 2018-19 with a compounded annual growth rate of 14 per cent and an average annual growth rate of 15.25 per cent. It is noticed that out of the total investment as of 31st March 2019, 72.92 per cent is in the form of grants and subsidies. It is an indicator of the extent to which the operations and losses of the SPSEs are financed by the state government which reflects a drain on the state resources.

Table 5.7: Sector-wise Funds infused in the State Public Sector Enterprises

(Amount in crore)

Year	Social sector (₹)	Competitive environment (₹)	Others (₹)	Total (₹)
2008-09	4.43	10.69	15.00	30.12
2009-10	8.68	3.30	5.25	17.23
2010-11	16.09	42.87	0.00	58.96
2011-12	36.60	32.03	0.00	68.63
2012-13	11.41	59.61	0.00	71.02
2013-14	10.96	87.00	0.00	97.96
2014-15	12.16	78.93	0.00	91.09
2015-16	21.02	107.79	0.00	128.81
2016-17	17.42	94.59	0.00	112.01
2017-18	16.86	96.39	0.00	113.25
2018-19	21.40	129.94	(1.84)	149.50
CAGR (%)	**15**	**25**	**(183)**	**16**
AAGR (%)	**32.64**	**128.85**	**(16.50)**	**31.17**

Source: CAG Report No. 2 of 2020 - Government of Goa for the year ended 31st March 2019.

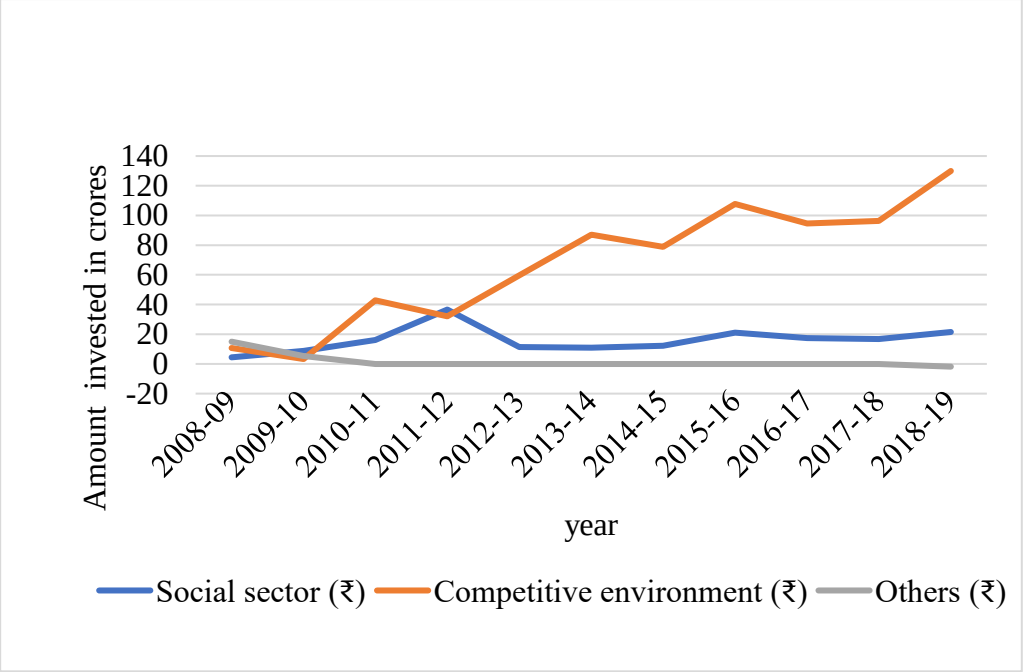

Figure 5.3: Sector-wise funds infused in the State Public Sector Enterprises

Table 5.7 shows a sector-wise analysis of funds infused by the Government of Goa in the SPSEs in each year over the period from 2008-09 to 2018-19. The investment in the enterprises operating in the social sector shows a compounded annual growth rate of 15 per cent and an average annual growth rate of 32.64 per cent. The funds infused by the state government in the enterprises operating in competitive environments record a compounded annual growth rate of 25 per cent and an average annual growth rate of 128.85 per cent. On the contrary, the investment in enterprises in other sectors shows a CAGR of (183) per cent and an average annual growth rate of (16.50) per cent. The total funds infused each year show a CAGR of 16 per cent and AAGR of 31.17 per cent. From the analysis, it is observed that the thrust of investment in the SPSEs by the state government has been in the enterprises operating in the competitive sector and mainly as grants and subsidies towards their operational expenses or losses.

Table 5.8: Year-wise details of the Investment by the State Government and Present Value of Investment of GOG

(Amount in crores)

Year	Present value of investment at the beginning of the year (₹)	Equity infused during the year (₹)	Net Interest free loans given by the St. govt during the year (₹)	Grants or subsidy given by the St. Govt during the year (₹)	Total investment during the year (₹)	Total investment at the end of the year (TI) (₹)	Average rate of interest on govt borrowings (ARI) %	Present value of investment at the end of the year [TI x (1+ ARI/100)] (₹)
2008-09	407.76	20.85	6.39	2.88	30.12	437.88	7.64	471.33
2009-10	471.33	12.85	0.00	4.38	17.23	488.56	7.79	526.62
2010-11	526.62	12.47	(0.60)	47.09	58.96	585.58	7.62	630.20
2011-12	630.20	19.40	(1.33)	50.56	68.63	698.83	7.59	751.87
2012-13	751.87	37.76	0.00	33.26	71.02	822.89	7.69	886.17
2013-14	886.17	0.50	(0.53)	97.99	97.96	984.13	7.44	1057.35
2014-15	1057.35	0.00	(0.53)	91.62	91.09	1148.44	7.59	1235.61
2015-16	1235.61	5.50	(0.53)	123.84	128.81	1364.42	7.30	1464.02
2016-17	1464.02	1.00	(0.72)	111.73	112.01	1576.03	7.09	1687.77
2017-18	1687.77	0.00	(0.55)	113.80	113.25	1801.02	7.03	1927.63
2018-19	1927.63	11.97	(0.54)	138.07	149.50	2077.13	6.95	2221.49
CAGR (%)	**15**	**(5)**	**(180)**	**42**	**16**	**15**	**(1)**	**15**

Source: CAG Report No. 2 of 2020 - Government of Goa for the year ended 31st March 2019.

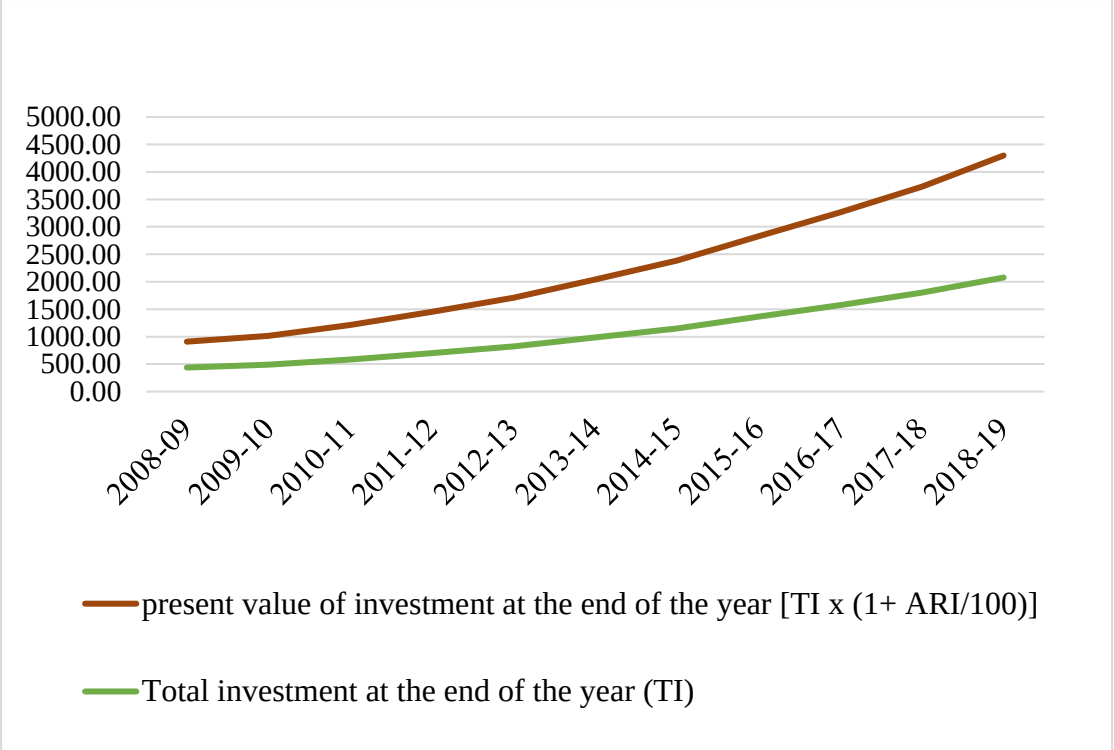

Figure 5.4: Investment by the State Government and the present value of Government Investment

Table 5.8 shows year-wise details of the investment by the state government in the SPSEs and the present value of investment of GOG as of 31st March each year. It is observed that the total investment by the State Government has increased from ₹ 437.88 crores to ₹ 2077.13 crores recording a CAGR of 15 per cent. The present value of investment calculated taking into account the average rate of interest on government borrowings shows an increasing trend from ₹471.33 crores to ₹2221.49 crores showing a CAGR of 15 per cent. The equity infused in the enterprises shows (5) per cent CAGR. Whereas the total annual investment shows a CAGR of 16 per cent. Over the years huge amounts have been invested towards grants and subsidies to the SPSEs recording a CAGR of 42 per cent which is a huge financial burden on the state finances.

5.3.7 Dependence of State Public Sector Enterprises on Public Finance (through Budgetary Support)

Table 5.9: Budgetary Support to the State Public Sector Enterprise

(Amount in crore)

Year	Equity (₹)	Loans (₹)	Grants and Subsidy (₹)	Total (₹)	Trend %
2008-09	4.45	6.55	128.31	139.31	100.00
2009-10	11.7	0	156.57	168.27	120.79
2010-11	12.47	0	199.57	212.04	152.21
2011-12	34.43	0.72	203.21	238.36	171.10
2012-13	40.16	4.39	178.44	222.99	160.07
2013-14	0	2.58	352.93	355.51	255.19
2014-15	0.5	1.68	439.78	441.96	317.25
2015-16	0	1.55	420.49	422.04	302.95
2016-17	1	1.36	386.93	389.29	279.44
2017-18	0	0	519.81	519.81	373.13
2018-19	13.81	0	639.93	653.74	469.27
CAGR	**11**	**(100)**	**16**	**15**	

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

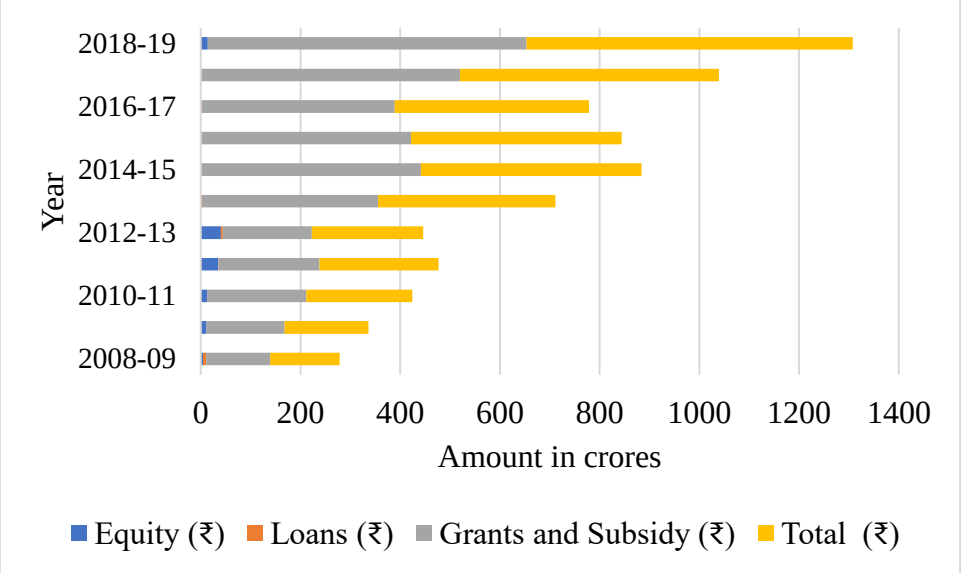

Figure 5.5: Budgetary Support to the State Public Sector Enterprise

Table 5.9 gives details regarding budgetary support of the State government to SPSEs taken together towards equity, loans, grants and subsidies for the period from 2008-09 to 2018-19. As per the figures shown in the table, the total budgetary outgo has increased from ₹139.31 crores in 2008-09 to ₹653.74 crores in 2018-19 recording a CAGR of 15 per cent. The trend percentage of total budgetary outgo taking 2008-09 as the base has been raised to 469.27 per cent in 2018-19. A large portion of the budget each year has been provided for grants and subsidies for capital and revenue purposes. The amount provided for grants and subsidies shows a steep increase of ₹128.31 crores in 2008-09 to ₹639.93 crores in 2018-19 recording a CAGR of 16 per cent. The support from the budget towards loans to SPSEs shows a CAGR of (100) per cent. The equity contribution from the budget annually increased from ₹4,45 crores in 2008-09 to ₹40.16 crores in 2012-13 and thereafter it was either minimum or none except an increased contribution of 13.81 crores in 2018-19 with a CAGR of 11 per cent. The total budgetary outgo has increased from ₹139.31 crores in 2008-09 to ₹653.74 crores in 2018-19 recording a CAGR of 15 per cent. A large portion of the budget each year has been provided for grants and subsidies for capital and revenue purposes.

5.3.8 Contribution to the Economy of the State: (Turnover as a percentage of GSDP)

The revenue-generating capacity of state-level public sector enterprises determines its importance in the state economy. The total turnover of state-level public sector enterprises as a percentage of the gross state domestic product can be used as a measure of revenue-generating capacity. The ratio of turnover of the SPSEs to the State's GDP also expresses the degree of activities of these enterprises in the State's Economy.

Table 5.10: Turnover of State Public Sector Enterprises as a percentage of GSDP

(Amount in crore)

Year	Turnover/ operating (₹)	Annual growth in turnover	GSDP of Goa (₹)	Annual growth in GSDP	Percentage of Turnover to GSDP of Goa
2008-09	459.33	-	25,414	-	1.81
2009-10	440.04	-4.20	29,126	14.61	1.51
2010-11	413.72	-5.98	33,605	15.38	1.23
2011-12	456.48	10.34	43,255	28.72	1.06
2012-13	569.35	24.73	42,407	-1.96	1.34
2013-14	652.18	14.55	48,897	15.30	1.33
2014-15	809.08	24.06	47814.18	-2.21	1.69
2015-16	820.56	1.42	55,053.85	15.14	1.49
2016-17	909.08	10.79	63,459.53	15.27	1.43
2017-18	934.44	2.79	70492.52	11.08	1.33
2018-19	1103.42	18.08	77171.8	9.48	1.43
AAGR (%)	**9.66**		**12.08**		
CAGR (%)	**8**		**11**		

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

As observed in table 5.10, the turnover of the SPSEs taken together has recorded growth over the period from 2008-09 to 2018-19. The annual growth in turnover shows an increasing trend whereas the GSDP also has increased over the period but the annual growth rate has been diminishing. The turnover that has increased from ₹459.33 crores in 2008-09 to ₹1103.42 in 2018-19 shows an AAGR of 9.66 and per cent CAGR of 8 per cent against the GSDP that shows an AAGR of 12.08 per cent and CAGR of 11 per cent. The share of turnover of SPSEs in the GSDP ranges from 1.06 per cent to 1.81 per cent with fluctuations seen over the period. The ratio marked lowest in 2011-12 and highest in 2008-09.

5.3.9 Employment Generation by State Public Sector Enterprises

Employment in the public sector can also be a source of resource redistribution. When more jobs are created in the public sector it has a significant compositional implication on the various sectors of the economy. The state public sector enterprises

contribute to the state economy through employment in the public sector enterprises and its contribution towards the improvement in the living conditions of the employees by serving as a model employer.

Table 5.11: Employment in State Public Sector Enterprises

Year	Number of employees	Annual growth
2008-09	3324	-
2009-10	3342	0.54
2010-11	3251	(2.72)
2011-12	3212	(1.20)
2012-13	3219	0.22
2013-14	3128	(2.83)
2014-15	3241	3.61
2015-16	3047	(5.99)
2016-17	3422	12.31
2017-18	3513	2.66
2018-19	3706	5.49
AAGR		**1.21**
CAGR	**0.01**	

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

Table 5.11 shows the year-wise total manpower in the SPSEs taken together during the period. The number of employees shows a decline from 2008-09 till 2013-14. Thereafter slight increase is observed in 2014-15 and again a decline in 2015-16. Further, it showed an increasing trend up to a maximum of 3706 employees in the year 2018-19. The CAGR recorded is 1 per cent and the AAGR is 1.21 per cent.

5.3.10 Financial Position

In the case of SPSEs, their "Public" role is more important than the "enterprise" role. Thus, these enterprises need me to bother much about their financial performance as most enterprises are set up with social and welfare role. However, objectively these enterprises need to be concerned with their financial performance for the successful implementation of their promotional and welfare role. A financially viable enterprise will be able to be self-sufficient and reduce its dependence on the government and other institutions. This section analyses the macro-financial indicators of the performance of SPSEs in the State.

Table 5.12: Financial position

(Amount in crore)

Year	Total paid up capital at the end of the year (₹)	Accumulated profit (+) /Loss (-) at the end of the year (₹)	Debt (₹)	Interest payments	Capital employed (₹)	Net worth (₹)
2008-09	200.62	(82.46)	224.73	27.67	557.46	118.16
2009-10	284.87	(34.56)	242.69	29.2	553.37	250.31
2010-11	246.95	(36)	212.48	31.3	574.33	210.95
2011-12	281.24	(46.15)	139.27	27.49	515.5	235.09
2012-13	301.68	(46.22)	314.07	29.13	500.21	255.46
2013-14	350.8	(47.24)	367.15	38.16	613.49	303.56
2014-15	346.27	(37.99)	329.45	46.93	702.77	308.28
2015-16	360.01	(13.38)	347.5	55.56	890.95	346.63
2016-17	360.56	26.86	546.32	68.54	1141.34	387.42
2017-18	365.2	59.13	1070.11	96.64	1534.45	424.33
2018-19	377.81	63.25	975.37	114.3	1501.96	441.06
AAGR (%)	**7.37**	**(28.14)**	**24.29**	**16.15**	**11.43**	**17.43**
CAGR (%)	**6**	**(198)**	**14**	**14**	**9**	**13**

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

Table 5.12 shows the financial position of the SPSEs taken together during the period from 2008-09 to 2018-19. The total paid-up capital over the period has increased from ₹ 200.62 crores to ₹ 377.81 crores recording an AAGR of 7.17 percent and CAGR of 6 percent. The debt position of SPSEs shows a higher increasing rate as compared to capital. The AAGR of Debt is 24.29 per cent and the CAGR is 14 per cent. The positive sign about the financial position of the SPSEs is the decline in the accumulated losses at an annual average rate of 28.14%. But on the other hand, interest payments have increased from ₹27.62 crores in 2008-09 to ₹114.3 crores in 2018-19 recording an AAGR of 16.15 per cent and CAGR of 14 per cent. This continues to be worrisome as a substantial portion of the revenue of SPSEs is washed in interest payments. The capital employed represents the sum total of investment in net gross block and working capital or sum total of investment in equity, debts and internal resources. The capital employed in the SPSEs has grown at an AAGR of 11.43% and a CAGR of 9% with the increased budgetary support from the state government. The net worth derived by

subtracting the accumulated losses and fictitious assets from the sum of paid-up capital and reserves and surplus has registered an increasing trend from ₹118.16 crores in 2008-09 to ₹441.06 crores in 2018-19 except in 2013-14 and 2014-15 that recorded a decline in the net worth. The net worth shows an AAGR of 17.43 per cent and a CAGR of 13 per cent. The increased net worth is the result of reduced accumulated losses and increased profit reported by the profit-making SPSEs in comparison to the losses sustained by the loss-making units. Thus, the overall net worth was positive and increasing.

5.3.11 Financial Performance

The yardstick to measure the financial performance of any enterprise is its profitability. The profitability of a company is traditionally assessed through return on investment, return on equity (return on net worth) and return on capital employed. Return on investment measures the profit or loss made in a year relating to the amount of money invested in the form of equity and long-term loans. Return on capital employed measures the efficiency of the company in using its capital. Return on equity is the measure of returns on shareholder's equity.

Table 5.13: Return on Net Worth

(Amount in crore)

Year	Net profit for the year (₹)	Net worth (₹)	RONW %
2008-09	24.55	118.16	20.78
2009-10	24.33	250.31	9.72
2010-11	5.03	210.95	2.38
2011-12	(1.32)	235.09	-0.56
2012-13	31.62	255.46	12.38
2013-14	22.69	303.56	7.47
2014-15	7.98	308.28	2.59
2015-16	52.7	346.63	15.20
2016-17	49.37	387.42	12.74
2017-18	49.71	424.33	11.71
2018-19	53.64	441.06	12.16
CAGR	**7**	**13**	**(5)**

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

The return on net worth is a measure of the financial performance of the enterprise to assess the effective management of shareholder's equity to create profits. The ratio is

calculated by dividing the profit after tax by the shareholder's equity. Generally, a minimum 15 per cent return on net worth indicates efficient use of shareholder's funds and the efficiency of the enterprise to grow. The return on net worth ratio as seen in table 5.13 for the period from 2008-09 to 2018-19 has been below 15 per cent in all the years except 2015-16 and even negative in 2011-12. The positive return on net worth ratios has been fluctuating from a minimum of 2.38 per cent to 15.20 per cent. The return on net worth shown above represents the aggregate return on the state government's equity in the SPSEs. The ratio recorded a CAGR of (5) per cent whereas the profits for the year show a CAGR of 7 per cent and the net worth shows a CAGR of 13 per cent.

Table 5.14: Return on Investment

(Amount in crore)

Year	Total earnings for the year (₹)	Minimum expected return to recover the cost of funds for the year (TI x ARI/100) (₹)	Historical cost of investment at the end of the year (₹)	Present value of investment at the end of the year (₹)	Rate of return on historical cost of investment %	Rate of return on present value of investment %	Required rate of return on present value of investment %
2008-09	24.55	33.45	293.88	471.33	8.35	5.21	7.10
2009-10	24.33	38.06	317.50	526.62	7.66	4.62	7.23
2010-11	5.03	44.62	377.06	630.20	1.33	0.80	7.08
2011-12	(1.32)	53.04	446.42	751.87	(0.30)	(0.18)	7.05
2012-13	31.62	63.28	516.11	886.17	6.13	3.57	7.14
2013-14	22.69	73.22	614.60	1057.35	3.69	2.15	6.92
2014-15	7.98	87.17	705.69	1235.61	1.13	0.65	7.05
2015-16	52.7	99.60	834.50	1464.02	6.32	3.60	6.80
2016-17	49.37	111.74	946.51	1687.77	5.22	2.93	6.62
2017-18	49.71	126.61	1059.76	1927.63	4.69	2.58	6.57
2018-19	53.64	144.36	1209.26	2221.49	4.44	2.41	6.50
CAGR	**7**	**14**	**14**	**15**	**(6)**	**(7)**	

Source: CAG Report No. 2 of 2020 - Government of Goa for the year ended 31st March 2019.

The return on investment is an analysis of earnings vis-à-vis investment carried out to assess the profitability of an enterprise. In view of the significant investment made by the state government in the SPSEs, a return on such investment is essential. Table 5.14 shows a year-wise analysis of the return on investment made by the government in the SPSEs based on the historical cost of investment as well as the present value of the investment. Traditionally the return on investment is calculated based on historical cost but it ignores the present value of investment which is an important aspect to be taken into account. Thus, for a better assessment of the profitability of the enterprises, the above analysis covers both the return on the historical cost of investment as well as the present value of investment. In order to calculate the present value of investment year-wise, the historical cost of investment of the concerned year is compounded with the average rate of interest on government borrowings representing the minimum cost of investment incurred by the government in the concerned year. This cost of investment is considered as the minimum expected rate of return on investment made by the government. Based on the above figures it can be noted that the historical cost of the investment which stood at ₹293.88 crores in 2008-09 has increased to ₹ 1209.26 crores in 2018-19 with a CAGR of 14 per cent. The present value of the investment which stood at ₹ 471.33 crores raised to ₹ 2221.49 crores with a CAGR of 15 per cent. The total earnings of the SPSEs over the period showed a CAGR of 7% against the minimum expected return to recover the cost of investment recording a CAGR of 14 per cent. Thus, the actual earning capacity of these enterprises taken together is almost half the expected capacity. The rate of return on the historical cost of investment ranged between the lowest mark of (30) per cent to the highest mark of 8.35 per cent showing a CAGR of (6) per cent. The rate of return on the present value of investment ranged from a minimum of (18) per cent and a maximum of 5.21 per cent with a CAGR of (7) per cent. The SPSES are expected to earn a return of 6 to 7.5 per cent on the present value of the investment of the state government. Thus overall, the SPSEs are seen to be underperforming and are unable to recover the cost of investment incurred by the state government.

Table 5.15: Return on Capital Employed

(Amount in crore)

Year	EBIT (₹)	Capital employed (₹)	Return on capital employed (%)
2008-09	131.93	557.46	21.64
2009-10	72.57	553.37	10.01
2010-11	58.03	574.33	7.28
2011-12	52.78	515.5	6.68
2012-13	64.22	500.21	8.94
2013-14	54.42	613.49	8.87
2014-15	69.89	702.77	9.94
2015-16	115.82	890.95	13
2016-17	122.91	1141.34	10.77
2017-18	180.17	1534.45	11.74
2018-19	203.92	1501.96	13.58
CAGR	**32.96**	**4**	**(4)**

Source: Compiled from CAG Report - Government of Goa for the year 2008-09 to 2018-19.

Return on capital employed is the ratio that measures a company's profitability and the efficiency with which the capital is employed. It is calculated by dividing the company's earnings before interest and tax by capital employed. Table 5.14 gives details of capital employed and earnings before interest and tax of all the SPSEs taken together during the period from 2008-09 to 2018-19. The ROCE of these enterprises ranged between 7.28 per cent lowest in 2010-11 and 21.64 per cent in 2008-09 registering a CAGR of (4) per cent. The ROCE is seen diminishing from 2008-09 to 2011-12 and has been improving since 2012-13 except in 2016-17.

5.4 Conclusion

The overall preview of the performance of public enterprises in Goa shows that the number of profit-making units is increasing every year but the returns are still low. EDC, GSIDCL, SIDCGL and GIDC are among the major profit-making units whereas KTCL, GTDC and GFDCL are incurring heavy losses among the loss-making units. The major thrust of investment has been in the competitive sector and mainly in the form of grants and subsidies.

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Chapter Six

Performance Analysis of Select State Public Sector Enterprises in Goa

This chapter demonstrates the developed framework through a notional example of select public sector enterprises. The sample considered for analysis includes 8 state-level public sector enterprises in Goa selected based on the availability of data. The data for analysis is obtained from secondary sources i.e., annual reports and records of the selected enterprises for a period of 12 years (from 2008-09 to 2019-20). Descriptive statistics is used to understand the data and the performance analysis is done using the developed AHP model.

6.1 Profile of the select State Public Sector Enterprises

Table 6.1: Brief profile of the select State Public Sector Enterprises

Name of the unit	Status	Sector	Year of Establishment	Age (On 31st March 2020)
Goa Industrial Development Corporation	Working Statutory corporation	Other Sector	1965	55 years
Economic Development Corporation Ltd	Working Government company	Other Sector	1975	45 years
Goa State Infrastructure Development Corporation Ltd	Working Government company	Social Sector	2001	19 years
Goa Meat Complex Ltd	Working Government company	Social Sector	1971	49 years
Sewerage and Infrastructural Development Corporation Ltd	Working Government company	Social Sector	2001	19 years
Goa State Scheduled Tribes Finance & Development Corporation Limited	Working Government company	Social Sector	2004	16 years

Name of the unit	Status	Sector	Year of Establishment	Age (On 31st March 2020)
Goa Tourism Development Corporation	Working Government company	Competitive Environment	1982	38 years
Kadamba Transport Corporation Ltd	Working Government company	Competitive Environment	1980	40 years

Source: Author's composition

i. GIDC

The Goa Industrial Development Corporation was established under the Companies Act of 1956 to secure the orderly establishment and organization of Industries in Industrial estates. The activities of the corporation include identifying land for setting up industrial estates within the industrial zone and encouraging the establishment of business enterprises thereby resulting in the creation of employment opportunities in the State.

ii. **EDC**

The Economic Development Corporation Ltd is a premium state-owned financial institution in Goa. Since 1975, it has been a promoter of economic development and industrial growth in Goa. It is mainly involved in extending financial assistance in the form of term loans to industrial and service sector projects. Thus, EDC also has directly or indirectly helped the State to ease the problem of unemployment through financial assistance to set up the units. EDC is also regarded as an excellent delivery channel of government policies to the citizens. EDC also takes on the initiative of training and endowing the individuals to strive for excellence.

iii. **GSIDCL**

Goa State Infrastructure Development Corporation Ltd is a wholly government-owned company on board with a mission to serve the needs of the public by contracting the infrastructure projects in the state such as roads, bridges, etc. It is a forerunner in the enablement of infrastructure for the state of Goa. It acts as a special-purpose vehicle for the implementation of all infrastructure projects envisioned by the state government.

The funding for the projects is provided by the state government through budget or by way of loans.

iv. GMCL

The Goa Meat Complex Ltd is a government undertaking established with the objective to organise the provisions of efficient and modern hygienic facilities for the slaughtering of animals in public and private slaughterhouses in order to provide wholesome hygienic meat to the population in the State. The GMCL facilitates the local meat traders with lairage, electricity, water, services of veterinary doctors, supervisors, etc. It also provides ante-mortem and post-mortem inspections of animals with due importance on hygiene and the quality of animals slaughtered.

v. GTDC

The Goa Tourism Development Corporation was set up with the objective to take care of the commercial tourism activities in the State. The activities under tourism include accommodation, vehicles, tours, boats, etc. and the corporation runs and manages these activities with the aim to promote and develop tourism in the State. The Corporation strives to establish a long-term relationship with the guests and provide them with the best value and perfect exponent of Goa's hospitality.

vi. KTCL

The Kadamba Transport Corporation Ltd is a state transport undertaking set up with the objective of providing safe, reliable, punctual, effective and efficient passenger transport to the people in Goa. Since its inception, the corporation has been operating in competition with private operators. Though the corporation is unable to meet the entire transport demand in the state, it still attempts to provide the best transport facilities to the people in the State and thus assists in the economic development of the State.

vii. SIDCL

The Sewerage and Infrastructural Development Corporation Ltd. was established to place sewerage networks and sewerage treatment plants in the State. Thus, it prevents the human and domestic sewage from being disposed of in the water bodies

and environment. The sewerage schemes are undertaken and on construction, it is transferred to PWD as an asset for operation and maintenance.

viii. GSSTFDCL

The Goa State Scheduled Tribes Finance & Development Corporation Limited is a State Govt company classified as a "company limited by shares". The corporation was set up exclusively for the economic development of scheduled tribes of Goa. The corporation is mandated to implement several Schemes for scheduled tribe communities to improve their level of education and social and economic condition and to bring them at par with other sections in the Society. The main object of the corporation is generating activities for the socio-economic advancement of scheduled tribes and other backward communities especially those from the weaker sections of the society.

6.2 Major Highlights of the select State Public Sector Enterprises

6.2.1 Investment of State Government

As owners, the Government of Goa has a huge financial stake in these enterprises. The capital in these enterprises is contributed by the state and central government. In addition to the share capital contribution, the state government also provides financial assistance by way of loans to these enterprises from time to time and also guarantees the repayment of loans with interest availed by the PSU from financial institutions. The state government also provides special financial support by way of grants and subsidies to the PSU as and when considered necessary.

Table 6.2: Investment of State Government in the Enterprises

Year	Total Investment (Amount in crores)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	18.03	70.92	88.67	30.04	0.618	23.11	4.80	3.10
2009-10	18.03	86.2	97.00	30.04	0.618	42.58	7.68	3.72
2010-11	18.03	87.86	81.72	28.91	0.618	64.77	10.95	3.72
2011-12	18.03	87.86	88.72	27.31	0.618	77.80	22.85	3.72
2012-13	18.03	87.86	89.64	27.31	0.618	82.20	25.25	3.72
2013-14	18.03	87.86	122.8	26.78	0.618	69.49	33.85	3.72
2014-15	18.03	87.86	126.4	25.71	0.618	84.51	40.25	3.72
2015-16	18.03	87.86	129.05	25.25	0.618	89.17	40.75	3.72
2016-17	18.03	86.2	104.64	24.82	0.618	103.80	40.75	3.72
2017-18	16.19	86.2	108.45	24.38	0.618	141.16	40.75	3.72
2018-19	16.19	86.2	131.02	26.46	0.618	167.55	45.40	3.72
2019-20	23.69	86.2	125.47	23.52	0.618	102.55	45.40	3.72
Mean	**18.20**	**85.76**	**107.80**	**26.71**	**0.62**	**87.39**	**29.89**	**3.67**
SD	**1.87**	**4.74**	**18.44**	**2.13**	**1.16**	**39.22**	**15.11**	**0.18**

Source: Annual reports of the State Enterprises from 2008-09 to 2019-20

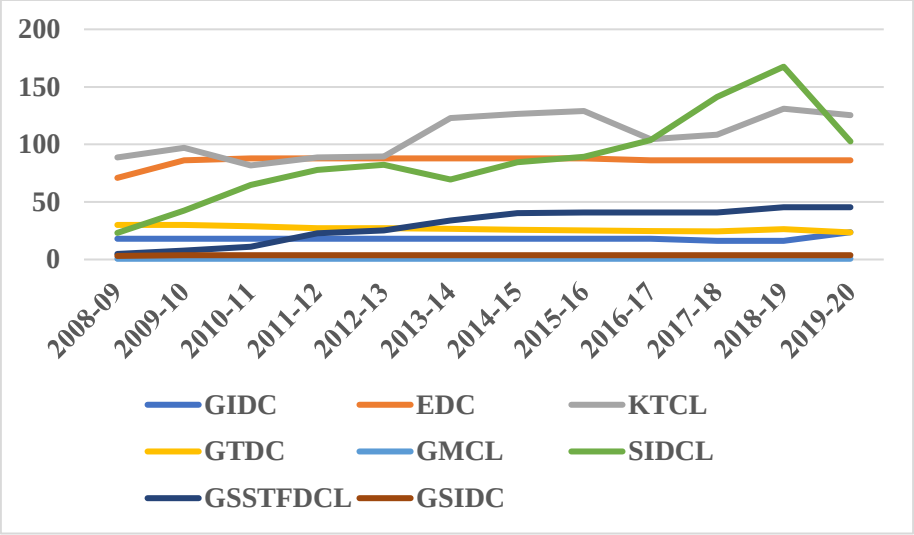

Figure 6.1: Investment of State Government in the Enterprises

Table 6.2 shows the investment (in crores) of state government in the select enterprises over the period from 2008-09 to 2019-20 as per their finalised accounts. The

standard deviation in the case of KTCL, SIDCL and GSSTFDCL is high showing high variation in the investment in these enterprises. Whereas the investment in other enterprises is found to be constant or showing less variation. The investment in KTCL shows a growth in the range of ₹81.72 crore to ₹131.02 crore, in SIDCL it ranges from ₹23.11 crore to ₹167.55 crore and that of GSSTFDCL it has increased from ₹4.8 crores to ₹45.4 crores. The investment in EDC has declined since 2016-17 and in GTDC it has been fluctuating throughout with an SD of 2.13 maintaining an average investment of ₹26.71 crores. There are no additions to the investment in GMCL throughout the period. The investment in GIDC remained constant at ₹18.03 crores till 2016-17 and declined to ₹16.19 crores in 2017-18 which further increased in 2019-20 to ₹23.69 crores showing an average investment of ₹18.20 crores during the period.

6.2.2 Shareholder's Equity

Shareholder's equity is the net worth or the total amount that the owners have invested in the business which includes the direct investment in the form of share capital along with the accumulated earnings of the business.

Table 6.3: Shareholder's Equity in the Enterprises

Year	Shareholder's Equity= Share Capital + Reserves and Surplus (Amount in crores)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	84.26	206.32	(50.84)	20.51	3.58	5.06	4.76	7.97
2009-10	90.29	242.27	(59.11)	20.86	3.35	6.29	7.52	8.97
2010-11	88.45	256.00	(52.55)	21.20	3.41	8.85	10.89	10.91
2011-12	84.71	274.83	(79.66)	13.13	3.93	10.51	22.98	12.01
2012-13	89.80	304.41	(60.50)	13.64	2.76	13.18	25.42	12.88
2013-14	100.92	328.33	(53.63)	14.51	5.67	16.62	34.42	18.43
2014-15	103.22	358.85	(53.12)	15.12	5.55	18.13	40.94	25.12
2015-16	103.01	400.06	(39.43)	16.20	10.69	20.25	41.45	29.89
2016-17	98.92	450.12	(37.94)	18.00	2.19	20.44	42.47	29.07
2017-18	96.11	477.43	(29.35)	19.36	2.04	23.64	42.78	34.23
2018-19	(18.85)	509.86	(51.42)	20.82	1.92	22.16	49.31	36.20
2019-20	(39.62)	553.02	(64.64)	12.61	1.47	19.43	49.98	38.29
Mean	**73.44**	**363.46**	**(52.68)**	**17.16**	**3.88**	**15.38**	**31.08**	**22.00**
SD	**48.62**	**113.91**	**13.20**	**3.33**	**2.52**	**6.39**	**16.31**	**11.38**

Source: Annual reports of the State Enterprises from 2008-09 to 2019-20

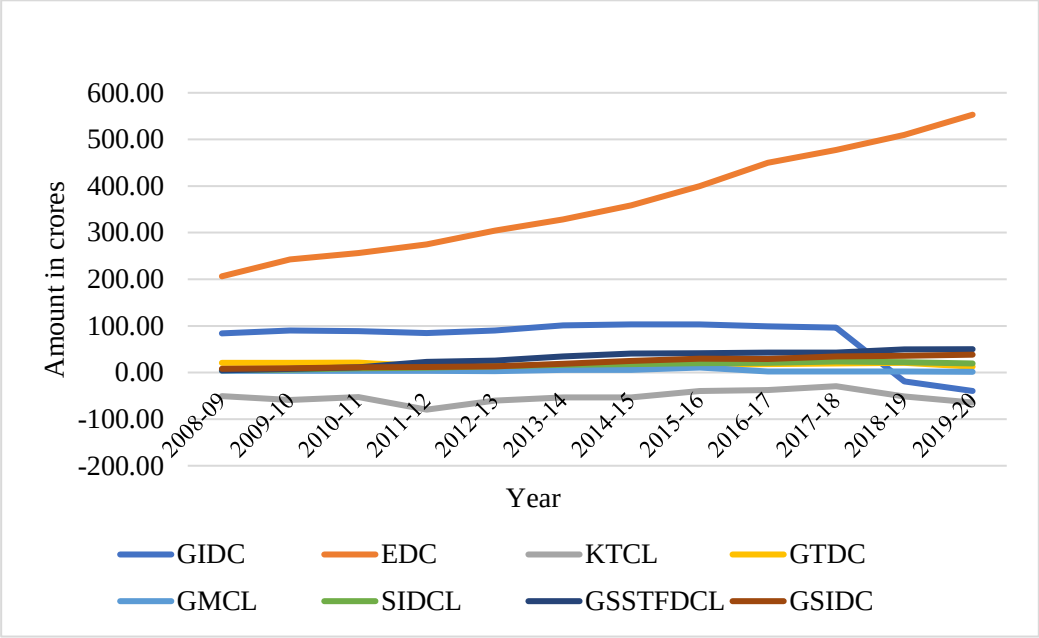

Figure 6.2: Shareholder's Equity in the Enterprises

Table 6.3 presents the shareholder's equity in the select state level public sector enterprises for the period from 2008-09 to 2019-20. Shareholder's equity is the net worth of the company which indicates the amount invested by the owners in the company including the accumulation of income that the company has earned and is re-invested since inception. Based on the figures it is observed that the shareholder's equity in the case of EDC, SIDCL, SSTFDCL and GSIDC shows an increasing trend over the period whereas in the case of GIDC, GTDC and GMCL it fluctuates throughout the period. The net worth of GMCL has been constantly decreasing since 2016-17 due to large payments or accumulated losses which have depleted the retained earnings. The net worth of KTCL is found to be negative throughout the period which is a cautioning sign that the company is in financial distress. EDC has the highest equity averaging ₹363.46 crores.

6.2.3 Capital Employed

Capital employed is the funds employed in the business operations to generate revenue. This amount includes the value of total assets minus current liabilities.

Table 6.4: Capital Employed in the Enterprises

Year	Capital Employed = Total assets – Total Current Liabilities (Amount in crores)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	95.70	40.61	()6.24	28.30	3.94	5.45	5.23	222.38
2009-10	102.08	40.17	(9.01)	28.80	3.70	6.98	9.30	194.61
2010-11	114.76	39.45	(20.91)	28.55	3.77	59.75	17.33	141.99
2011-12	110.71	289.26	(47.41)	21.08	3.93	70.60	24.22	62.23
2012-13	(112.89)	317.82	(60.49)	21.52	2.76	69.10	26.38	107.67
2013-14	(79.59)	387.57	37.26	20.42	5.67	31.28	35.10	150.52
2014-15	130.51	433.48	40.07	18.97	5.55	47.16	41.38	257.77
2015-16	129.05	466.27	55.93	18.80	13.24	73.96	41.86	457.62
2016-17	119.22	654.17	29.66	53.84	3.86	85.11	42.85	680.61
2017-18	121.23	564.57	31.15	77.29	4.12	196.98	47.90	691.20
2018-19	12.66	587.48	47.52	40.51	4.39	258.28	49.86	727.62
2019-20	158.45	587.07	32.75	36.06	3.10	218.26	51.79	596.35
Mean	**75.16**	**367.33**	**10.86**	**32.85**	**4.84**	**93.58**	**32.77**	**357.55**
SD	**87.47**	**226.10**	**38.56**	**17.46**	**2.78**	**83.88**	**15.98**	**254.67**

Source: Annual reports of the State Enterprises from 2008-09 to 2019-20

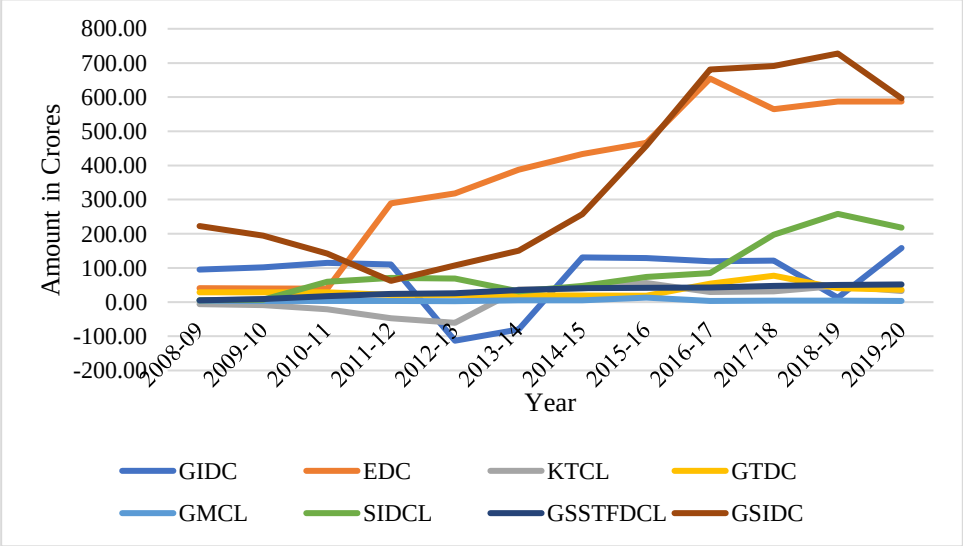

Figure 6.3: Capital Employed in the Enterprises

Table 6.4 presents the capital employed position of the select state-level public sector enterprises for the period from 2008-09 to 2019-20. As observed in the table the

capital employed of EDC, SIDCL, SSTFDCL and GSIDC has been substantially increased during the period whereas there is a large fluctuation noticed in capital employed of GIDC & GTDC it is fluctuating throughout the period. The capital employed in GMCL has remained more or less constant except with a nominal increase in 2015-16. Negative capital employed has been noticed in the case of KTCL from 2008-09 till 2012-13 and then has improved since 2013-14. Also, GIDC showed negative capital employed in the year 2012-13. Negative capital employed is mainly due to negative working capital. The highest capital employed is in EDC with an average of ₹367.33 crores followed by GSIDCL ₹357.55 crores.

6.2.4 Total Assets

Total assets refer to the sum total of all the assets owned by the entity which includes both non-current and current assets. The amount of total assets is the economic value of the whole thing that the entity owns and will benefit the owners in the future. An increase in the value of total assets reflects growth in the size of the entity and improved ability to pay its debt obligations.

Table 6.5: Total Assets in the Enterprises

Year	Total Assets = Noncurrent assets + Current assets (Amount in crores)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	444.15	248.65	26.54	32.16	6.27	24.48	5.28	283.68
2009-10	459.54	242.28	30.98	33.15	6.57	45.90	9.33	263.08
2010-11	467.64	349.02	51.42	35.26	6.60	62.19	17.37	256.50
2011-12	467.90	541.67	54.19	31.75	7.78	78.63	24.29	256.17
2012-13	249.12	511.98	61.00	31.80	7.97	80.11	35.08	341.92
2013-14	283.80	640.40	74.95	42.32	11.11	53.54	44.82	414.59
2014-15	510.37	680.77	80.83	31.86	11.67	67.77	60.12	601.27
2015-16	549.35	736.83	103.79	38.81	16.06	118.25	65.36	832.22
2016-17	561.01	909.63	90.03	78.45	9.59	127.52	68.84	1027.91
2017-18	593.89	913.65	94.26	167.43	8.83	338.90	70.24	1226.10
2018-19	625.60	898.50	88.30	119.40	7.74	333.61	73.52	1243.12
2019-20	546.51	813.73	79.10	116.34	7.92	300.40	77.90	1234.85
Mean	**479.91**	**623.93**	**69.62**	**63.23**	**9.01**	**135.94**	**46.01**	**665.12**
SD	**114.69**	**247.64**	**24.82**	**46.43**	**2.80**	**117.36**	**26.75**	**420.56**

Source: Annual reports of the State Enterprises from 2008-09 to 2019-20

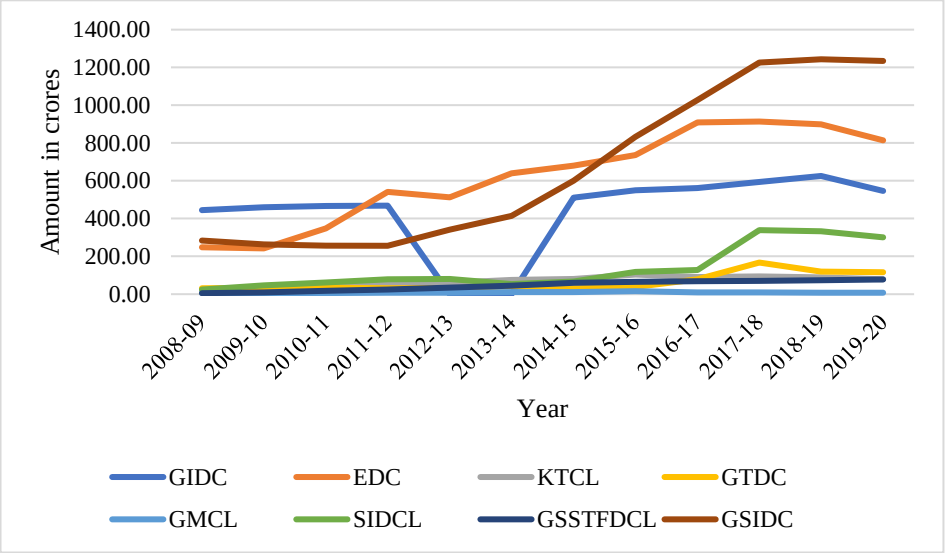

Figure 6.4: Total Assets in the Enterprises

From table 6.5, it is evident that the total assets position of all the select SOEs over the period from 2008-09 to 2019-20 has substantially improved which is a good sign as it improves the company's ability to pay its debt obligations. The total asset value is seen highest in GSIDCL averaging ₹665.12 crores with the highest S.D. of 420.56 followed by EDC ₹623.93 crores and GIDC with ₹479.91 crores. GMCL having the lowest average total assets of ₹9.01 crores, showed a marginal increase in its total assets till 2015-16 thereafter it has been continuously declining which reflects the company's failure to generate revenue from its operations and its assets are consumed in its operations.

6.2.5 Total Revenue

Total revenue represents the total earnings of the entity from various sources. It includes operating as well as other revenue earned during the financial year.

Table 6.6: Total Revenue of the Enterprises

Year	Total revenue							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	33.69	43.33	61.72	17.20	1.69	1.15	0.20	200.30
2009-10	28.91	44.10	73.53	18.45	1.94	2.72	0.33	167.20
2010-11	22.66	40.62	83.00	21.17	2.56	3.57	0.54	189.65
2011-12	24.47	56.02	64.38	24.77	5.01	6.55	0.67	202.45
2012-13	28.07	65.96	94.77	23.96	2.76	5.76	0.97	258.47
2013-14	27.22	85.19	124.64	26.88	3.22	5.52	1.67	313.34
2014-15	31.61	76.71	142.74	28.05	3.91	4.59	1.81	484.21
2015-16	31.07	76.71	168.54	28.53	4.92	5.35	2.33	479.91
2016-17	43.56	102.72	167.05	32.29	8.10	4.87	2.61	527.03
2017-18	53.69	117.48	169.69	37.58	4.33	9.12	2.73	685.40
2018-19	156.92	100.89	200.99	37.77	5.45	4.41	3.80	531.72
2019-20	67.70	100.93	204.82	38.79	6.20	2.89	3.56	583.31
Mean	**45.80**	**75.89**	**129.66**	**27.95**	**4.18**	**4.71**	**1.77**	**385.25**
SD	**37.41**	**26.28**	**52.97**	**7.42**	**1.89**	**2.05**	**1.25**	**181.98**

Source: Annual reports of the State Enterprises from 2008-09 to 2019-20

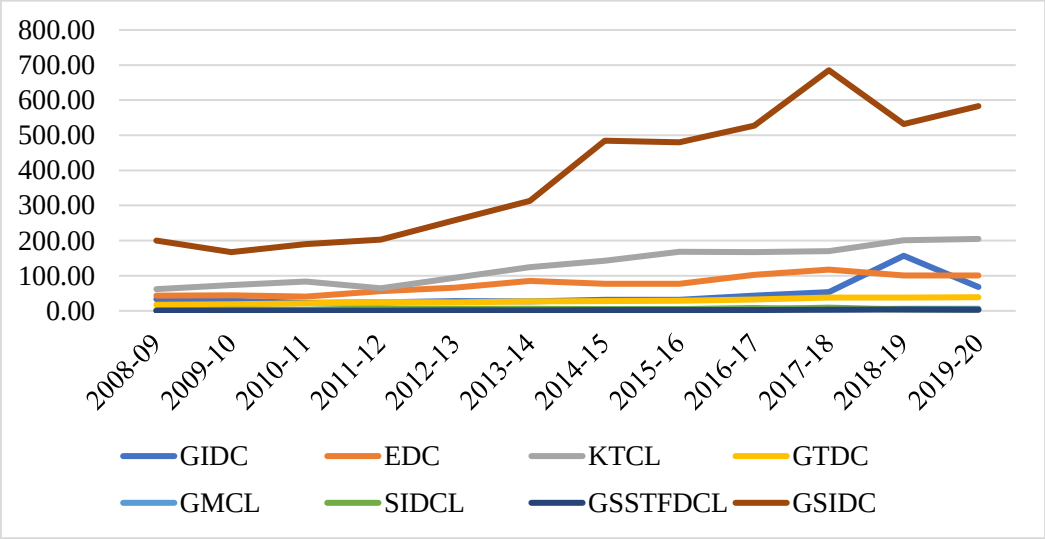

Figure 6.5: Total Revenue in the Enterprises

Table 6.6 presents the total revenue of SOEs for the period under study. All the enterprises under study have shown substantial growth in their total revenue except GMCL and SIDCL showing regular fluctuations in their total revenue. The total revenue comprises both the operating and non-operating revenue of the enterprise. Among these firms, GSIDC has shown exquisite growth in its total revenue with an

average of ₹385.25 crores over the period followed by KTCL ₹129.66 crores and EDC ₹75.89 crores.

6.2.6 Net Profit After Tax

Table 6.7: Net Profit After Tax

Year	Net profit after tax							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	14.76	25.27	(15.27)	(1.32)	(0.47)	0.21	-0.03	1.42
2009-10	6.03	25.72	(14.07)	0.35	(0.47)	1.23	-0.12	1.44
2010-11	(2.82)	14.91	(15.71)	0.34	0.06	1.36	0.10	2.37
2011-12	(4.16)	19.99	(18.57)	(8.08)	0.52	1.66	0.19	1.55
2012-13	(2.03)	30.75	(13.24)	0.52	(1.16)	3.08	0.04	1.31
2013-14	0.01	25.11	(24.08)	0.86	(0.71)	1.93	0.40	5.91
2014-15	0.76	31.92	18.26	0.54	(0.11)	1.51	0.12	7.12
2015-16	(2.3119)	42.42	5.19	1.08	0.49	2.12	0.01	5.17
2016-17	(5.65)	50.05	(3.53)	1.8	(0.23)	0.32	1.03	4.73
2017-18	7.05	56.36	(11.03)	1.35	(0.34)	3.59	0.31	5.61
2018-19	(115.39)	33.86	(22.88)	1.46	(0.12)	(1.47)	1.88	1.95
2019-20	(30.72)	38.13	(12.68)	(8.21)	(0.45)	(2.73)	0.68	2.09
Mean	**(11.21)**	**32.87**	**(10.63)**	**(0.78)**	**(0.25)**	**1.07**	**0.38**	**3.39**
SD	**34.54**	**12.17**	**12.06**	**3.53**	**0.47**	**1.79**	**0.57**	**2.14**

Source: Annual reports of the State Enterprises from 2008-09 to 2019-20

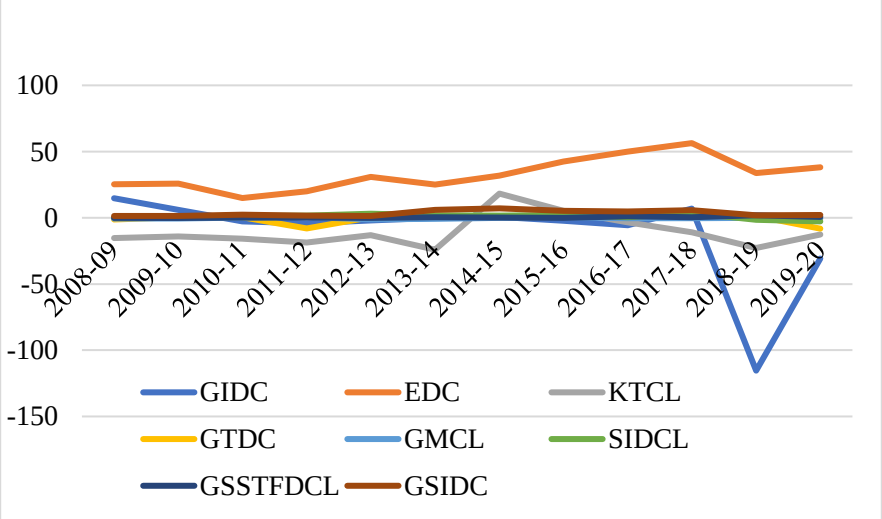

Figure 6.6: Net Profit After Tax

It is evident from table 6.7 that the profitability measured through net profit after tax does not present a very impressive scenario. Among these units, only EDC, GSIDC and GSSTFDCL showed profit earned throughout the period, SIDCL has also generated profit during the period except in 2018-19 and 2019-20 whereas the rest units showed a dismal picture of profitability. The average net profit of EDC has been the highest i.e., 32.87 crores while GSIDCL, SIDCL and GSSTFDCL showed meagre average profit of 3.39 crores, 1.07 crores and 0.384 crores respectively.

6.3 Performance Analysis Using the Developed Framework

Chapter four dealt with the first part of the study where an MCDM-based comprehensive framework for performance evaluation of public enterprises is developed. This section of the study presents the application of the model taking a notional example of select public sector enterprises in Goa. The analysis of performance is done using fifteen parameters broadly classified into four major criteria: financial performance, physical performance, contribution to the economy and contribution to the society.

6.3.1 Analysis of Financial Performance

The financial performance of state enterprises is of wide interest and concern as they are set up at a huge cost to the exchequer. The main purpose of financial performance evaluation is to evaluate the profitability and financial soundness of the enterprise. The financial performance of an enterprise also depends on financial management. Thus, the financial performance is evaluated using the parameters of profitability, liquidity and solvency.

6.3.1.a Profitability

Table 6.8: Return on Asset Ratio

Year	Return on asset ratio (ROA= NPAT/TA x 100)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	3.32	10.16	(57.54)	(4.10)	(7.54)	0.85	(0.53)	0.50
2009-10	1.31	10.62	(45.42)	1.06	(7.20)	2.68	(1.23)	0.55
2010-11	(0.60)	4.27	(30.55)	0.96	2.02	3.28	0.57	0.92
2011-12	(0.89)	3.69	(34.27)	(25.45)	6.65	2.12	0.76	0.61
2012-13	(0.82)	6.01	(21.70)	1.64	(14.55)	3.84	0.11	0.38
2013-14	0.00	3.92	(32.13)	2.03	(9.68)	5.17	1.87	1.43
2014-15	0.15	4.69	22.59	1.69	-0.97	2.23	0.20	1.18
2015-16	(0.42)	5.76	5.00	2.78	3.02	1.79	0.02	0.62
2016-17	(1.01)	5.50	(3.92)	2.29	(2.44)	0.25	1.49	0.46
2017-18	1.19	6.17	(11.70)	0.81	(3.88)	1.06	0.44	0.46
2018-19	(18.45)	3.77	(25.91)	1.22	(1.55)	(0.44)	2.56	0.16
2019-20	(5.62)	4.69	(16.03)	(7.06)	(5.70)	(0.91)	0.87	0.17
Mean	**(1.82)**	**5.77**	**(20.96)**	**(1.84)**	**(3.49)**	**1.83**	**0.59**	**0.62**
SD	**5.64**	**2.32**	**22.00**	**7.98**	**5.90**	**1.78**	**1.03**	**0.38**

Source: Author's computation

The profitability of the state-owned enterprises is measured in terms of Return on Assets ratio which indicates the efficiency of the firm in converting its investment into income. A higher ROA always indicates better financial performance. ROA less than 5 per cent is generally considered low and above 20 per cent is excellent. But this may vary from industry to industry as there is no such ideal ROA ratio. As observed in table 6.8, only 4 out of 8 state-owned enterprises i.e., EDC, SIDCL, GSSTFDCL and GSIDC show a profit in terms of their average ROA ratio. Among these 4 firms, only EDC has an average ROA ratio slightly higher than 5 per cent, whereas SIDCL, GSSTFDCL and GSIDC have a ratio of less than 5 per cent. Up to 10 per cent, variations are observed in the values in the ROA ratio of all the firms except in the case of KTCL showing an SD of 22 points. As a whole the assets of the firms are not effectively utilised in generating income.

6.3.1.b Liquidity

Table 6.9: Current Ratio

Year	Current Ratio (CR= CA/CL)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.77	2.00	0.18	2.87	1.43	1.22	6.53	4.59
2009-10	0.70	1.98	0.23	3.13	1.34	1.11	23.12	3.81
2010-11	0.69	1.81	0.38	2.38	1.11	23.63	10.62	2.22
2011-12	0.64	1.52	0.28	1.13	1.02	8.58	16.35	1.27
2012-13	0.66	0.90	0.15	1.23	0.80	6.24	1.42	1.43
2013-14	0.75	0.70	0.43	1.12	1.34	1.68	2.19	1.55
2014-15	0.78	0.67	0.59	1.17	1.26	2.44	1.77	1.74
2015-16	0.81	0.84	0.87	1.14	1.63	0.62	1.60	2.22
2016-17	0.76	0.87	0.50	2.12	0.88	0.64	1.63	2.96
2017-18	0.76	0.58	0.35	1.58	0.99	0.26	2.06	2.28
2018-19	0.62	0.70	0.67	1.22	1.09	0.27	2.07	2.40
2019-20	0.64	0.48	0.66	1.18	0.84	0.34	1.75	1.93
Mean	**0.71**	**1.09**	**0.44**	**1.69**	**1.14**	**3.92**	**5.93**	**2.37**
SD	**0.07**	**0.57**	**0.22**	**0.74**	**0.26**	**6.74**	**7.15**	**0.99**

Source: Author's computation

The results of liquidity analysis of the state enterprises in terms of current ratio is presented in table 6.9. The current ratio is the ratio of current assets to current liabilities which ideally should be 2:1. However, when the current ratio reaches 1:1 it means that the company is able to cover its current liabilities with current assets. As observed in table 6.9, GIDC and KTCL have an average liquidity ratio of less than one which indicates poor liquidity and a shortage of working capital in these firms. Other enterprises have better liquidity positions with average current ratio between 1 and 2 except GSSTFDL, SIDCL and GSIDC having average liquidity ratios noticeably higher than 2 which indicates a better liquidity position in these enterprises. But in the case of GSSTFDCL and SIDCL the S.D is high compared to other enterprises under study. The mean ratio in GSSTFDCL is 5.93 which reflects the chances of unproductive assets affecting its income.

6.3.1.c Solvency

Table 6.10: Debt Asset Ratio

Year	Debt Asset ratio (DA Ratio = TD/TA)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.81	1.00	2.85	0.76	0.37	1.52	0.17	0.80
2009-10	0.80	0.83	2.84	0.76	0.44	1.67	0.19	0.81
2010-11	0.78	1.15	1.97	0.79	0.43	0.86	0.09	0.82
2011-12	0.79	0.49	2.41	0.75	0.50	0.86	0.05	0.95
2012-13	1.50	0.40	1.99	0.75	0.65	0.82	0.28	0.96
2013-14	1.38	0.49	0.95	0.86	0.75	1.00	0.49	0.95
2014-15	0.77	0.47	0.90	0.88	0.52	1.03	0.32	0.96
2015-16	0.79	0.44	0.79	0.93	0.18	0.88	0.36	0.96
2016-17	0.82	0.39	0.78	0.54	0.60	1.66	0.38	0.97
2017-18	0.82	0.44	0.67	0.65	0.53	1.10	0.32	0.97
2018-19	1.01	0.39	0.72	0.84	0.43	0.81	0.33	0.97
2019-20	1.05	0.32	0.80	0.80	0.61	0.27	0.35	0.97
Mean	**0.94**	**0.57**	**1.47**	**0.78**	**0.50**	**1.04**	**0.28**	**0.93**
SD	**0.25**	**0.27**	**0.87**	**0.10**	**0.15**	**0.40**	**0.13**	**0.07**

Source: Author's computation

Table 6.10 depicts the solvency position of the SOEs measured in terms of the ratio of total debt to total assets. It is a metric used to measure the financial risk to the company and know the extent to which the company's assets are funded by debts. A high ratio indicates that a significant portion of assets are financed by debt whereas a low ratio indicates the use of equity to finance its assets. Ideally, a ratio below 1 is considered relatively safe and a ratio above 2 reflects the financial risk to the company. From the above analysis, it is found that all the above SOEs have an average debt-to-asset ratio below 1 and are financially safe as major portions of their assets are financed out of equity except in the case of KTCL and SIDCL where the ratio is slightly higher than 1. Overall, the solvency position of the firms has been good/ The data shows the S.D of the solvency ratio has been less than 1 throughout the period

6.3.2 Analysis of Physical Performance:

Each public sector enterprise contributes in different ways to the quality of life of its country's citizens and to the overall growth and development of the economy.

Their performance in terms of goods and services delivered by these enterprises reflects its significance in the overall social and economic progress of the country. Thus, measuring the physical performance of these enterprises based on the output, impact of each enterprise's activity and the efficiency of its operation is an important and integral part of the overall performance evaluation of public sector enterprises.

6.3.2.a Deliverables /Output

Table 6.11: Deliverables/Output (Growth rate of output)

Year	Deliverables/Output (Growth rate of output taking 2008-09 as base)							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2009-10	299.40	160.55	104.40	177.04	119.97	0.00	183.02	37.81
2010-11	228.67	234.56	100.69	162.15	142.56	480.58	507.55	32.16
2011-12	130.46	202.14	96.52	169.40	166.49	1970.98	512.58	77.83
2012-13	181.32	102.75	90.86	166.95	150.80	1635.07	6.29	89.13
2013-14	56.31	141.59	102.57	158.49	8.77	2359.71	77.99	290.44
2014-15	36.67	96.64	108.08	194.82	0.00	2769.94	279.87	112.26
2015-16	27.07	108.87	108.70	197.75	4.88	10542.17	217.61	91.73
2016-17	88.32	132.72	105.17	191.92	48.83	5055.11	107.55	168.59
2017-18	159.81	111.93	108.03	206.76	36.29	1152.61	71.07	98.94
2018-19	156.63	164.83	121.53	37.30	1.18	164.51	111.95	126.57
2019-20	143.79	141.90	113.73	33.09	0.83	510.65	208.81	83.21
Mean	**134.04**	**141.54**	**105.02**	**149.64**	**65.05**	**2228.44**	**198.69**	**109.06**
SD	**79.79**	**43.17**	**8.00**	**60.11**	**66.20**	**2996.30**	**163.67**	**67.60**

Source: Author's computation

To measure the physical performance, output/deliverables is used as one of the parameters and is measured in terms of growth rate taking 2008-09 as base period. Table 6.11 shows the growth rate of output of the SOEs during the period of study. The output is quantified in terms of output in units and where the units of output are difficult to measure the value of work done is considered especially in the case of GIDC, SIDCL and GSIDC which are in the infrastructure development business. From the above analysis, constant fluctuations are observed in the output of all the SOEs. The high standard deviation also reflects the data is more spread out for all SOEs. The average

growth rate in output of SIDCL is the highest i.e., 2,228.44 especially due to the high rate of deliverables between 2011-12 to 2017-18. At the same time, the rate of deliverables of GTDC and GMCL has decreased tremendously in 2018-19 and 2019-20.

6.3.2.b Impact of Activity

Table 6.12: Impact of Activity (Turnover share of GSDP**)**

Year	**Impact (**Turnover share of GSDP**)**							
	GIDC	**EDC**	**KTCL**	**GTDC**	**GMCL**	**SIDCL**	**GSSTFDCL**	**GSIDC**
2008-09	0.000359	0.001570	0.001884	0.000632	0.000004	0.000000	0.000008	0.007641
2009-10	0.000281	0.001458	0.001735	0.000613	0.000004	0.000013	0.000010	0.005589
2010-11	0.000288	0.001181	0.001699	0.000603	0.000004	0.000007	0.000015	0.005530
2011-12	0.000133	0.001259	0.001414	0.000554	0.000003	0.000018	0.000015	0.004485
2012-13	0.000206	0.001511	0.001362	0.000556	0.000004	0.000024	0.000023	0.005882
2013-14	0.000266	0.001709	0.001370	0.000516	0.000000	0.000042	0.000013	0.006338
2014-15	0.000219	0.001572	0.001506	0.000577	0.000000	0.000045	0.000015	0.010008
2015-16	0.000224	0.001529	0.001347	0.000515	0.000000	0.000067	0.000014	0.008574
2016-17	0.000482	0.001586	0.001108	0.000490	0.000003	0.000056	0.000011	0.008193
2017-18	0.000538	0.001635	0.001031	0.000480	0.000002	0.000120	0.000009	0.009672
2018-19	0.001851	0.001285	0.001079	0.000405	0.000000	0.000047	0.000008	0.006864
2019-20	0.000717	0.001176	0.001076	0.000414	0.000000	0.000026	0.000009	0.007225
Mean	**0.00046**	**0.00145**	**0.00138**	**0.00053**	**0.000002**	**0.00004**	**0.000012**	**0.00717**
SD	**0.00047**	**0.00018**	**0.00028**	**0.00007**	**0.000002**	**0.00003**	**0.000004**	**0.00172**

Source: Author's computation

Another parameter considered for analysing physical performance of SOEs is impact of the activity measured in terms of ratio of turnover of the enterprise to the GSDP. Based on the analysis in table 6.12, all the enterprises have shown a very thin share in the GSDP. Thus, creating a very low impact of their activity in the economy. The SD shows high variation in turnover of these three enterprises.

6.3.2.c Efficiency of Operation

Table 6.13: Efficiency of operation (Cost Revenue Ratio)

Year	**Efficiency of operation** (Cost of Revenue/Total Revenue)							
	GIDC	**EDC**	**KTCL**	**GTDC**	**GMCL**	**SIDCL**	**GSSTFDCL**	**GSIDC**
2008-09	0.56	0.32	1.02	1.09	1.38	0.37	1.14	0.89
2009-10	0.75	0.24	0.88	0.97	1.13	0.30	1.35	0.87
2010-11	1.12	0.41	0.88	0.98	0.95	0.43	0.82	0.90
2011-12	1.17	0.36	1.24	1.25	0.76	0.29	0.67	0.94
2012-13	1.00	0.21	0.75	0.99	1.42	0.19	0.93	0.95
2013-14	1.00	0.26	0.73	0.98	1.22	0.42	0.75	0.91
2014-15	0.98	0.22	0.38	1.01	1.03	0.51	0.93	0.92
2015-16	1.07	0.24	0.41	1.12	0.91	0.58	0.99	0.90
2016-17	0.24	0.17	0.44	1.10	1.03	0.63	0.61	0.87
2017-18	0.19	0.15	0.49	0.96	1.14	0.44	0.89	0.87
2018-19	0.26	0.24	0.53	0.96	1.01	1.31	0.50	0.83
2019-20	0.65	0.27	0.48	1.21	1.07	1.98	0.81	0.87
Mean	**0.75**	**0.26**	**0.69**	**1.05**	**1.09**	**0.62**	**0.87**	**0.89**
SD	**0.56**	**0.32**	**1.02**	**1.09**	**1.38**	**0.37**	**1.14**	**0.89**

Source: Author's computation

This parameter for analysis of physical performance is efficiency of operation measured in terms of ratio of cost of revenue to total revenue of the enterprise. The cost of revenue is a metric to measure the company's ability to use its resources to operate and earn income efficiently. The enterprises showing high cost of revenue are considered less efficient as it reduces their income. As seen through the data in table 6.13, the average cost-revenue ratio of GTDC and GMCL is more than one. Thus, high operating costs show less efficiency of operation. The mean ratio of EDC is the lowest which shows the operational efficiency of the enterprise. The SD in the case of all the enterprises is low showing the data is sparsely spread over the period.

6.3.3 Analysis of Contribution to the Economy

The state-level public sector enterprises in developing countries are important contributors to the development processes. These enterprises contribute to the economy in various ways justifying its existence such as providing citizens with vital goods and

services at affordable prices, accelerating industrialisation, supporting vulnerable social groups via employment and smoothing of business, generating resources for further development, etc. Thus, assessing the efficiency of these enterprises in contributing to the growth of the economy is an important component of its overall performance analysis.

6.3.3.a Internal Resource Generation

Table 6.14: Ratio of Internal Resource Generation to Total Investment

Year	IRG= Depreciation+ Retained Earnings+ Deferred Revenue Expenditure							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	1.14	0.51	(1.05)	0.00	2.27	0.03	(0.13)	1.63
2009-10	0.90	0.71	(1.08)	0.01	1.90	0.04	(0.09)	1.46
2010-11	0.44	0.81	(1.24)	0.02	2.04	0.03	(0.05)	1.98
2011-12	0.39	0.95	(1.52)	(0.28)	2.90	0.03	(0.02)	2.28
2012-13	0.57	1.21	(1.62)	(0.24)	2.71	0.04	(0.02)	2.56
2013-14	0.65	1.40	(1.08)	(0.24)	1.61	0.04	0.00	4.07
2014-15	0.66	1.67	(1.11)	(0.21)	1.43	0.03	0.00	6.06
2015-16	0.45	2.12	(0.97)	(0.09)	2.19	0.03	0.00	7.20
2016-17	0.26	2.61	(1.17)	(0.08)	1.92	0.01	0.03	6.96
2017-18	1.05	2.72	(1.17)	(0.05)	1.25	0.03	0.04	8.35
2018-19	(6.40)	2.95	(1.12)	0.00	1.00	(0.01)	0.07	8.94
2019-20	(0.85)	3.16	(1.28)	(0.36)	0.27	(0.02)	0.09	9.51
Mean	**(0.06)**	**1.73**	**(1.20)**	**(0.13)**	**1.79**	**0.02**	**(0.01)**	**5.08**
SD	**2.06**	**0.94**	**0.19**	**0.13**	**0.74**	**0.02**	**0.06**	**3.08**

Source: Author's computation

Generation of internal resources by any enterprise in the public sector is of vital importance. By generating internal resources, SLPEs bear the ability to support their own expansion and reduce financial dependence on the State and also contribute to the development of peripheral areas in the state (Nandi, 2010). In our study, this performance parameter is measured using the ratio of the amount of Internal resources generated by the enterprise to the total investment (Capital employed) in the enterprise. A ratio greater than one will be preferable as it indicates better operational efficiency. Table 6.14 indicates the ratio of internal resource generation to total investment in the eight SLPEs under study for the period from 2008-09 to 2019-20. From the analysis it

is noticed that EDC, GMCL, SIDCL and GSIDC have an average ratio of more than 1 showing internal resource generation in these enterprises over the period has been more than the amount invested. EDC and GSIDC show increasing self-dependence with the increasing trend of the ratio, whereas the ratio has diminished in the case of GMCL and has turned negative in the case of SIDCL in 2018-19 and 2019-20.

6.3.3.b Contribution to the Exchequer

Table 6.15: Ratio of Contribution to the Exchequer to Total Investment

Year	Contribution to Exchequer = Interest on State govt loans + Dividend to the State Govt + Taxes and Duties + Royalty/Rent/Cess							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.01	0.07	(0.09)	0.08	0.01	0.02	0.00	0.26
2009-10	0.01	0.09	(0.18)	0.03	0.01	0.01	0.00	0.19
2010-11	0.01	0.10	(0.22)	0.02	0.12	0.01	0.00	0.34
2011-12	0.08	0.09	(0.30)	0.07	1.14	0.04	0.00	0.24
2012-13	0.01	0.12	(0.31)	0.09	0.01	0.02	0.00	0.22
2013-14	0.01	0.17	(0.38)	(3.52)	0.01	0.02	0.00	0.37
2014-15	0.02	0.10	(0.47)	(2.95)	0.01	0.01	0.00	0.75
2015-16	0.63	0.05	(0.65)	(3.51)	0.65	0.05	0.00	0.42
2016-17	1.16	0.13	(0.79)	(4.06)	0.02	0.04	0.00	0.77
2017-18	1.97	0.35	(0.76)	(3.83)	0.02	0.05	0.00	0.86
2018-19	3.73	0.19	(0.77)	(1.62)	0.93	0.04	0.00	0.35
2019-20	2.03	0.20	(0.89)	(1.36)	0.06	0.02	0.00	0.39
Mean	**0.81**	**0.14**	**(0.49)**	**(1.71)**	**0.25**	**0.03**	**0.00**	**0.43**
SD	**1.20**	**0.08**	**0.28**	**1.75**	**0.41**	**0.02**	**0.00**	**0.23**

Source: Author's computation

In developing economies, the public sector enterprises are set up by the government in the core sectors of the economy so that they can make a certain impact on the general public as well as the economy as a whole. These enterprises are buoyed by the government through infrastructure and financial support (Nandi, 2010). Thus, these enterprises are expected to make substantial contributions to the exchequer in the form of taxes, duties, dividends and interest in order to finance the other developmental plans of the government. In other words, contribution to the exchequer reflects the returns made by the state enterprises on the amount invested by the government. The

ratio of the contribution made by the state enterprises to the exchequer (net contribution after deducting subsidies received from the government) to total investment (capital employed) in these enterprises is taken as the parameter to measure the performance of the SOE as a contribution to the economy. Favourably the ratio should be high as it reflects higher returns to the government. From table 6.15, it is observed that a substantial contribution to the exchequer is from GIDC followed by GSIDC which is on an average of 0.80 and 0.43. The exchequer also receives nominal contributions from EDC, GMCL and SIDCL. But the mean ratio of GTDC and KTCL is negative as it indicates subsidies received from the government are more than the contribution to the exchequer which shows the inability of these enterprises to contribute to the exchequer and more dependence on support from the government for maintaining their operations. GSSTFDCL has no contribution to the exchequer throughout the period.

6.3.3.c Employment Generation

Table 6.16: Employment Generation
(Trend percentage of number of employees)

Year	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
2009-10	98.74	97.85	106.30	101.39	98.63	100.00	75.00	130.51
2010-11	96.85	97.85	104.00	98.34	95.89	100.00	50.00	125.42
2011-12	96.85	95.70	109.93	93.63	87.67	100.00	50.00	130.51
2012-13	92.43	93.55	109.02	100.00	93.15	100.00	50.00	120.34
2013-14	79.81	92.47	109.15	95.84	93.15	176.92	50.00	142.37
2014-15	80.13	94.62	104.24	95.84	89.04	176.92	375.00	174.58
2015-16	83.28	93.55	99.82	91.14	86.30	176.92	375.00	174.58
2016-17	82.33	96.77	97.52	86.15	83.56	238.46	350.00	162.71
2017-18	74.76	92.47	93.34	81.72	80.82	461.54	325.00	161.02
2018-19	74.45	88.17	98.85	76.73	76.71	453.85	325.00	150.85
2019-20	67.19	82.80	104.60	73.41	75.34	453.85	325.00	186.44
Mean	**85.57**	**93.82**	**103.06**	**91.18**	**88.36**	**219.87**	**204.17**	**146.61**
SD	**11.04**	**4.68**	**5.20**	**9.53**	**8.17**	**149.43**	**149.56**	**26.08**

Source: Author's computation

The government's decision of setting up of public sector enterprises both at central and state level which extended scope for employment opportunities both direct and indirect. Direct employment opportunities include employment generation within

these enterprises and indirect opportunities include employment generation through these enterprises (Nandi, 2010). In this study, we have quantified the parameter of employment generation only based on direct employment opportunities created within the enterprises to display the improved employment situation in the state due to the operations of state enterprises. The growth rate in the number of employees during the period based on the trend percentages calculated taking 2008-09 as the fixed base year is shown in table 6.16. The average growth rate in employment is found to be favourable i.e., above 100 per cent in the case of SIDCL, GSSTFDCL, GSIDC and KTCL. High S.D. is observed in the employment situation of SIDCL and GSSTFDCL with a sharp increasing trend seen from 2014-15 onwards. Whereas in the case of GTDC, GMCL, EDC and GIDC a gradual declining percentage is observed.

6.3.3.d Value Addition

Table 6.17: Ratio of Value Addition to Total Investment

Year	Value addition= Interest + Dividends Taxes + Retained earnings + Employee remuneration							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	1.09	0.73	(0.70)	0.22	4.01	0.03	(0.11)	9.06
2009-10	0.80	0.90	(0.63)	0.24	3.80	0.04	(0.07)	7.78
2010-11	0.22	1.02	(0.66)	0.36	3.90	0.04	(0.04)	7.42
2011-12	0.26	1.21	(0.89)	0.37	6.38	0.07	(0.01)	5.83
2012-13	0.35	1.54	(0.89)	0.21	5.98	0.07	0.00	6.64
2013-14	0.48	1.88	(0.46)	0.33	5.27	0.06	0.01	10.70
2014-15	0.57	2.09	(0.43)	0.36	5.44	0.04	0.02	15.23
2015-16	1.02	2.50	(0.25)	0.43	6.88	0.08	0.02	19.93
2016-17	1.42	3.15	(0.31)	0.57	10.79	0.05	0.04	25.77
2017-18	3.03	3.53	(0.33)	0.52	6.47	0.08	0.05	32.91
2018-19	(2.83)	3.57	(0.26)	0.63	6.68	0.05	0.09	34.52
2019-20	1.57	3.71	(0.44)	0.60	8.11	0.03	0.11	31.95
Mean	**0.67**	**2.15**	**(0.52)**	**0.40**	**6.14**	**0.05**	**0.01**	**17.31**
SD	**1.35**	**1.11**	**0.23**	**0.15**	**1.97**	**0.02**	**0.06**	**11.21**

Source: Author's computation

Value addition is an economic and social validation of an enterprise in the public sector (Nandi, 2010). It is not only regarded as its contribution to the economy, but also it reflects the efficiency of the enterprise in using the resources and generating

wealth for the stakeholders. The study quantifies this parameter using the ratio of value addition to capital employed. Table 6.17 shows the ratio of value addition made by the state enterprises for every rupee of capital invested in it. From the above analysis, it is observed that the value addition by all the enterprises under study is positive except KTCL which has a negative ratio throughout the period due to its huge accumulated losses. Thus, KTCL has not been able to generate value from the funds invested. The ratio of more than one depicts that the value addition is more than the funds invested in the enterprise. In the case of GSIDC, the ratio is highest among all the eight enterprises i.e., 17.31 times followed by GMCL 6.14 times and EDC 2.15 times.

6.3.4 Analysis of Contribution to the Society

While pursuing commercial objectives, public enterprises have to play an important role in meeting a variety of social objectives. Thus, there is a need to account for the resources spent on social obligations while measuring the performance of public sector enterprises (Ghuman, 2001), Society's stake in the public sector enterprises is more than its owners. Within the public sector, a significant role is played by state enterprises- companies in which the state participates in the property and decisions. These entities are expected to provide benchmarks in terms of their commitment to the community. The social efficiency of the state enterprises can be analysed in terms of their contribution towards social obligations benefitting various stakeholders. The contribution of the select state enterprises in Goa is analysed using the following parameters.

6.3.4.a Promoting Research & Development, Innovation and Technological Up-gradation

Expenditure on research and development plays an important role in the business processes that result in technology bringing better goods and services and more efficient and cost-effective processes thereby resulting in increased competitiveness. It includes expenditure on generating new knowledge, products and process development, development of technology for efficiency improvement and cost reduction, use of time and energy saving devices, automation and upgradation, developing patents and copyrights, innovative ICT solutions, quality improvement, any other. The ratio of expenditure on research & development, innovations and technological upgradation to total revenue is calculated to measure this parameter.

Table 6.18: Ratio of expenditure on Promoting Research & Development, Innovation and Technological Up-Gradation to Total Revenue

Year	Ratio of expenditure on R&D, Innovation and technological upgradation to total revenue							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000010
2009-10	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.0005
2010-11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2011-12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0057
2012-13	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.0023
2013-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0011
2014-15	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000083
2015-16	0.000	0.000	0.000	0.000	0.516	0.000	0.000	0.0002
2016-17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0003
2017-18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2018-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0003
2019-20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000000
Mean	**0.000**	**0.000**	**0.000**	**0.000**	**0.043**	**0.000**	**0.0012**	**0.0009**
SD	**0.000**	**0.000**	**0.000**	**0.000**	**0.149**	**0.000**	**0.0035**	**0.0017**

Source: Author's computation

As reflected in Table 6.18, only GMCL has spent an average of 4.3 percent of total revenue, GSSTFDCL has spent an average of 0.12 percent and GSIDCL has spent an average of 0.09 percent of their total revenue on upgrading the technology. As recommended by DPE, Govt of India, the state enterprises need to focus on R&D to provide better goods and services and for a demonstrable increase in competitiveness.

6.3.4.b Protection and Conservation of Environment

It includes expenditure incurred on waste management, expenditure incurred on energy conservation, expenditure on reduction of environmental impact due to introduction of new technology, expenditure incurred on relieving urban congestions and reduction of noise level, expenditure incurred on reduction of emissions, the amount spent on an innovative solution for energy efficiency, any other. It is measured as the ratio of the amount spent on protection and conservation of the environment to total revenue. From the records of the enterprises, it is observed that none of the state enterprises has spent any amount on the protection and conservation of the environment

during the period under study. This is one area where every business enterprise should play an active role in the protection of the environment by implementing strategies that reduce pollution in the environment.

6.3.4.c Community Welfare

It includes the welfare of society by way of subsidies on essential goods and services, the amount spent to develop social infrastructure, to enlarge and improve the physical resources of the state, to improve knowledge skills and productivity of people in the state, on community welfare, on education, health and other social overheads, on development of small scale and ancillary industries, on infrastructure for growth of industries, for promoting balance regional development, any other. The ratio of **e**xpenditure on social overheads to total revenue is considered as the yardstick to measure this performance parameter.

Table 6.19: Ratio of expenditure on Community Welfare to Total Revenue

Year	Ratio of amount spent on community welfare/social overheads to total revenue							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.0000	0.0545	0.15797	0.0000	0.0000	0.0000	0.0000	0.0000
2009-10	0.0000	0.0347	0.19135	0.0000	0.0000	0.0000	0.038344	0.0000
2010-11	0.0000	0.0135	0.20735	0.0000	0.0000	0.0000	0.0000	0.0000
2011-12	0.0000	0.0166	0.40929	0.0000	0.0000	0.0000	0.0000	0.0000
2012-13	0.0000	0.01031	0.37987	0.0000	0.0000	0.0000	0.0000	0.0000
2013-14	0.0000	0.01396	0.29276	0.0000	0.0000	0.0000	0.0000	0.0000
2014-15	0.0000	0.01265	0.32472	0.0000	0.0000	0.0000	0.0000	0.0000
2015-16	0.0000	0.01538	0.43195	0.0000	0.0000	0.0000	0.0000	0.0000
2016-17	0.0000	0.01626	0.51919	0.0000	0.0000	0.0000	0.0000	0.0007
2017-18	0.0000	0.01583	0.41753	0.0000	0.0000	0.0000	0.0000	0.0000
2018-19	0.0000	0.02815	0.46788	0.0000	0.0000	0.0000	0.0000	0.0008
2019-20	0.0015	0.01397	0.46968	0.0000	0.0000	0.0000	0.0000	0.0000
Mean	**0.0001**	**0.02047**	**0.35579**	**0.0000**	**0.0000**	**0.0000**	**0.00320**	**0.00012**
SD	**0.0004**	**0.01275**	**0.12001**	**0.0000**	**0.0000**	**0.0000**	**0.01107**	**0.00029**

Source: Author's computation

As observed in table 6.19, only EDC and KTCL have spent on community welfare or social overheads throughout the period. KTCL has been the highest contributor towards social overhead by way of various subsidies provided to the public which accounts for an average of 35.57 per cent of their total turnover. Amount spent

by EDC on social overheads is by way of subsidies on loans granted to the public which accounts for 2.04 per cent of their total revenue. Negligible spending on social overheads is also observed in the case of GIDC, GSSTFDCL and GSIDC.

6.3.4.d Human Resource Development

Human Resource Development is an internal area of social commitment of public sector enterprises. It is concerned with the well-being of employees which includes expenditure on the improvement of working and living conditions of employees, expenses on training, coaching, mentoring and career development of employees, expenditure on health and safety of employees, and any other expenses on employee wellness. To measure this parameter the ratio of expenditure on the development of human resources to total revenue is considered in this study.

Table 6.20: Ratio of expenditure on Human Resource Development to Total Revenue

Year	Ratio of expenditure on human resource development to total revenue							
	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.13	0.08	0.06	0.05	0.30	0.05	0.12	0.00095
2009-10	0.09	0.06	0.04	0.06	0.21	0.02	0.13	0.00114
2010-11	0.22	0.06	0.09	0.03	0.12	0.02	0.06	0.00100
2011-12	0.12	0.04	0.12	0.05	0.24	0.02	0.03	0.00104
2012-13	0.11	0.03	0.08	0.05	0.22	0.14	0.12	0.00224
2013-14	0.08	0.02	0.02	0.05	0.19	0.04	0.04	0.00131
2014-15	0.12	0.01	0.03	0.05	0.13	0.05	0.06	0.00081
2015-16	0.10	0.04	0.03	0.06	0.12	0.04	0.09	0.00119
2016-17	0.10	0.02	0.03	0.05	0.16	0.08	0.04	0.00108
2017-18	0.09	0.05	0.03	0.06	0.10	0.04	0.07	0.00128
2018-19	0.08	0.04	0.03	0.06	0.15	0.02	0.06	0.00211
2019-20	0.14	0.03	0.03	0.07	0.07	0.03	0.06	0.00120
Mean	**0.114**	**0.041**	**0.049**	**0.054**	**0.166**	**0.046**	**0.073**	**0.001**
SD	**0.039**	**0.019**	**0.032**	**0.008**	**0.065**	**0.035**	**0.036**	**0.000**

Source: Author's computation

Table 6.20 shows the ratio of the amount spent by state enterprises on development of human resources to total revenue over the period. There is wide fluctuation observed in the ratio in all the state enterprises. The average amount spent on HRD is less than 10 per cent of total revenue in all the enterprises except in GIDC where 11 per cent and GMCL where 16 per cent of the total revenue is spent on HRD.

6.3.4.e Corporate Governance

Corporate governance is a policy framework of the government to ensure transparency and trust among the shareholders and related stakeholders. Corporate governance practices are efficiency-enhancing; more specifically, board quality and strategic planning seem to be effective internal governance mechanisms in promoting overall organizational efficiency (Curi et al., 2016). The Department of Public Enterprise (DPE) in India issues guidelines on corporate governance which are applicable to all CPSEs and also the listed state enterprises. None of the state enterprises in Goa is listed on the stock exchange, thus the corporate governance guidelines are not stringent on them but the implementation of corporate governance guidelines enhances their efficiency. Thus, this parameter is one of the social objectives in the interest of the public who are the stakeholders of state enterprises. It will be measured based on four basic governance requirements – board size (minimum three members), independence of board ($1/3^{rd}$ of the total board size), prescribed number of board meetings in a year (minimum 4 meetings in a year) and conduct of the internal audit. For each requirement the enterprise scores '1' point for meeting the requirement and '0' for not meeting the requirement. The total of all four requirements considered is taken as the corporate governance compliance score for the parameter. Based on the information obtained about corporate governance compliance, all the state enterprises under study comply with the basic corporate governance requirements for efficient functioning and maintaining transparency of operations. Only in the case of GMCL, the independence of the board is not compiled in all the years considered for the study and also the compliance with the minimum number of board meetings was not met in 2009-10, 2012-13 and 2013-14.

6.4 Performance Score

The performance scores of the select state-level public enterprises have been ascertained using the performance evaluation model developed in chapter four. The multi-criteria model is developed using the criteria weights generated through AHP analysis. The generic model enables the calculation of the performance scores of the enterprise based on which the enterprises can be rated. The system of rating used in the study is given below.

Table 6.21: System of rating aggregate performance score

Aggregated score (percentage)	Rating
90-100	Excellent
70-90	Very Good
50-70	Good
33-50	Fair
0-33	Poor

The above table 6.21 shows the MOU rating score used by the Department of Public Sector Enterprises in India for Central Public Sector enterprises. The above rating is used to rate the aggregate performance score of the select enterprises.

6.4.1 Financial Performance Score

Table 6.22: Financial Performance Score
(0.14 or 14 percent weightage)

Year	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.135	0.105	(0.052)	0.047	0.042	0.017	0.027	0.146
2009-10	0.112	0.108	(0.033)	0.107	0.037	0.027	0.060	0.136
2010-11	0.095	0.080	0.002	0.090	0.070	0.095	0.064	0.128
2011-12	0.088	0.089	(0.012)	(0.216)	0.085	0.050	0.101	0.062
2012-13	0.067	0.084	(0.002)	0.077	(0.023)	0.055	0.015	0.083
2013-14	0.084	0.065	0.022	0.075	0.017	0.048	0.033	0.135
2014-15	0.109	0.067	0.108	0.072	0.059	0.032	0.015	0.126
2015-16	0.105	0.078	0.109	0.081	0.124	0.028	0.012	0.107
2016-17	0.095	0.082	0.072	0.115	0.036	0.011	0.029	0.110
2017-18	0.113	0.071	0.059	0.081	0.035	0.019	0.019	0.099
2018-19	(0.082)	0.072	0.058	0.069	0.053	0.015	0.044	0.087
2019-20	0.033	0.078	0.065	(0.019)	0.020	0.046	0.022	0.080
Mean	**0.079**	**0.082**	**0.033**	**0.048**	**0.046**	**0.037**	**0.037**	**0.108**
SD	**0.057**	**0.014**	**0.053**	**0.090**	**0.037**	**0.024**	**0.027**	**0.027**
Mean %	**7.938**	**8.162**	**3.303**	**4.818**	**4.629**	**3.686**	**3.678**	**10.833**

Source: Author's computation.

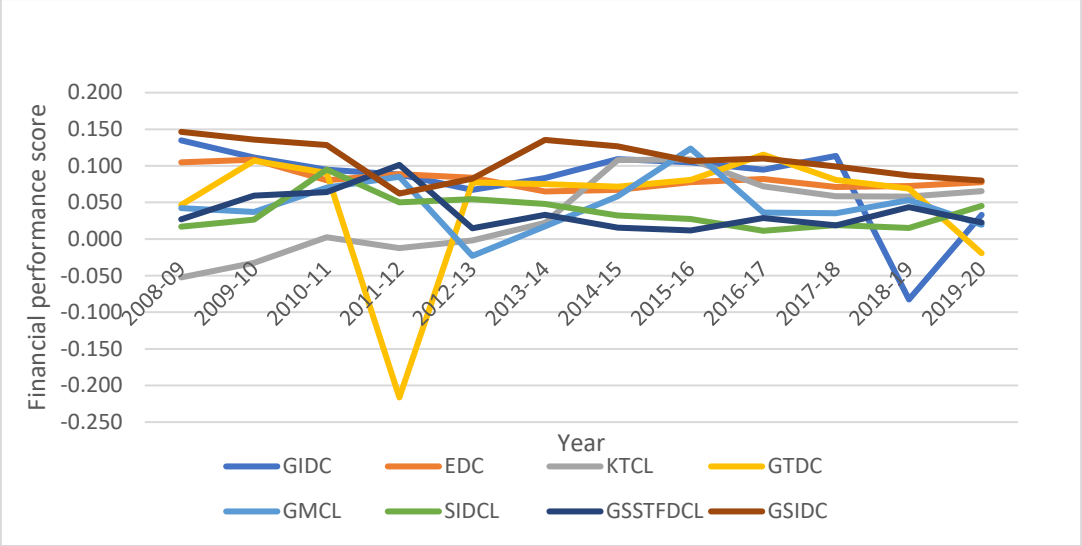

Figure 6.7: Financial Performance Score

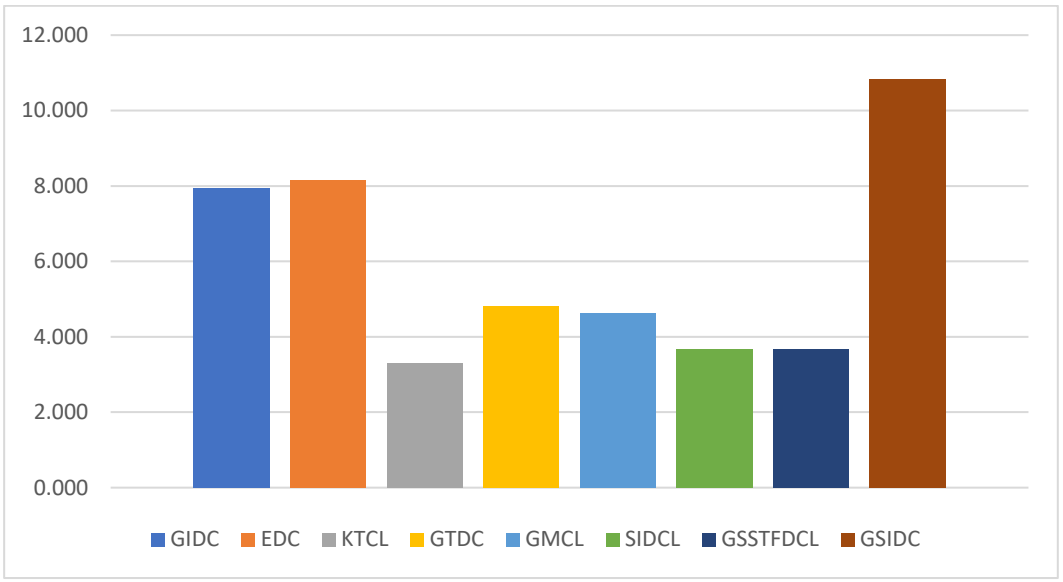

Figure 6.8: Average Financial Performance

Based on the financial performance score reflected in table 6.23, out of a total weight of 0.14 (14 per cent) for the financial performance as derived from AHP, the top three enterprises are GSIDCL with a score of 0.108 (10.8 per cent), followed by EDC with a score of 0.082 (8.2 per cent) and GIDC's score of 0.079 (7.9 per cent).

6.4.2 Physical Performance Score

Table 6.23: Physical Performance Score

(0.12 or 12 percent weightage)

Year	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.036	0.068	0.081	0.093	0.080	0.026	0.040	0.084
2009-10	0.057	0.085	0.083	0.113	0.092	0.035	0.047	0.070
2010-11	0.043	0.079	0.082	0.109	0.104	0.026	0.091	0.067
2011-12	0.027	0.077	0.069	0.098	0.115	0.045	0.097	0.068
2012-13	0.037	0.080	0.077	0.107	0.092	0.062	0.058	0.074
2013-14	0.021	0.083	0.081	0.104	0.035	0.042	0.057	0.105
2014-15	0.018	0.079	0.110	0.113	0.037	0.040	0.069	0.091
2015-16	0.016	0.077	0.103	0.106	0.046	0.073	0.060	0.084
2016-17	0.058	0.096	0.095	0.104	0.072	0.048	0.065	0.096
2017-18	0.080	0.098	0.090	0.113	0.058	0.056	0.046	0.091
2018-19	0.086	0.082	0.093	0.076	0.038	0.020	0.069	0.088
2019-20	0.045	0.073	0.094	0.066	0.036	0.013	0.060	0.081
Mean	**0.044**	**0.081**	**0.088**	**0.1002**	**0.067**	**0.040**	**0.063**	**0.083**
SD	**0.023**	**0.009**	**0.011**	**0.015**	**0.029**	**0.018**	**0.017**	**0.012**
Mean %	**4.37**	**8.15**	**8.82**	**10.02**	**6.71**	**4.04**	**6.30**	**8.32**

Source: Author's computation

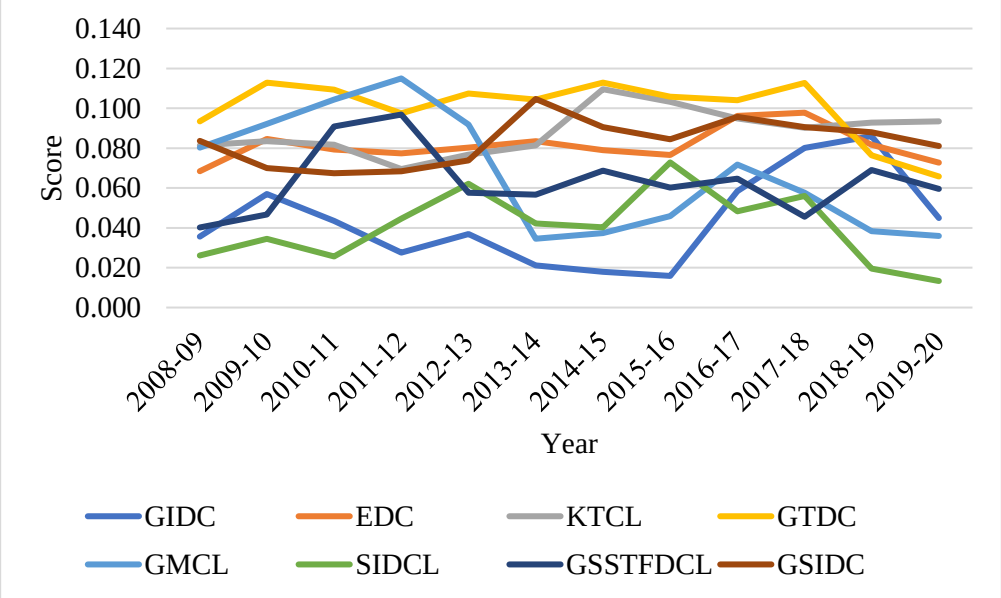

Figure 6.9: Physical Performance Score

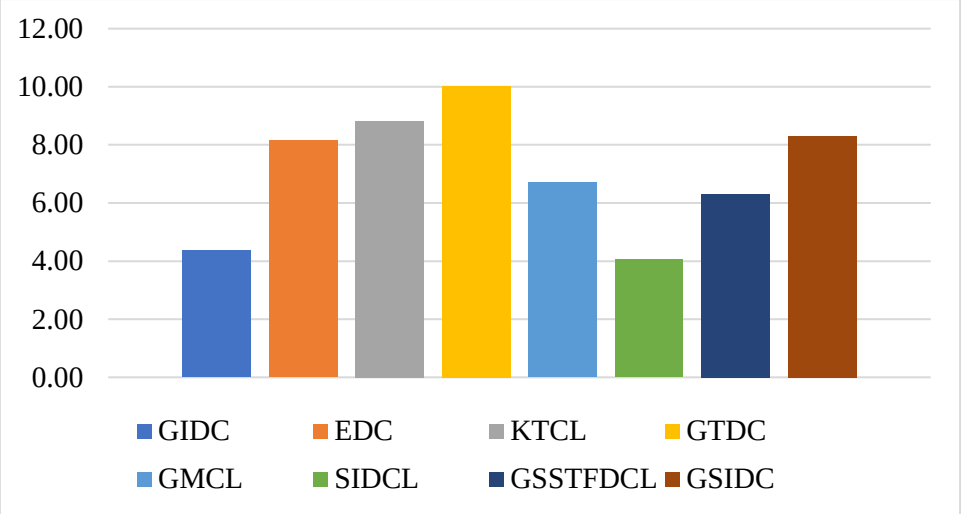

Figure 6.10: Average Physical Performance

Based on the physical performance score reflected in table 6.23, out of a total weight of 0.12 (12 per cent) as derived from AHP, GTDC has scored the highest score of average 0.1002 (10.02 per cent). There is a marginal difference in the average physical performance score of KTCL 0.088 (8.8 per cent), GSIDC 0.083 (8.3 per cent) and EDC 0.081 (8.1percent) The S.D is low indicating the data is clustered around the mean. Thus, GTDC, KTCL and GSIDC are the top three enterprises in terms of physical performance.

6.4.3 Performance Score for Contribution to the Economy

Table 6.24: Performance Score for Contribution to the Economy (0.33 or 33 per cent weightage)

Year	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.235	0.176	0.022	0.163	0.221	0.124	(0.131)	0.120
2009-10	0.212	0.183	0.029	0.169	0.209	0.145	(0.088)	0.135
2010-11	0.168	0.188	0.015	0.179	0.214	0.128	(0.048)	0.143
2011-12	0.167	0.191	(0.012)	0.117	0.284	0.181	(0.001)	0.141
2012-13	0.172	0.204	(0.019)	0.116	0.235	0.181	0.004	0.135
2013-14	0.163	0.220	0.034	0.079	0.204	0.187	0.027	0.180
2014-15	0.166	0.224	0.025	0.096	0.195	0.143	0.154	0.250
2015-16	0.176	0.232	0.030	0.113	0.247	0.214	0.155	0.249
2016-17	0.180	0.271	0.005	0.116	0.234	0.166	0.181	0.270
2017-18	0.265	0.306	(0.001)	0.114	0.186	0.309	0.183	0.299
2018-19	(0.303)	0.283	0.013	0.156	0.216	0.202	0.238	0.269
2019-20	0.105	0.284	(0.007)	0.081	0.167	0.136	0.261	0.298
Mean	**0.142**	**0.230**	**0.011**	**0.125**	**0.218**	**0.176**	**0.078**	**0.208**
SD	**0.146**	**0.045**	**0.018**	**0.034**	**0.031**	**0.051**	**0.133**	**0.071**
Mean %	**14.21**	**23.02**	**1.12**	**12.48**	**21.77**	**17.64**	**7.79**	**20.75**

Source: Author's computation

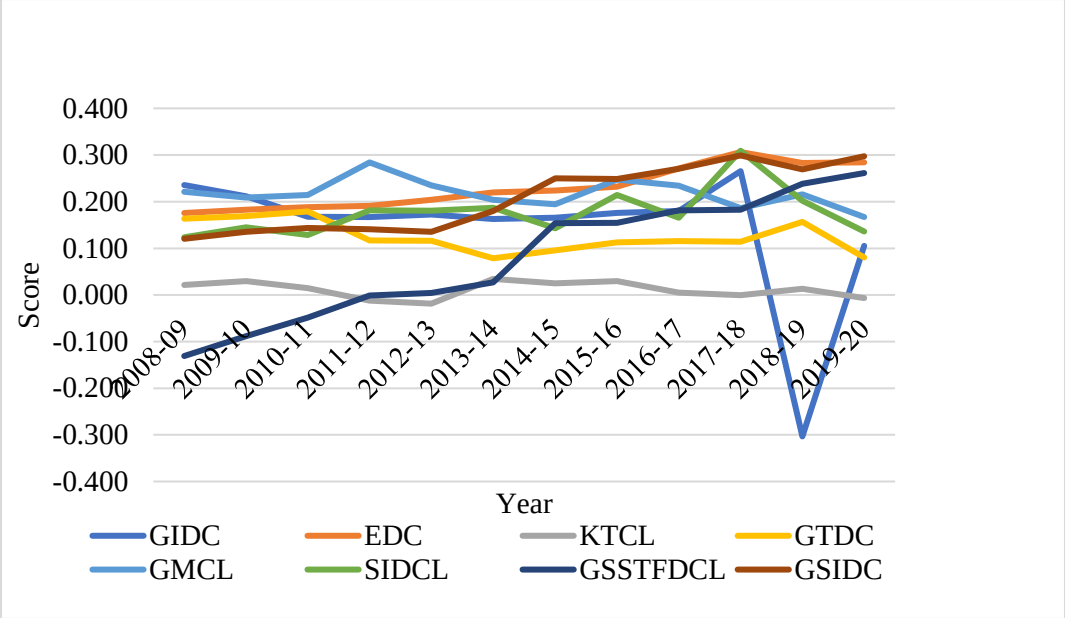

Figure 6.11: Performance Score for Contribution to Economy

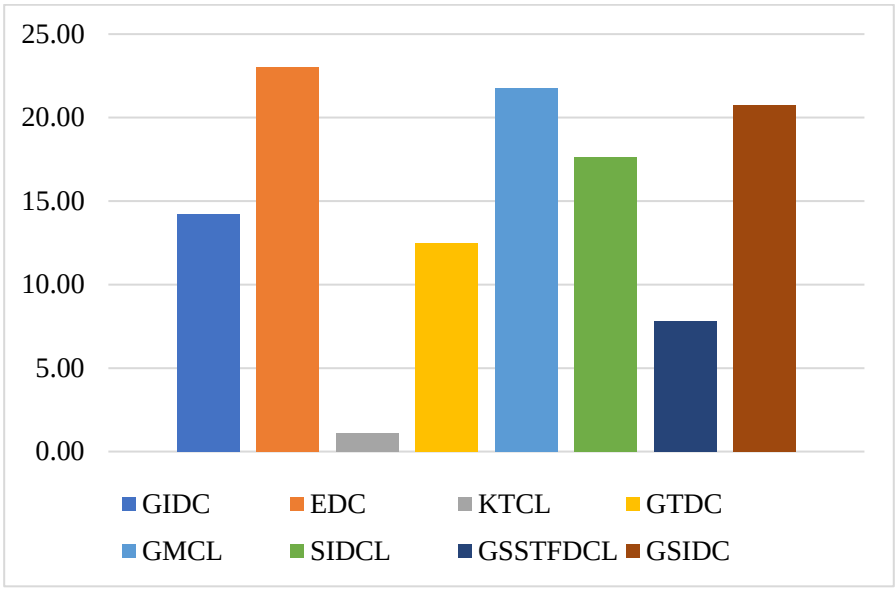

Figure 6.12: Average Contribution to Economy

The score for contribution to economy shown in table 6.24, is out of the total weight of 0.33 (33 per cent) as derived from AHP. EDC scored the highest score of 0.23 (23 per cent), followed by GMCL at 0.218 (21.8 per cent) and GSIDCL at 0.208 (20.8 per cent) emerged among the top three. In the case of GSSTFDCL from 2008-09 till 2011-12 the contribution to the economy has been negative and also of KTCL in 2011-12 and 2012-13, 2017-18 and 2019-20 the contribution to the economy is negative. KTCL has the lowest mean score for contribution to the economy.

6.4.4 Performance Score for Contribution to Society

Table 6.25: Performance Score for Contribution to Society (0.41 or 41 percent weightage)

Year	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.132	0.320	0.158	0.195	0.165	0.100	0.165	0.155
2009-10	0.108	0.239	0.155	0.166	0.113	0.077	0.320	0.177
2010-11	0.180	0.177	0.208	0.124	0.092	0.076	0.110	0.160
2011-12	0.125	0.161	0.290	0.156	0.142	0.078	0.084	0.204
2012-13	0.118	0.133	0.247	0.170	0.118	0.180	0.171	0.300
2013-14	0.102	0.132	0.159	0.152	0.105	0.092	0.092	0.199
2014-15	0.125	0.113	0.174	0.161	0.097	0.103	0.117	0.141
2015-16	0.112	0.163	0.204	0.164	0.094	0.098	0.140	0.180
2016-17	0.116	0.136	0.235	0.151	0.110	0.131	0.098	0.282
2017-18	0.111	0.177	0.207	0.170	0.087	0.090	0.125	0.188
2018-19	0.102	0.193	0.217	0.162	0.107	0.078	0.111	0.413
2019-20	0.274	0.140	0.215	0.180	0.072	0.087	0.110	0.180
Mean	**0.134**	**0.174**	**0.206**	**0.163**	**0.109**	**0.099**	**0.137**	**0.215**
SD	**0.049**	**0.057**	**0.041**	**0.017**	**0.025**	**0.030**	**0.064**	**0.079**
Mean %	**13.37**	**17.36**	**20.59**	**16.26**	**10.86**	**9.92**	**13.69**	**21.50**

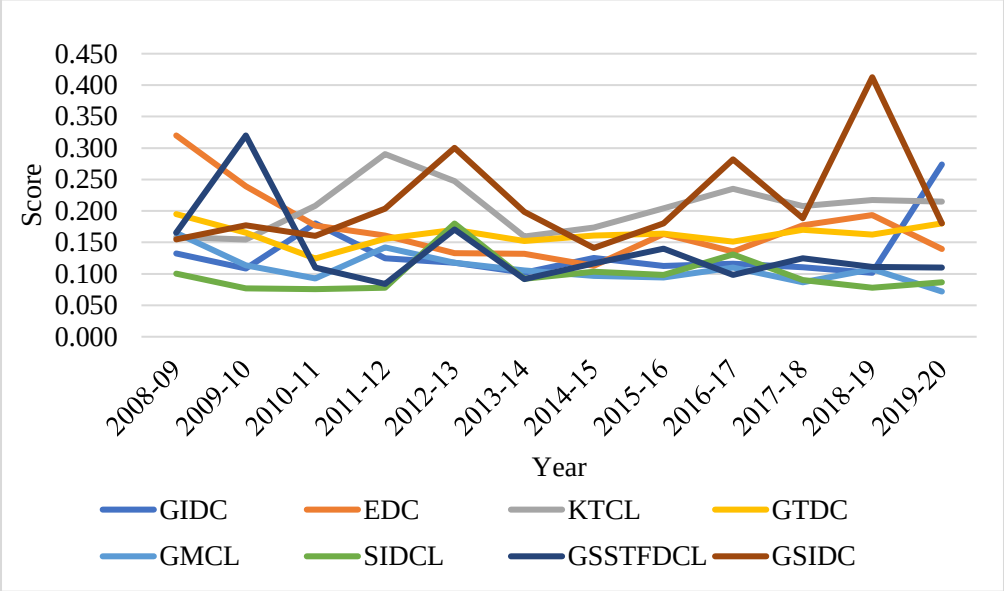

Figure 6.13: Performance Score for Contribution to Society

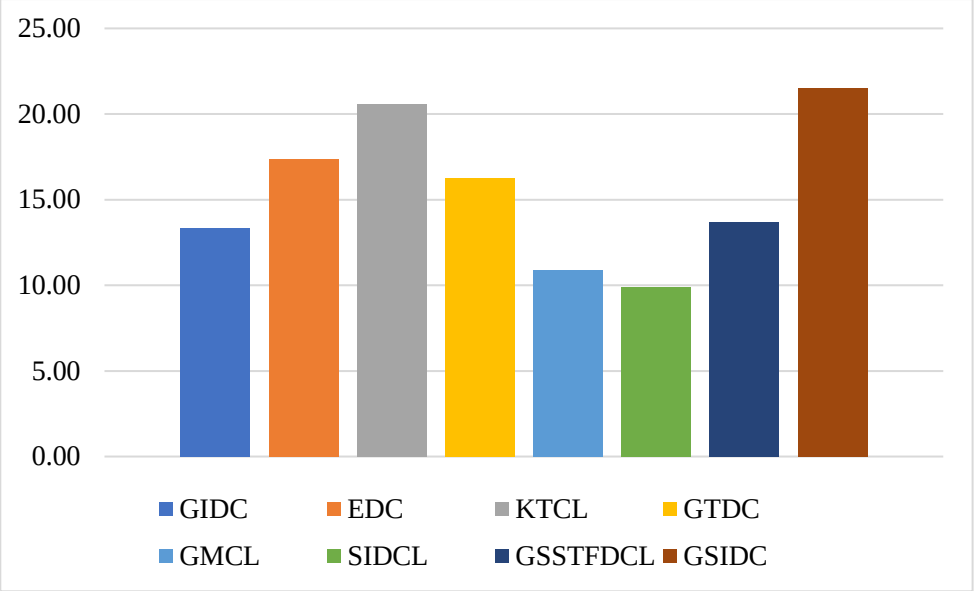

Figure 6.14: Average Contribution to Society

The score for contribution to the economy as presented in table 6.25, out of a total weight of 0.41 (41 per cent) as derived from AHP, GSIDC with the highest average score of 0.215 (21.5 per cent) followed by KTCL 0.206 (20.6 per cent), followed by and EDC 0.173 (17.3 per cent) are the top three contributors to society. But still, their contribution to society is up to 50 per cent of the total weightage to the criteria.

6.4.5 Criteria-wise Average Performance Score

Table 6.26 Criteria-wise Average Performance Score (in percentage)

Criteria	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
Financial performance	7.938	8.162	3.303	4.818	4.629	3.686	3.678	10.833
Physical performance	4.373	8.145	8.818	10.020	6.706	4.045	6.304	8.318
Contribution to economy	14.21	23.02	1.12	12.48	21.77	17.64	7.79	20.75
Contribution to society	12.21	17.36	20.59	16.26	12.73	9.92	12.52	19.40

Source: Author's computation

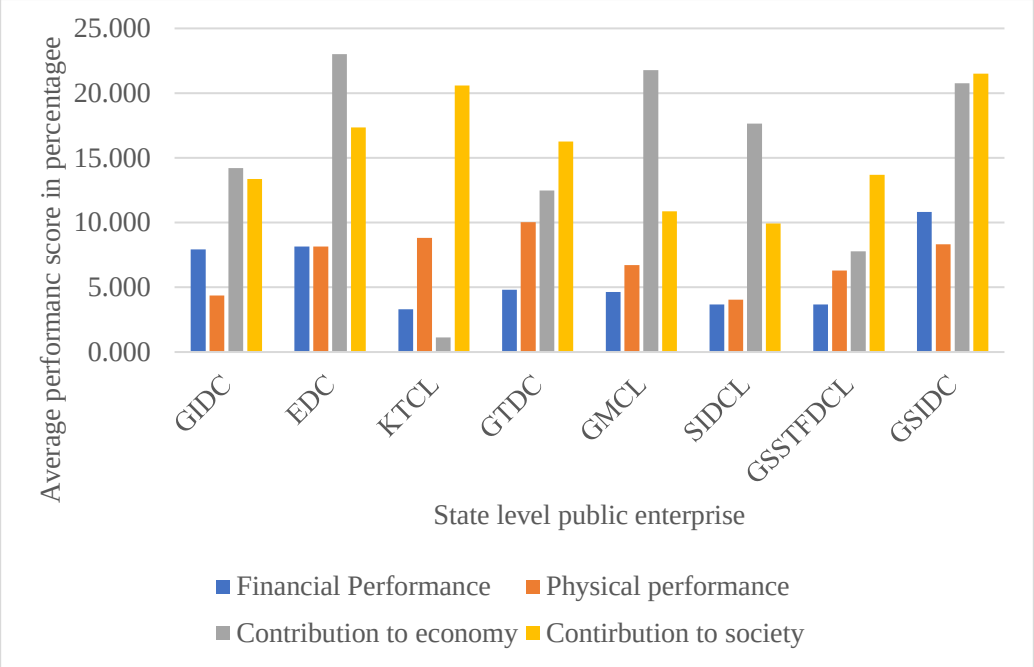

Figure 6.15: Criteria-wise Average Performance

Summarised criteria wise performance of individual state enterprises is presented in table 6.26. As reflected from the above analysis, GIDC, EDC, GMCL and SIDCL have their best performance score in contribution to the economy, and KTCL, GTDC, GSIDC and GSSTFDCL have their best performance scores in contribution to society. GIDC, SIDCL and GSIDC have scored the lowest scores in physical performance. KTCL has scored the lowest in its contribution to the economy. GTDC, GMCL, SIDCL and GSSTFDCL have scored lowest in their financial performance. The highest contributor to the economy is EDC and to society is GSIDC. GSIDC also has the highest financial performance score whereas GTDC has the highest physical performance score. The findings support the findings of (H. Gupta, 2017) that the financially sound public enterprise can make a significant contribution to society. But at the same time, the proposition made by (S. Gupta, 2010) is found suitable for KTCL as its financial performance score is the lowest but has the highest score for contribution to society. Thus, it is worth mentioning that the poor financial performance of public enterprises in India is to some extent attributable to the burden of social responsibility.

6.4.6 Overall Performance Score

Table 6.27: Overall Performance Score

Year	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
2008-09	0.538	0.669	0.209	0.498	0.509	0.267	0.102	0.505
2009-10	0.489	0.615	0.235	0.554	0.451	0.283	0.338	0.518
2010-11	0.486	0.525	0.307	0.503	0.481	0.325	0.216	0.499
2011-12	0.407	0.518	0.335	0.154	0.626	0.354	0.281	0.475
2012-13	0.394	0.501	0.304	0.471	0.422	0.478	0.247	0.592
2013-14	0.369	0.500	0.297	0.410	0.361	0.369	0.209	0.618
2014-15	0.418	0.483	0.416	0.441	0.387	0.319	0.355	0.608
2015-16	0.409	0.550	0.446	0.464	0.511	0.413	0.367	0.620
2016-17	0.449	0.585	0.407	0.486	0.452	0.356	0.373	0.758
2017-18	0.569	0.652	0.356	0.477	0.366	0.475	0.372	0.677
2018-19	-0.198	0.630	0.382	0.464	0.415	0.315	0.462	0.857
2019-20	0.457	0.574	0.367	0.307	0.295	0.282	0.453	0.639
Mean	**0.399**	**0.567**	**0.338**	**0.436**	**0.440**	**0.353**	**0.315**	**0.614**
SD	**0.197**	**0.064**	**0.072**	**0.107**	**0.087**	**0.071**	**0.106**	**0.112**
Mean %	**39.89**	**56.69**	**33.83**	**43.59**	**43.96**	**35.28**	**31.46**	**61.40**

Source: Author's computation.

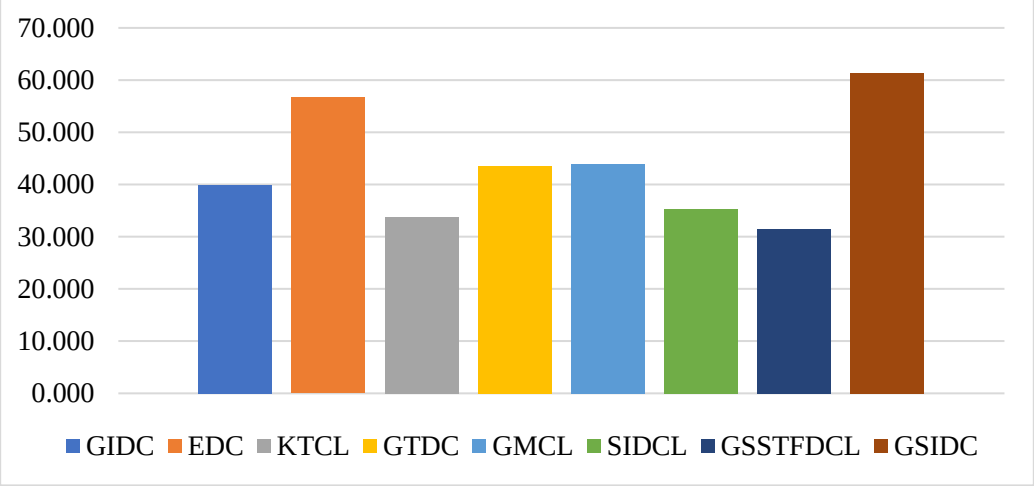

Figure 6.16: Overall Average Performance

Table 6.27 presents the overall performance score of the state enterprises based on scores of all the parameters taken together. Based on the average overall

performance score, GSIDC ranks first, second being EDC followed by GMCL and GTDC.

6.5 Final Ratings

Based on the overall performance scores as shown in table 6.27, the enterprises under study are rated using the system of aggregate rating adopted from the MOU rating score of DPE for public sector enterprises.

Table 6.28: Ratings of the enterprises based on aggregate scores

Aggregated score (percentage)	Rating	SLPEs
90-100	Excellent	--
70-90	Very Good	--
50-70	Good	GSIDC, EDC
33-50	Fair	GIDC, GTDC, KTCL GMCL, SIDCL
0-33	Poor	GSSTFDCL

Source: MOU ratings, Department of Public Enterprises

Table 6.28 shows the ratings of the enterprises, wherein only two enterprises EDC and GSIDC are rated as "Good" as their overall average score is above 50 per cent. GIDC, KTCL, GTDC, GMCL, and SIDCL are rated "Fair" as their performance scores are between 33-50 per cent. GSSTFDCL having its overall performance score below 33 is rated as "Poor" in terms of its performance.

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Chapter Seven
Relative Performance Evaluation

7.1 Relative Performance Evaluation

Relative performance evaluation also commonly termed as comparative performance evaluation refers to the evaluation of a firm's performance relative to a peer's performance. Relative performance evaluation of enterprises requires ranking the individual enterprise based on the absolute values of their performance parameters. In order to set the right priorities for the future, it is essential to know where the enterprise has been and where it is going. Thus, relative performance evaluation usually aims at ranking among a group of units and helps to determine the scope for improvement in performance. It reflects on how well an enterprise is performing in comparison with other enterprises in the group. In such comparative analysis, when multiple criteria are involved, it is useful to derive a single measure that expressively differentiates the items in the group (Terry, 1963). As performance evaluation plays an important role in the development of the performance of individual enterprises, comparative performance evaluation is equally important as rankings offer scope for improvement of performance. In this chapter, a methodology for relative performance analysis is presented and illustrated with a notional example.

7.2 Methodology

This study on performance evaluation of public sector enterprises is extended by integrating two MCDM techniques - AHP and VIKOR to present a methodology for relative performance evaluation of enterprises in the public sector using the same performance indicators identified in chapter four and with the same weights generated with AHP. For the application of the VIKOR method, the related data of the same select state-level public sector enterprises is used in a modified form. The modification to the data is required because of the problems with accounting-based financial ratios in statistical analysis such as non-normal distribution for many ratios, the ratio "blow-up phenomenon, the outliers, the non-linear relationship among the ratios, difficulty in interpreting and using the negative ratios within the distribution, etc., (Lev & Sunder, 1979). Thus, the difficulties associated with the ratios can be mitigated with the simple transformation of ratios. Ratio transformation is done by replacing each observation

with its respective rank within the sample. This methodology has been successfully applied in competitive analysis and proves to be less biased than the untransformed ratios. The transformation of ratios to rank makes data easier to analyse and interpret. Thus, the use of relative rank transformation of the ratios provides a conceptual and methodological solution to many problems associated with the use of ratios (Kane & Meade, 1998). The study introduces a novel method of ratio transformation based on ranking the absolute values of the performance parameters of observed units according to their level of superiority. The ranks are then converted into scores by adopting the scoring technique suggested by Garrett. The calculated scores are used as input data for VIKOR analysis in the normalised decision matrix.

7.3 VIKOR Analysis

The analytical results presented here in this section include:

a. Ratio transformation to Garrett scores
b. Normalised decision matrix
c. Rating best and worst scores
d. Weights for the parameters
e. Distance for each alternative (S_{ij})
f. Utility measure (S_i), Regret measure (R_i) and VIKOR Index (Q_i)
g. Ranking of enterprises based on the VIKOR Index (Q_i) in descending order (The alternative having the smallest VIKOR value is determined to be the best alternative).

7.3.1 Ratio Transformation to Garrett scores

Tables 7.1 to 7.4 show the transformation of actual ratio data into Garrett scores for all the fifteen parameters into four categories: financial performance, physical performance, contribution to the economy and contribution to society. These scores are used for preparing the normalised matrix for VIKOR analysis.

Table 7.1: Garrett Score- Financial Performance

2008-09												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	3.32	2	18.75	68	0.77	7	81.250	33	0.807	5	56.250	47
EDC	10.163	1	6.25	80	2.004	4	43.750	54	1.000	6	68.750	41
KTCL	(57.540)	8	93.75	21	0.179	8	93.750	21	2.850	8	93.750	21
GTDC	(4.104)	6	68.75	41	2.870	3	31.250	60	0.760	3	31.250	60
GMCL	(7.54)	7	81.25	33	1.432	5	56.250	47	0.372	2	18.750	68
SIDCGL	0.85	3	31.25	60	1.217	6	68.750	41	1.523	7	81.250	33
GSSTFDCL	(0.53)	5	56.25	47	6.534	1	6.250	80	0.167	1	6.250	80
GSIDCL	0.50	4	43.75	54	4.592	2	18.750	68	0.803	4	43.750	54
2009-10												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	1.31	3	31.25	60	0.70	7	81.25	33	0.80	4	43.75	54
EDC	10.62	1	6.25	80	1.98	4	43.75	54	0.83	6	68.75	41
KTCL	(45.42)	8	93.75	21	0.23	8	93.75	21	2.84	8	93.75	21
GTDC	1.06	4	43.75	54	3.13	3	31.25	60	0.76	3	31.25	60
GMCL	(7.20)	7	81.25	33	1.34	5	56.25	47	0.44	2	18.75	68
SIDCGL	2.68	2	18.75	68	1.11	6	68.75	41	1.67	7	81.25	33
GSSTFDCL	(1.23)	6	68.75	41	23.12	1	6.25	80	0.19	1	6.25	80
GSIDCL	0.55	5	56.25	47	3.81	2	18.75	68	0.81	5	56.25	47
2010-11												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	(0.60)	7	81.25	33	0.69	7	81.250	33	0.78	3	31.25	60
EDC	4.27	1	6.25	80	1.81	5	56.250	47	1.15	7	81.25	33

KTCL	(30.55)	8	93.75	21	0.38	8	93.750	21	1.97	8	93.75	21
GTDC	0.96	4	43.75	54	2.38	3	31.250	60	0.79	4	43.75	54
GMCL	2.02	3	31.25	60	1.11	6	68.750	41	0.43	2	18.75	68
SIDCGL	3.28	2	18.75	68	23.63	1	6.250	80	0.86	6	68.75	41
GSSTFDCL	0.57	6	68.75	41	10.62	2	18.750	68	0.09	1	6.25	80
GSIDCL	0.92	5	56.25	47	2.22	4	43.750	54	0.82	5	56.25	47
2011-12												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	(0.89)	6	68.75	41	0.64	7	81.250	33	0.79	5	56.250	47
EDC	3.69	2	18.75	68	1.52	3	31.250	60	0.49	2	18.750	68
KTCL	(34.27)	8	93.75	21	0.28	8	93.750	21	2.41	8	93.750	21
GTDC	(25.45)	7	81.25	33	1.13	5	56.250	47	0.75	4	43.750	54
GMCL	6.65	1	6.25	80	1.02	6	68.750	41	0.50	3	31.250	60
SIDCGL	2.12	3	31.25	60	8.58	2	18.750	68	0.86	6	68.750	41
GSSTFDCL	0.76	4	43.75	54	16.35	1	6.250	80	0.05	1	6.250	80
GSIDCL	0.61	5	56.25	47	1.27	4	43.750	54	0.95	7	81.250	33
2012-13												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	(0.82)	6	68.75	41	0.66	7	81.25	33	1.50	7	81.25	33
EDC	6.01	1	6.25	80	0.90	5	56.25	47	0.40	2	18.75	68
KTCL	(21.70)	8	93.75	21	0.15	8	93.75	21	1.99	8	93.75	21
GTDC	1.64	3	31.25	60	1.23	4	43.75	54	0.75	4	43.75	54
GMCL	(14.55)	7	81.25	33	0.80	6	68.75	41	0.65	3	31.25	60
SIDCGL	3.84	2	18.75	68	6.24	1	6.25	80	0.82	5	56.25	47
GSSTFDCL	0.11	5	56.25	47	1.42	3	31.25	60	0.28	1	6.25	80
GSIDCL	0.38	4	43.75	54	1.43	2	18.75	68	0.96	6	68.75	41

2013-14												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.003	6	68.75	41	0.75	6	68.75	41	1.38	8	93.75	21
EDC	3.92	2	18.75	68	0.70	7	81.25	33	0.485	1	6.25	80
KTCL	(32.13)	8	93.75	21	0.43	8	93.75	21	0.945	5	56.25	47
GTDC	2.03	3	31.25	60	1.12	5	56.25	47	0.86	4	43.75	54
GMCL	(9.68)	7	81.25	33	1.34	4	43.75	54	0.75	3	31.25	60
SIDCGL	5.17	1	6.25	80	1.68	2	18.75	68	1.00	7	81.25	33
GSSTFDCL	1.87	4	43.75	54	2.19	1	6.25	80	0.489	2	18.75	68
GSIDCL	1.43	5	56.25	47	1.55	3	31.25	60	0.954	6	68.75	41
2014-15												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.15	7	81.25	33	0.78	6	68.75	41	0.77	4	43.75	54
EDC	4.69	2	18.75	68	0.67	7	81.25	33	0.47	2	18.75	68
KTCL	22.59	1	6.25	80	0.59	8	93.75	21	0.90	6	68.75	41
GTDC	1.69	4	43.75	54	1.17	5	56.25	47	0.88	5	56.25	47
GMCL	(0.97)	8	93.75	21	1.26	4	43.75	54	0.52	3	31.25	60
SIDCGL	2.23	3	31.25	60	2.44	1	6.25	80	1.03	8	93.75	21
GSSTFDCL	0.20	6	68.75	41	1.77	2	18.75	68	0.32	1	6.25	80
GSIDCL	1.18	5	56.25	47	1.74	3	31.25	60	0.96	7	81.25	33
2015-16												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.15	7	81.25	33	0.81	7	81.25	33	0.794	5	56.25	47
EDC	4.69	2	18.75	68	0.84	6	68.75	41	0.44	3	31.25	60
KTCL	22.59	1	6.25	80	0.87	5	56.25	47	0.793	4	43.75	54

GTDC	1.69	4	43.75	54	1.14	4	43.75	54	0.93	7	81.25	33
GMCL	(0.97)	8	93.75	21	1.63	2	18.75	68	0.18	1	6.25	80
SIDCGL	2.23	3	31.25	60	0.62	8	93.75	21	0.88	6	68.75	41
GSSTFDCL	0.20	6	68.75	41	1.60	3	31.25	60	0.36	2	18.75	68
GSIDCL	1.18	5	56.25	47	2.22	1	6.25	80	0.96	8	93.75	21
2016-17												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	(1.01)	6	68.75	41	0.76	6	68.75	41	0.82	6	68.75	41
EDC	5.50	1	6.25	80	0.87	5	56.25	47	0.39	2	18.75	68
KTCL	(3.92)	8	93.75	21	0.50	8	93.75	21	0.78	5	56.25	47
GTDC	2.29	2	18.75	68	2.12	2	18.75	68	0.54	3	31.25	60
GMCL	(2.44)	7	81.25	33	0.88	4	43.75	54	0.60	4	43.75	54
SIDCGL	0.25	5	56.25	47	0.64	7	81.25	33	1.66	8	93.75	21
GSSTFDCL	1.49	3	31.25	60	1.63	3	31.25	60	0.38	1	6.25	80
GSIDCL	0.46	4	43.75	54	2.96	1	6.25	80	0.97	7	81.25	33
2017-18												
SLPE	**Profitability (ROA)**	**Rank**	**Percent position**	**Garrett score**	**Liquidity**	**Rank**	**Percent position**	**Garrett score**	**Solvency**	**Rank**	**Percent position**	**Garrett score**
GIDC	1.19	2	18.75	68	0.76	5	56.25	47	0.82	6	68.75	41
EDC	6.17	1	6.25	80	0.58	6	68.75	41	0.44	2	18.75	68
KTCL	(11.70)	8	93.75	21	0.35	7	81.25	33	0.67	5	56.25	47
GTDC	0.81	4	43.75	54	1.58	3	31.25	60	0.65	4	43.75	54
GMCL	(3.88)	7	81.25	33	0.99	4	43.75	54	0.53	3	31.25	60
SIDCGL	1.06	3	31.25	60	0.26	8	93.75	21	1.10	8	93.75	21
GSSTFDCL	0.44	6	68.75	41	2.06	2	18.75	68	0.32	1	6.25	80
GSIDCL	0.46	5	56.25	47	2.28	1	6.25	80	0.97	7	81.25	33
2018-19												

SLPE	Profitability (ROA)	Rank	Percent position	Garrett score	Liquidity	Rank	Percent position	Garrett score	Solvency	Rank	Percent position	Garrett score
GIDC	(18.45)	7	81.25	33	0.62	7	81.25	33	1.01	8	93.75	21
EDC	3.77	1	6.25	80	0.70	5	56.25	47	0.39	2	18.75	68
KTCL	(25.91)	8	93.75	21	0.67	6	68.75	41	0.72	4	43.75	54
GTDC	1.22	3	31.25	60	1.22	3	31.25	60	0.84	6	68.75	41
GMCL	(1.55)	6	68.75	41	1.09	4	43.75	54	0.43	3	31.25	60
SIDCGL	(0.44)	5	56.25	47	0.27	8	93.75	21	0.81	5	56.25	47
GSSTFDCL	2.56	2	18.75	68	2.07	2	18.75	68	0.33	1	6.25	80
GSIDCL	0.16	4	43.75	54	2.40	1	6.25	80	0.97	7	81.25	33
2019-20												
SLPE	Profitability (ROA)	Rank	Percent position	Garrett score	Liquidity	Rank	Percent position	Garrett score	Solvency	Rank	Percent position	Garrett score
GIDC	(5.62)	5	56.25	47	0.64	6	68.75	41	1.05	8	93.75	21
EDC	4.69	1	6.25	80	0.48	7	81.25	33	0.32	2	18.75	68
KTCL	(16.03)	8	93.75	21	0.66	5	56.25	47	0.801	6	68.75	41
GTDC	(7.06)	7	81.25	33	1.18	3	31.25	60	0.798	5	56.25	47
GMCL	(5.70)	6	68.75	41	0.84	4	43.75	54	0.61	4	43.75	54
SIDCGL	(0.91)	4	43.75	54	0.34	8	93.75	21	0.27	1	6.25	80
GSSTFDCL	0.87	2	18.75	68	1.75	2	18.75	68	0.35	3	31.25	60
GSIDCL	0.17	3	31.25	60	1.93	1	6.25	80	0.97	7	81.25	33

Source: Author's computation

As seen in table 7.1, the financial performance ratios of profitability, liquidity and solvency of the select enterprises are first ranked, then the percent position is calculated and the percent position is converted into Garrett scores.

Table 7.2: Garrett Score- Physical Performance

2008-09												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	100.00	1	6.25	80	0.000359	5	56.25	47	0.56	3	31.25	60
EDC	100.00	1	6.25	80	0.001570	3	31.25	60	0.32	1	6.25	80
KTCL	100.00	1	6.25	80	0.001884	2	18.75	68	1.02	5	56.25	47
GTDC	100.00	1	6.25	80	0.000632	4	43.75	54	1.09	6	68.75	41
GMCL	100.00	1	6.25	80	0.000004	7	81.25	33	1.38	8	93.75	21
SIDCGL	100.00	1	6.25	80	0.000000	8	93.75	21	0.37	2	18.75	68
GSSTFDCL	100.00	1	6.25	80	0.000008	6	68.75	41	1.14	7	81.25	33
GSIDCL	100.00	1	6.25	80	0.007641	1	6.25	80	0.887	4	43.75	54
2009-10												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	299.40	1	6.25	80	0.000281	5	56.25	47	0.75	3	31.25	60
EDC	160.55	4	43.75	54	0.001458	3	31.25	60	0.24	1	6.25	80
KTCL	104.40	6	68.75	41	0.001735	2	18.75	68	0.88	4	43.75	54
GTDC	177.04	3	31.25	60	0.000613	4	43.75	54	0.97	6	68.75	41
GMCL	119.97	5	56.25	47	0.000004	8	93.75	21	1.13	7	81.25	33
SIDCGL	0.00	8	93.75	21	0.000013	6	68.75	41	0.30	2	18.75	68
GSSTFDCL	183.02	2	18.75	68	0.000010	7	81.25	33	1.35	8	93.75	21
GSIDCL	37.81	7	81.25	33	0.005589	1	6.25	80	0.867	5	56.25	47
2010-11												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**

GIDC	228.67	4	43.75	54	0.000288	5	56.25	47	1.12	8	93.75	21
EDC	234.56	3	31.25	60	0.001181	3	31.25	60	0.41	1	6.25	80
KTCL	100.69	7	81.25	33	0.001699	2	18.75	68	0.88	4	43.75	54
GTDC	162.15	5	56.25	47	0.000603	4	43.75	54	0.98	7	81.25	33
GMCL	142.56	6	68.75	41	0.000004	8	93.75	21	0.95	6	68.75	41
SIDCGL	480.58	2	18.75	68	0.000007	7	81.25	33	0.43	2	18.75	68
GSSTFDCL	507.55	1	6.25	80	0.000015	6	68.75	41	0.82	3	31.25	60
GSIDCL	32.16	8	93.75	21	0.005530	1	6.25	80	0.896	5	56.25	47
2011-12												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	130.46	6	68.75	41	0.00013	5	56.25	47	1.17	6	68.75	41
EDC	202.14	3	31.25	60	0.00126	3	31.25	60	0.36	2	18.75	68
KTCL	96.52	7	81.25	33	0.00141	2	18.75	68	1.24	7	81.25	33
GTDC	169.40	4	43.75	54	0.00055	4	43.75	54	1.25	8	93.75	21
GMCL	166.49	5	56.25	47	0.00000	8	93.75	21	0.76	4	43.75	54
SIDCGL	1970.98	1	6.25	80	0.00002	6	68.75	41	0.29	1	6.25	80
GSSTFDCL	512.58	2	18.75	68	0.00001	7	81.25	33	0.67	3	31.25	60
GSIDCL	77.83	8	93.75	21	0.00449	1	6.25	80	0.94	5	56.25	47
2012-13												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	181.32	2	18.75	68	0.000206	5	56.25	47	1.00	7	81.25	33
EDC	102.75	5	56.25	47	0.001511	2	18.75	68	0.21	2	18.75	68
KTCL	90.86	6	68.75	41	0.001362	3	31.25	60	0.75	3	31.25	60
GTDC	166.95	3	31.25	60	0.000556	4	43.75	54	0.99	6	68.75	41

GMCL	150.80	4	43.75	54	0.000004	8	93.75	21	1.42	8	93.75	21
SIDCGL	1,635.07	1	6.25	80	0.000024	6	68.75	41	0.19	1	6.25	80
GSSTFDCL	6.29	8	93.75	21	0.000023	7	81.25	33	0.93	4	43.75	54
GSIDCL	89.13	7	81.25	33	0.005882	1	6.25	80	0.945	5	56.25	47
2013-14												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	56.31	7	81.25	33	0.000266	5	56.25	47	1.00	7	81.25	33
EDC	141.59	4	43.75	54	0.001709	2	18.75	68	0.26	1	6.25	80
KTCL	102.57	5	56.25	47	0.001370	3	31.25	60	0.73	3	31.25	60
GTDC	158.49	3	31.25	60	0.000516	4	43.75	54	0.98	6	68.75	41
GMCL	8.77	8	93.75	21	0.000000	8	93.75	21	1.22	8	93.75	21
SIDCGL	2,359.71	1	6.25	80	0.000042	6	68.75	41	0.42	2	18.75	68
GSSTFDCL	77.99	6	68.75	41	0.000013	7	81.25	33	0.75	4	43.75	54
GSIDCL	290.44	2	18.75	68	0.006338	1	6.25	80	0.911	5	56.25	47
2014-15												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	36.67	7	81.25	33	0.000219	5	56.25	47	0.98	6	68.75	41
EDC	96.64	6	68.75	41	0.001572	2	18.75	68	0.22	1	6.25	80
KTCL	108.08	5	56.25	47	0.001506	3	31.25	60	0.38	2	18.75	68
GTDC	194.82	3	31.25	60	0.000577	4	43.75	54	1.01	7	81.25	33
GMCL	0.00	8	93.75	21	0.000000	8	93.75	21	1.03	8	93.75	21
SIDCGL	2,769.94	1	6.25	80	0.000045	6	68.75	41	0.51	3	31.25	60
GSSTFDCL	279.87	2	18.75	68	0.000015	7	81.25	33	0.93	5	56.25	47
GSIDCL	112.26	4	43.75	54	0.010008	1	6.25	80	0.922	4	43.75	54

2015-16												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	27.07	7	81.25	33	0.000224	5	56.25	47	1.07	7	81.25	33
EDC	108.87	4	43.75	54	0.001529	2	18.75	68	0.24	1	6.25	80
KTCL	108.70	5	56.25	47	0.001347	3	31.25	60	0.41	2	18.75	68
GTDC	197.75	3	31.25	60	0.000515	4	43.75	54	1.12	8	93.75	21
GMCL	4.88	8	93.75	21	0.000000	8	93.75	21	0.91	5	56.25	47
SIDCGL	10,542.17	1	6.25	80	0.000067	6	68.75	41	0.58	3	31.25	60
GSSTFDCL	217.61	2	18.75	68	0.000014	7	81.25	33	0.99	6	68.75	41
GSIDCL	91.73	6	68.75	41	0.008574	1	6.25	80	0.901	4	43.75	54
2016-17												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	88.32	7	81.25	33	0.000482	5	56.25	47	0.24	2	18.75	68
EDC	132.72	4	43.75	54	0.001586	2	18.75	68	0.17	1	6.25	80
KTCL	105.17	6	68.75	41	0.001108	3	31.25	60	0.44	3	31.25	60
GTDC	191.92	2	18.75	68	0.000490	4	43.75	54	1.10	8	93.75	21
GMCL	48.83	8	93.75	21	0.000003	8	93.75	21	1.03	7	81.25	33
SIDCGL	5,055.11	1	6.25	80	0.000056	6	68.75	41	0.63	5	56.25	47
GSSTFDCL	107.55	5	56.25	47	0.000011	7	81.25	33	0.61	4	43.75	54
GSIDCL	168.59	3	31.25	60	0.008193	1	6.25	80	0.868	6	68.75	41

2017-18												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	159.81	3	31.25	60	0.000538	4	43.75	54	0.19	2	18.75	68
EDC	111.93	4	43.75	54	0.001635	2	18.75	68	0.15	1	6.25	80
KTCL	108.03	5	56.25	47	0.001031	3	31.25	60	0.49	4	43.75	54
GTDC	206.76	2	18.75	68	0.000480	5	56.25	47	0.96	7	81.25	33
GMCL	36.29	8	93.75	21	0.000002	8	93.75	21	1.14	8	93.75	21
SIDCGL	1,152.61	1	6.25	80	0.000120	6	68.75	41	0.44	3	31.25	60
GSSTFDCL	71.07	7	81.25	33	0.000009	7	81.25	33	0.89	6	68.75	41
GSIDCL	98.94	6	68.75	41	0.009672	1	6.25	80	0.868	5	56.25	47
2018-19												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**
GIDC	156.63	3	31.25	60	0.001851	2	18.75	68	0.26	2	18.75	68
EDC	164.83	1	6.25	80	0.001285	3	31.25	60	0.24	1	6.25	80
KTCL	121.53	5	56.25	47	0.001079	4	43.75	54	0.53	4	43.75	54
GTDC	37.30	7	81.25	33	0.000405	5	56.25	47	0.96	6	68.75	41
GMCL	1.18	8	93.75	21	0.000000	8	93.75	21	1.01	7	81.25	33
SIDCGL	164.51	2	18.75	68	0.000047	6	68.75	41	1.31	8	93.75	21
GSSTFDCL	111.95	6	68.75	41	0.000008	7	81.25	33	0.50	3	31.25	60
GSIDCL	126.57	4	43.75	54	0.006864	1	6.25	80	0.832	5	56.25	47
2019-20												
SLPE	**Output**	**Rank**	**Percent position**	**Garrett score**	**Impact**	**Rank**	**Percent position**	**Garrett score**	**Efficiency**	**Rank**	**Percent position**	**Garrett score**

GIDC	143.79	3	31.25	60	0.000717	4	43.75	54	0.65	3	31.25	60
EDC	141.90	4	43.75	54	0.001176	2	18.75	68	0.27	1	6.25	80
KTCL	113.73	5	56.25	47	0.001076	3	31.25	60	0.48	2	18.75	68
GTDC	33.09	7	81.25	33	0.000414	5	56.25	47	1.21	7	81.25	33
GMCL	0.83	8	93.75	21	0.000000	8	93.75	21	1.07	6	68.75	41
SIDCGL	510.65	1	6.25	80	0.000026	6	68.75	41	1.98	8	93.75	21
GSSTFDCL	208.81	2	18.75	68	0.000009	7	81.25	33	0.81	4	43.75	54
GSIDCL	83.21	6	68.75	41	0.007225	1	6.25	80	0.868	5	56.25	47

Source: Author's computation

Table 7.2 presents the physical performance ratios viz., output, impact and efficiency of operation are converted into Garrett scores.

Table 7.3: Garrett Score - Contribution to Economy

2008-09																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	1.14	3	31.25	60	0.008	5	56.25	47	100.00	1	6.25	80	1.09	3	31.25	60
EDC	0.51	4	43.75	54	0.07	3	31.25	60	100.00	1	6.25	80	0.73	4	43.75	54
KTCL	(1.05)	8	93.75	21	(0.09)	8	93.75	21	100.00	1	6.25	80	(0.70)	8	93.75	21
GTDC	0.002	6	68.75	41	0.08	2	18.75	68	100.00	1	6.25	80	0.22	5	56.25	47
GMCL	2.27	1	6.25	80	0.007	6	68.75	41	100.00	1	6.25	80	4.01	2	18.75	68
SIDCGL	0.03	5	56.25	47	0.02	4	43.75	54	100.00	1	6.25	80	0.03	6	68.75	41
GSSTFDCL	(0.13)	7	81.25	33	0.00	7	81.25	33	100.00	1	6.25	80	-0.11	7	81.25	33
GSIDCL	1.63	2	18.75	68	0.26	1	6.25	80	100.00	1	6.25	80	9.06	1	6.25	80

2009-10																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.90	3	31.25	60	0.0095	4	43.75	54	98.74	5	56.25	47	0.80	4	43.75	54
EDC	0.71	4	43.75	54	0.09	2	18.75	68	97.85	7	81.25	33	0.90	3	31.25	60
KTCL	(1.08)	8	93.75	21	(0.18)	8	93.75	21	106.30	2	18.75	68	(0.63)	8	93.75	21
GTDC	0.01	6	68.75	41	0.03	3	31.25	60	101.39	3	31.25	60	0.24	5	56.25	47
GMCL	1.90	1	6.25	80	0.0091	5	56.25	47	98.63	6	68.75	41	3.80	2	18.75	68
SIDCGL	0.04	5	56.25	47	0.0087	6	68.75	41	100.00	4	43.75	54	0.04	6	68.75	41
GSSTFDCL	(0.09)	7	81.25	33	0.00	7	81.25	33	75.00	8	93.75	21	(0.07)	7	81.25	33
GSIDCL	1.46	2	18.75	68	0.19	1	6.25	80	130.51	1	6.25	80	7.78	1	6.25	80
2010-11																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.44	4	43.75	54	0.011	5	56.25	47	96.85	6	68.75	41	0.22	5	56.25	47
EDC	0.81	3	31.25	60	0.10	3	31.25	60	97.85	5	56.25	47	1.02	3	31.25	60
KTCL	(1.24)	8	93.75	21	(0.22)	8	93.75	21	104.00	2	18.75	68	(0.66)	8	93.75	21
GTDC	0.02	6	68.75	41	0.02	4	43.75	54	98.34	4	43.75	54	0.36	4	43.75	54
GMCL	2.04	1	6.25	80	0.12	2	18.75	68	95.89	7	81.25	33	3.90	2	18.75	68
SIDCGL	0.03	5	56.25	47	0.009	6	68.75	41	100.00	3	31.25	60	0.04	6	68.75	41
GSSTFDCL	(0.05)	7	81.25	33	0.00	7	81.25	33	50.00	8	93.75	21	(0.04)	7	81.25	33
GSIDCL	1.98	2	18.75	68	0.34	1	6.25	80	125.42	1	6.25	80	7.42	1	6.25	80
2011-12																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.39	4	43.75	54	0.08	4	43.75	54	96.85	4	43.75	54	0.26	5	56.25	47

EDC	0.95	3	31.25	60	0.09	3	31.25	60	95.70	5	56.25	47	1.21	3	31.25	60
KTCL	(1.52)	8	93.75	21	(0.30)	8	93.75	21	109.93	2	18.75	68	(0.89)	8	93.75	21
GTDC	(0.28)	7	81.25	33	0.07	5	56.25	47	93.63	6	68.75	41	0.37	4	43.75	54
GMCL	2.90	1	6.25	80	1.14	1	6.25	80	87.67	7	81.25	33	6.38	1	6.25	80
SIDCGL	0.03	5	56.25	47	0.04	6	68.75	41	100.00	3	31.25	60	0.07	6	68.75	41
GSSTFDCL	(0.02)	6	68.75	41	0.00	7	81.25	33	50.00	8	93.75	21	(0.01)	7	81.25	33
GSIDCL	2.28	2	18.75	68	0.24	2	18.75	68	130.51	1	6.25	80	5.83	2	18.75	68
2012-13																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.57	4	43.75	54	0.013	5	56.25	47	92.43	7	81.25	33	0.35	4	43.75	54
EDC	1.21	3	31.25	60	0.12	2	18.75	68	93.55	5	56.25	47	1.54	3	31.25	60
KTCL	(1.62)	8	93.75	21	(0.31)	8	93.75	21	109.02	2	18.75	68	(0.89)	8	93.75	21
GTDC	(0.24)	7	81.25	33	0.09	3	31.25	60	100.00	3	31.25	60	0.21	5	56.25	47
GMCL	2.71	1	6.25	80	0.009	6	68.75	41	93.15	6	68.75	41	5.98	2	18.75	68
SIDCGL	0.04	5	56.25	47	0.02	4	43.75	54	100.00	3	31.25	60	0.07	6	68.75	41
GSSTFDCL	(0.02)	6	68.75	41	0.00	7	81.25	33	50.00	8	93.75	21	0.00	7	81.25	33
GSIDCL	2.56	2	18.75	68	0.22	1	6.25	80	120.34	1	6.25	80	6.64	1	6.25	80
2013-14																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.65	4	43.75	54	0.014	4	43.75	54	79.81	7	81.25	33	0.48	5	56.25	47
EDC	1.40	3	31.25	60	0.17	2	18.75	68	92.47	6	68.75	41	1.88	3	31.25	60
KTCL	(1.08)	8	93.75	21	(0.38)	7	81.25	33	109.15	3	31.25	60	(0.46)	8	93.75	21
GTDC	(0.24)	7	81.25	33	(3.52)	8	93.75	21	95.84	4	43.75	54	0.33	4	43.75	54
GMCL	1.61	2	18.75	68	0.010	5	56.25	47	93.15	5	56.25	47	5.27	2	18.75	68

SIDCGL	0.04	5	56.25	47	0.02	3	31.25	60	176.92	1	6.25	80	0.06	6	68.75	41
GSSTFDCL	0.00	6	68.75	41	0.00	6	68.75	41	50.00	8	93.75	21	0.01	7	81.25	33
GSIDCL	4.07	1	6.25	80	0.37	1	6.25	80	142.37	2	18.75	68	10.70	1	6.25	80
2014-15																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.66	4	43.75	54	0.02	3	31.25	60	80.13	8	93.75	21	0.57	4	43.75	54
EDC	1.67	2	18.75	68	0.10	2	18.75	68	94.62	6	68.75	41	2.09	3	31.25	60
KTCL	(1.11)	8	93.75	21	(0.47)	7	81.25	33	104.24	4	43.75	54	(0.43)	8	93.75	21
GTDC	(0.21)	7	81.25	33	(2.95)	8	93.75	21	95.84	5	56.25	47	0.36	5	56.25	47
GMCL	1.43	3	31.25	60	0.008	4	43.75	54	89.04	7	81.25	33	5.44	2	18.75	68
SIDCGL	0.03	5	56.25	47	0.007	5	56.25	47	176.92	2	18.75	68	0.04	6	68.75	41
GSSTFDCL	0.00	6	68.75	41	0.00	6	68.75	41	375.00	1	6.25	80	0.02	7	81.25	33
GSIDCL	6.06	1	6.25	80	0.75	1	6.25	80	174.58	3	31.25	60	15.23	1	6.25	80
2015-16																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.45	4	43.75	54	0.63	2	18.75	68	83.28	8	93.75	21	1.02	4	43.75	54
EDC	2.12	3	31.25	60	0.051	4	43.75	54	93.55	5	56.25	47	2.50	3	31.25	60
KTCL	(0.97)	8	93.75	21	(0.65)	7	81.25	33	99.82	3	31.25	60	(0.25)	8	93.75	21
GTDC	(0.09)	7	81.25	33	(3.51)	8	93.75	21	91.14	6	68.75	41	0.43	5	56.25	47
GMCL	2.19	2	18.75	68	0.65	1	6.25	80	86.30	7	81.25	33	6.88	2	18.75	68
SIDCGL	0.03	5	56.25	47	0.050	5	56.25	47	176.92	2	18.75	68	0.08	6	68.75	41
GSSTFDCL	0.00	6	68.75	41	0.00	6	68.75	41	375.00	1	6.25	80	0.02	7	81.25	33
GSIDCL	7.20	1	6.25	80	0.42	3	31.25	60	174.58	3	31.25	60	19.93	1	6.25	80

2016-17																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	0.26	4	43.75	54	1.16	1	6.25	80	82.33	8	93.75	21	1.42	4	43.75	54
EDC	2.61	2	18.75	68	0.13	3	31.25	60	96.77	5	56.25	47	3.15	3	31.25	60
KTCL	(1.17)	8	93.75	21	(0.79)	7	81.25	33	97.52	4	43.75	54	(0.31)	8	93.75	21
GTDC	(0.08)	7	81.25	33	(4.06)	8	93.75	21	86.15	6	68.75	41	0.57	5	56.25	47
GMCL	1.92	3	31.25	60	0.02	5	56.25	47	83.56	7	81.25	33	10.79	2	18.75	68
SIDCGL	0.01	6	68.75	41	0.04	4	43.75	54	238.46	2	18.75	68	0.05	6	68.75	41
GSSTFDCL	0.03	5	56.25	47	0.00	6	68.75	41	350.00	1	6.25	80	0.04	7	81.25	33
GSIDCL	6.96	1	6.25	80	0.77	2	18.75	68	162.71	3	31.25	60	25.77	1	6.25	80
2017-18																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	1.05	4	43.75	54	1.97	1	6.25	80	74.76	8	93.75	21	3.03	4	43.75	54
EDC	2.72	2	18.75	68	0.35	3	31.25	60	92.47	5	56.25	47	3.53	3	31.25	60
KTCL	(1.17)	8	93.75	21	(0.76)	7	81.25	33	93.34	4	43.75	54	(0.33)	8	93.75	21
GTDC	(0.05)	7	81.25	33	(3.83)	8	93.75	21	81.72	6	68.75	41	0.52	5	56.25	47
GMCL	1.25	3	31.25	60	0.02	5	56.25	47	80.82	7	81.25	33	6.47	2	18.75	68
SIDCGL	0.03	6	68.75	41	0.05	4	43.75	54	461.54	1	6.25	80	0.08	6	68.75	41
GSSTFDCL	0.04	5	56.25	47	0.00	6	68.75	41	325.00	2	18.75	68	0.05	7	81.25	33
GSIDCL	8.35	1	6.25	80	0.86	2	18.75	68	161.02	3	31.25	60	32.91	1	6.25	80
2018-19																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	(6.40)	8	93.75	21	3.73	1	6.25	80	74.45	8	93.75	21	(2.83)	8	93.75	21

EDC	2.95	2	18.75	68	0.19	4	43.75	54	88.17	5	56.25	47	3.57	3	31.25	60
KTCL	(1.12)	7	81.25	33	(0.77)	7	81.25	33	98.85	4	43.75	54	(0.26)	7	81.25	33
GTDC	0.00	5	56.25	47	(1.62)	8	93.75	21	76.73	6	68.75	41	0.63	4	43.75	54
GMCL	1.00	3	31.25	60	0.93	2	18.75	68	76.71	7	81.25	33	6.68	2	18.75	68
SIDCGL	(0.01)	6	68.75	41	0.04	5	56.25	47	453.85	1	6.25	80	0.05	6	68.75	41
GSSTFDCL	0.07	4	43.75	54	0.00	6	68.75	41	325.00	2	18.75	68	0.09	5	56.25	47
GSIDCL	8.94	1	6.25	80	0.35	3	31.25	60	150.85	3	31.25	60	34.52	1	6.25	80
2019-20																
SLPE	**IRG**	**Rank**	**Percent position**	**Garrett score**	**CE**	**Rank**	**Percent position**	**Garrett score**	**EG**	**Rank**	**Percent position**	**Garrett score**	**VA**	**Rank**	**Percent position**	**Garrett score**
GIDC	(0.85)	7	81.25	33	2.03	1	6.25	80	67.19	8	93.75	21	1.57	4	43.75	54
EDC	3.16	2	18.75	68	0.20	3	31.25	60	82.80	5	56.25	47	3.71	3	31.25	60
KTCL	(1.28)	8	93.75	21	(0.89)	7	81.25	33	104.60	4	43.75	54	(0.44)	8	93.75	21
GTDC	(0.36)	6	68.75	41	(1.36)	8	93.75	21	73.41	7	81.25	33	0.60	5	56.25	47
GMCL	0.27	3	31.25	60	0.06	4	43.75	54	75.34	6	68.75	41	8.11	2	18.75	68
SIDCGL	(0.02)	5	56.25	47	0.02	5	56.25	47	453.85	1	6.25	80	0.03	7	81.25	33
GSSTFDCL	0.09	4	43.75	54	0.00	6	68.75	41	325.00	2	18.75	68	0.11	6	68.75	41
GSIDCL	9.51	1	6.25	80	0.39	2	18.75	68	186.44	3	31.25	60	31.95	1	6.25	80

Source: Author's computation

(* IRG= Internal resource generation, CE= Contribution to exchequer, EG=Employment generation, VA = Value addition)

Table 7.3 shows the ratios reflecting contribution to economy i.e., internal resource generation, contribution to exchequer, employment generation and value addition are converted into Garrett scores to normalise the data for VIKOR analysis.

Table 7.4: Garrett Score - Contribution to Society

2008-09																			
SLPE	R&D	Rank	PP	GS	C. En	Rank	PP	GS	CW	Rank	PP	GS	HRD	Rank	PP	GS	CG	Rank	PP	GS
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.133	2	18.75	68	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.054	2	18.75	68	0.081	4	43.75	54	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.158	1	6.25	80	0.055	5	56.25	47	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.054	6	68.75	41	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.297	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.047	7	81.25	33	4.00	1	6.25	80
GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.118	3	31.25	60	4.00	1	6.25	80
GSIDCL	0.000	1	6.25	80	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2009-10																				
SLPE	R&D	Rank	PP	GS	C. En	Rank	PP	GS	CW	Rank	PP	GS	HRD	Rank	PP	GS	CG	Rank	PP	GS
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.089	3	31.25	60	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.034	2	18.75	68	0.061	4	43.75	54	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.191	1	6.25	80	0.042	6	68.75	41	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.060	5	56.25	47	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.206	1	6.25	80	2.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.019	7	81.25	33	4.00	1	6.25	80
GSSTFDC	0.012	1	6.25	80	0.000	0	0	0	0.038	0	0	0	0.134	2	18.75	68	4.00	1	6.25	80
GSIDCL	0.001	2	18.8	68	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2010-11																				
SLPE	R&D	Rank	PP	GS	C. En	Rank	PP	GS	CW	Rank	PP	GS	HRD	Rank	PP	GS	CG	Rank	PP	GS
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.221	1	6.25	80	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.014	2	18.75	68	0.055	5	56.25	47	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.207	1	6.25	80	0.091	3	31.25	60	4.00	1	6.25	80

GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.035	6	68.75	41	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.117	2	18.75	68	3.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.018	7	81.25	33	4.00	1	6.25	80
GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.056	4	43.75	54	4.00	1	6.25	80
GSIDCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2011-12																				
SLPE	**R&D**	**Rank**	**PP**	**GS**	**C. En**	**Rank**	**PP**	**GS**	**CW**	**Rank**	**PP**	**GS**	**HRD**	**Rank**	**PP**	**GS**	**CG**	**Rank**	**PP**	**GS**
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.119	2	18.75	68	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.017	2	18.75	68	0.039	5	56.25	47	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.409	1	6.25	80	0.119	3	31.25	60	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.049	4	43.75	54	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.239	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.021	7	81.25	33	4.00	1	6.25	80
GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.027	6	68.75	41	4.00	1	6.25	80
GSIDCL	0.006	1	6.25	80	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2012-13																				
SLPE	**R&D**	**Rank**	**PP**	**GS**	**C. En**	**Rank**	**PP**	**GS**	**CW**	**Rank**	**PP**	**GS**	**HRD**	**Rank**	**PP**	**GS**	**CG**	**Rank**	**PP**	**GS**
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.106	4	43.75	54	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.010	2	18.75	68	0.031	7	81.25	33	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.380	1	6.25	80	0.084	5	56.25	47	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.047	6	68.75	41	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.217	1	6.25	80	2.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.139	2	18.75	68	4.00	1	6.25	80
GSSTFDC	0.001	2	18.8	68	0.000	0	0	0	0.000	0	0	0	0.124	3	31.25	60	4.00	1	6.25	80
GSIDCL	0.002	1	6.25	80	0.000	0	0	0	0.000	0	0	0	0.002	8	93.75	21	4.00	1	6.25	80
2013-14																				

SLPE	R&D	Rank	PP	GS	C. En	Rank	PP	GS	CW	Rank	PP	GS	HRD	Rank	PP	GS	CG	Rank	PP	GS
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.077	2	18.75	68	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.014	2	18.75	68	0.024	6	68.75	41	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.293	1	6.25	80	0.020	7	81.25	33	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.051	3	31.25	60	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.186	1	6.25	80	2.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.038	4	43.75	54	4.00	1	6.25	80
GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.035	5	56.25	47	4.00	1	6.25	80
GSIDCL	0.001	1	6.25	80	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2014-15																				
SLPE	R&D	Rank	PP	GS	C. En	Rank	PP	GS	CW	Rank	PP	GS	HRD	Rank	PP	GS	CG	Rank	PP	GS
GIDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.120	2	18.75	68	4.00	1	6.25	80
EDC	0.0000	0	0	0	0.000	0	0	0	0.013	2	18.75	68	0.014	7	81.25	33	4.00	1	6.25	80
KTCL	0.0000	0	0	0	0.000	0	0	0	0.325	1	6.25	80	0.026	6	68.75	41	4.00	1	6.25	80
GTDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.054	4	43.75	54	4.00	1	6.25	80
GMCL	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.128	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.050	5	56.25	47	4.00	1	6.25	80
GSSTFDC	0.0006	1	6.25	80	0.000	0	0	0	0.000	0	0	0	0.063	3	31.25	60	4.00	1	6.25	80
GSIDCL	0.0001	2	18.8	68	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2015-16																				
SLPE	R&D	Rank	PP	GS	C. En	Rank	PP	GS	CW	Rank	PP	GS	HRD	Rank	PP	GS	CG	Rank	PP	GS
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.096	2	18.75	68	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.015	3	31.25	60	0.043	5	56.25	47	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.432	2	18.75	68	0.027	7	81.25	33	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.056	4	43.75	54	4.00	1	6.25	80
GMCL	0.516	1	6.25	80	0.000	0	0	0	0.000	0	0	0	0.122	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.571	1	6.25	80	0.045	6	68.75	41	4.00	1	6.25	80

GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.090	3	31.25	60	4.00	1	6.25	80
GSIDCL	0.000	2	18.8	68	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2016-17																				
SLPE	**R&D**	**Rank**	**PP**	**GS**	**C. En**	**Rank**	**PP**	**GS**	**CW**	**Rank**	**PP**	**GS**	**HRD**	**Rank**	**PP**	**GS**	**CG**	**Rank**	**PP**	**GS**
GIDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.104	2	18.75	68	4.00	1	6.25	80
EDC	0.0000	0	0	0	0.000	0	0	0	0.016	2	18.75	68	0.023	7	81.25	33	4.00	1	6.25	80
KTCL	0.0000	0	0	0	0.000	0	0	0	0.519	1	6.25	80	0.035	6	68.75	41	4.00	1	6.25	80
GTDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.051	4	43.75	54	4.00	1	6.25	80
GMCL	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.161	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.082	3	31.25	60	4.00	1	6.25	80
GSSTFDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.043	5	56.25	47	4.00	1	6.25	80
GSIDCL	0.0003	1	6.25	80	0.000	0	0	0	0.001	3	31.25	60	0.001	8	93.75	21	4.00	1	6.25	80
2017-18																				
SLPE	**R&D**	**Rank**	**PP**	**GS**	**C. En**	**Rank**	**PP**	**GS**	**CW**	**Rank**	**PP**	**GS**	**HRD**	**Rank**	**PP**	**GS**	**CG**	**Rank**	**PP**	**GS**
GIDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.093	2	18.75	68	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.016	2	18.75	68	0.052	5	56.25	47	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.418	1	6.25	80	0.034	7	81.25	33	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.061	4	43.75	54	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.103	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.035	6	68.75	41	4.00	1	6.25	80
GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.072	3	31.25	60	4.00	1	6.25	80
GSIDCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80
2018-19																				
SLPE	**R&D**	**Rank**	**PP**	**GS**	**C. En**	**Rank**	**PP**	**GS**	**CW**	**Rank**	**PP**	**GS**	**HRD**	**Rank**	**PP**	**GS**	**CG**	**Rank**	**PP**	**GS**
GIDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.077	2	18.75	68	4.00	1	6.25	80
EDC	0.0000	0	0	0	0.000	0	0	0	0.028	2	18.75	68	0.041	5	56.25	47	4.00	1	6.25	80

KTCL	0.0000	0	0	0	0.000	0	0	0	0.468	1	6.25	80	0.031	6	68.75	41	4.00	1	6.25	80
GTDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.058	3	31.25	60	4.00	1	6.25	80
GMCL	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.154	1	6.25	80	3.00	2	18.75	68
SIDCGL	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.021	7	81.25	33	4.00	1	6.25	80
GSSTFDC	0.0000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.057	4	43.75	54	4.00	1	6.25	80
GSIDCL	0.0003	1	6.25	80	0.000	0	0	0	0.001	0	0	0	0.002	8	93.75	21	4.00	1	6.25	80
2019-20																				
SLPE	**R&D**	**Rank**	**PP**	**GS**	**C. En**	**Rank**	**PP**	**GS**	**CW**	**Rank**	**PP**	**GS**	**HRD**	**Rank**	**PP**	**GS**	**CG**	**Rank**	**PP**	**GS**
GIDC	0.000	0	0	0	0.000	0	0	0	0.001	3	31.25	60	0.136	1	6.25	80	4.00	1	6.25	80
EDC	0.000	0	0	0	0.000	0	0	0	0.014	2	18.75	68	0.029	6	68.75	41	4.00	1	6.25	80
KTCL	0.000	0	0	0	0.000	0	0	0	0.470	1	6.25	80	0.028	7	81.25	33	4.00	1	6.25	80
GTDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.068	2	18.75	68	4.00	1	6.25	80
GMCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.066	3	31.25	60	3.00	2	18.75	68
SIDCGL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.031	5	56.25	47	4.00	1	6.25	80
GSSTFDC	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.056	4	43.75	54	4.00	1	6.25	80
GSIDCL	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0.001	8	93.75	21	4.00	1	6.25	80

Source: Author's computation

(* PP=Percent Position, GS= Garrett Score, R&D= Research and Development, C.En=Contribution to environment, CW=Community welfare, HRD= Human resource development, CG= Corporate governance)

Table 7.4 presents the ratios used to reflect contribution to society are normalised by transforming the ratios into Garrett scores. The actual ratios are first ranked, thereafter the percent position of the ranks is calculated and based on the percent position the Garrett score is obtained.

7.3.2 Normalised Decision Matrix

Table 7.5: Normalised Decision Matrix (year-wise)

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
2008-09															
GIDC	68	33	47	60	47	80	60	80	47	60	0	0	0	68	80
EDC	80	54	41	54	60	80	54	80	60	80	0	0	68	54	80
KTCL	21	21	21	21	21	80	21	80	68	47	0	0	80	47	80
GTDC	41	60	60	41	68	80	47	80	54	41	0	0	0	41	80
GMCL	33	47	68	80	41	80	68	80	33	21	0	0	0	80	68
SIDCL	60	41	33	47	54	80	41	80	21	68	0	0	0	33	80
GSSTFDCL	47	80	80	33	33	80	33	80	41	33	0	0	0	60	80
GSIDCL	54	68	54	68	80	80	80	80	80	54	80	0	0	21	80
2009-10															
GIDC	60	33	54	60	54	47	54	80	47	60	0	0	0	60	80
EDC	80	54	41	54	68	33	60	54	60	80	0	0	68	54	80
KTCL	21	21	21	21	21	68	21	41	68	54	0	0	80	41	80
GTDC	54	60	60	41	60	60	47	60	54	41	0	0	0	47	80
GMCL	33	47	68	80	47	41	68	47	21	33	0	0	0	80	68
SIDCL	68	41	33	47	41	54	41	21	41	68	0	0	0	33	80
GSSTFDCL	41	80	80	33	33	21	33	68	33	21	80	0	0	68	80
GSIDCL	47	68	47	68	80	80	80	33	80	47	68	0	0	21	80
2010-11															
GIDC	33	33	60	54	47	41	47	54	47	21	0	0	0	80	80
EDC	80	47	33	60	60	47	60	60	60	80	0	0	68	47	80

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
KTCL	21	21	21	21	21	68	21	33	68	54	0	0	80	60	80
GTDC	54	60	54	41	54	54	54	47	54	33	0	0	0	41	80
GMCL	60	41	68	80	68	33	68	41	21	41	0	0	0	68	68
SIDCL	68	80	41	47	41	60	41	68	33	68	0	0	0	33	80
GSSTFDCL	41	68	80	33	33	21	33	80	41	60	0	0	0	54	80
GSIDCL	47	54	47	68	80	80	80	21	80	47	0	0	0	21	80
2011-12															
GIDC	41	33	47	54	54	54	47	41	47	41	0	0	0	68	80
EDC	68	60	68	60	60	47	60	60	60	68	0	0	68	47	80
KTCL	21	21	21	21	21	68	21	33	68	33	0	0	80	60	80
GTDC	33	47	54	33	47	41	54	54	54	21	0	0	0	54	80
GMCL	80	41	60	80	80	33	80	47	21	54	0	0	0	80	68
SIDCL	60	68	41	47	41	60	41	80	41	80	0	0	0	33	80
GSSTFDCL	54	80	80	41	33	21	33	68	33	60	0	0	0	41	80
GSIDCL	47	54	33	68	68	80	68	21	80	47	80	0	0	21	80
2012-13															
GIDC	41	33	33	54	47	33	54	68	47	33	0	0	0	54	80
EDC	80	47	68	60	68	47	60	47	68	68	0	0	68	33	80
KTCL	21	21	21	21	21	68	21	41	60	60	0	0	80	47	80
GTDC	60	54	54	33	60	60	47	60	54	41	0	0	0	41	80
GMCL	33	41	60	80	41	41	68	54	21	21	0	0	0	80	68
SIDCL	68	80	47	47	54	60	41	80	41	80	0	0	0	68	80
GSSTFDCL	47	60	80	41	33	21	33	21	33	54	68	0	0	60	80
GSIDCL	54	68	41	68	80	80	80	33	80	47	80	0	0	21	80
2013-14															

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
GIDC	41	41	21	54	54	33	47	33	47	33	0	0	0	68	80
EDC	68	33	80	60	68	41	60	54	68	80	0	0	68	41	80
KTCL	21	21	47	21	33	60	21	47	60	60	0	0	80	33	80
GTDC	60	47	54	33	21	54	54	60	54	41	0	0	0	60	80
GMCL	33	54	60	68	47	47	68	21	21	21	0	0	0	80	68
SIDCL	80	68	33	47	60	80	41	80	41	68	0	0	0	54	80
GSSTFDCL	54	80	68	41	41	21	33	41	33	54	0	0	0	47	80
GSIDCL	47	60	41	80	80	68	80	68	80	47	80	0	0	21	80
2014-15															
GIDC	33	41	54	54	60	21	54	33	47	41	0	0	0	68	80
EDC	68	33	68	68	68	41	60	41	68	80	0	0	68	33	80
KTCL	80	21	41	21	33	54	21	47	60	68	0	0	80	41	80
GTDC	54	47	47	33	21	47	47	60	54	33	0	0	0	54	80
GMCL	21	54	60	60	54	33	68	21	21	21	0	0	0	80	68
SIDCL	60	80	21	47	47	68	41	80	41	60	0	0	0	47	80
GSSTFDCL	41	68	80	41	41	80	33	68	33	47	80	0	0	60	80
GSIDCL	47	60	33	80	80	60	80	54	80	54	68	0	0	21	80
2015-16															
GIDC	33	33	47	54	68	21	54	33	47	33	0	0	0	68	80
EDC	68	41	60	60	54	47	60	54	68	80	0	0	60	47	80
KTCL	80	47	54	21	33	60	21	47	60	68	0	0	68	33	80
GTDC	54	54	33	33	21	41	47	60	54	21	0	0	0	54	80
GMCL	21	68	80	68	80	33	68	21	21	47	80	0	0	80	68
SIDCL	60	21	41	47	47	68	41	80	41	60	0	0	80	41	80
GSSTFDCL	41	60	68	41	41	80	33	68	33	41	0	0	0	60	80

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
GSIDCL	47	80	21	80	60	60	80	41	80	54	68	0	0	21	80
2016-17															
GIDC	41	41	41	54	80	21	54	33	47	68	0	0	0	68	80
EDC	80	47	68	68	60	47	60	54	68	80	0	0	68	33	80
KTCL	21	21	47	21	33	54	21	41	60	60	0	0	80	41	80
GTDC	68	68	60	33	21	41	47	68	54	21	0	0	0	54	80
GMCL	33	54	54	60	47	33	68	21	21	33	0	0	0	80	68
SIDCL	47	33	21	41	54	68	41	80	41	47	0	0	0	60	80
GSSTFDCL	60	60	80	47	41	80	33	47	33	54	0	0	0	47	80
GSIDCL	54	80	33	80	68	60	80	60	80	41	80	0	0	21	80
2017-18															
GIDC	68	47	41	54	80	21	54	60	54	68	0	0	0	68	80
EDC	80	41	68	68	60	47	60	54	68	80	0	0	68	47	80
KTCL	21	33	47	21	33	54	21	47	60	54	0	0	80	33	80
GTDC	54	60	54	33	21	41	47	68	47	33	0	0	0	54	80
GMCL	33	54	60	60	47	33	68	21	21	21	0	0	0	80	68
SIDCL	60	21	21	41	54	80	41	80	41	60	0	0	0	41	80
GSSTFDCL	41	68	80	47	41	68	33	33	33	41	0	0	0	60	80
GSIDCL	47	80	33	80	68	60	80	41	80	47	0	0	0	21	80
2018-19															
GIDC	33	33	21	21	80	21	21	60	68	68	0	0	0	68	80
EDC	80	47	68	68	54	47	60	80	60	80	0	0	68	47	80
KTCL	21	41	54	33	33	54	33	47	54	54	0	0	80	41	80
GTDC	60	60	41	47	21	41	54	33	47	41	0	0	0	60	80
GMCL	41	54	60	60	68	33	68	21	21	33	0	0	0	80	68

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
SIDCL	47	21	47	41	47	80	41	68	41	21	0	0	0	33	80
GSSTFDCL	68	68	80	54	41	68	47	41	33	60	0	0	0	54	80
GSIDCL	54	80	33	80	60	60	80	54	80	47	80	0	0	21	80
2019-20															
GIDC	47	41	21	33	80	21	54	60	54	60	0	0	60	80	80
EDC	80	33	68	68	60	47	60	54	68	80	0	0	68	41	80
KTCL	21	47	41	21	33	54	21	47	60	68	0	0	80	33	80
GTDC	33	60	47	41	21	33	47	33	47	33	0	0	0	68	80
GMCL	41	54	54	60	54	41	68	21	21	41	0	0	0	60	68
SIDCL	54	21	80	47	47	80	33	80	41	21	0	0	0	47	80
GSSTFDCL	68	68	60	54	41	68	41	68	33	54	0	0	0	54	80
GSIDCL	60	80	33	80	68	60	80	41	80	47	0	0	0	21	80

Source: Author's computation

Above table 7.5 presents the normalised decision matrix prepared based on the Garrett scores obtained. The normalisation of actual values of the performance parameters is done by using the ratio transformation technique explained above. The above figures are the transformed scores of all the fifteen parameters used in the study for the performance evaluation framework which are categorised into four broad categories.

7.3.3 Rating Best and Worst Scores

Table 7.6: Rating (Best and Worst) scores of the parameters

Ideal solutions	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
Best (f_i^+)	80	80	21	80	80	80	80	80	80	80	0	0	80	80	80
Worst (f_i^-)	21	21	80	80	80	80	21	21	80	21	0	0	0	21	68

Source: Author's computation

Table 7.6 shows the best and worst scores for the performance parameters as per step three explained above. The best score is the maximum score and the worst score is the minimum score for beneficial parameters. For non-beneficial parameters i.e., solvency (debt -asset ratio) and efficiency of operation (cost of revenue ratio) where lower values are considered better, the best score is the minimum score and the worst score is the maximum score.

7.3.4 Weights of the Parameters

Table 7.7: Weights of the parameters

	Performance Parameters														
	Financial performance (0.14)			Physical performance (0.12)			Contribution to the economy (0.33)				Contribution to society (0.41)				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
Weights	0.03	0.06	0.05	0.04	0.03	0.05	0.07	0.05	0.14	0.07	0.04	0.05	0.14	0.12	0.06

Source: Author's computation

Table 7.7 represents the weights of each performance parameter derived from the Analytical hierarchy process in chapter four. These weights are used in the VIKOR analysis.

7.3.5 Distance for Each Alternative (S_{ij})

Table 7.8: Distance for each alternative (S_{ij})

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
2008-09															
GIDC	0.006	0.048	0.022	0.000	0.017	0.033	0.024	0.028	0.000	0.024	0.040	0.000	0.140	0.024	0.000
EDC	0.000	0.026	0.017	0.000	0.010	0.050	0.031	0.017	0.000	0.031	0.040	0.000	0.021	0.053	0.000
KTCL	0.030	0.060	0.000	0.000	0.006	0.022	0.070	0.050	0.000	0.070	0.040	0.000	0.000	0.067	0.000
GTDC	0.020	0.020	0.033	0.000	0.013	0.017	0.046	0.010	0.000	0.039	0.040	0.000	0.140	0.079	0.000
GMCL	0.024	0.034	0.040	0.000	0.024	0.000	0.000	0.033	0.000	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.010	0.040	0.010	0.000	0.030	0.040	0.039	0.022	0.000	0.046	0.040	0.000	0.140	0.096	0.000
GSSTFDCL	0.017	0.000	0.050	0.000	0.020	0.010	0.056	0.040	0.000	0.056	0.040	0.000	0.140	0.041	0.000
GSIDCL	0.013	0.012	0.028	0.000	0.000	0.028	0.014	0.000	0.000	0.000	0.000	0.000	0.140	0.120	0.000
2009-10															
GIDC	0.010	0.048	0.028	0.000	0.017	0.033	0.024	0.022	0.078	0.031	0.040	0.000	0.140	0.041	0.000
EDC	0.000	0.026	0.017	0.018	0.010	0.050	0.031	0.010	0.112	0.024	0.040	0.000	0.021	0.053	0.000
KTCL	0.030	0.060	0.000	0.026	0.006	0.028	0.070	0.050	0.028	0.070	0.040	0.000	0.000	0.079	0.000
GTDC	0.013	0.020	0.033	0.014	0.013	0.017	0.046	0.017	0.047	0.039	0.040	0.000	0.140	0.067	0.000
GMCL	0.024	0.034	0.040	0.022	0.030	0.010	0.000	0.028	0.093	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.006	0.040	0.010	0.040	0.020	0.040	0.039	0.033	0.062	0.046	0.040	0.000	0.140	0.096	0.000
GSSTFDCL	0.020	0.000	0.050	0.008	0.024	0.000	0.056	0.040	0.140	0.056	0.000	0.000	0.140	0.024	0.000
GSIDCL	0.017	0.012	0.022	0.032	0.000	0.022	0.014	0.000	0.000	0.000	0.006	0.000	0.140	0.120	0.000
2010-11															
GIDC	0.024	0.048	0.033	0.018	0.017	0.000	0.031	0.028	0.093	0.039	0.000	0.000	0.140	0.000	0.000
EDC	0.000	0.034	0.010	0.014	0.010	0.050	0.024	0.017	0.078	0.024	0.000	0.000	0.021	0.067	0.000

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
KTCL	0.030	0.060	0.000	0.032	0.006	0.028	0.070	0.050	0.028	0.070	0.000	0.000	0.000	0.041	0.000
GTDC	0.013	0.020	0.028	0.022	0.013	0.010	0.046	0.022	0.062	0.031	0.000	0.000	0.140	0.079	0.000
GMCL	0.010	0.040	0.040	0.026	0.030	0.017	0.000	0.010	0.112	0.014	0.000	0.000	0.140	0.024	0.060
SIDCL	0.006	0.000	0.017	0.008	0.024	0.040	0.039	0.033	0.047	0.046	0.000	0.000	0.140	0.096	0.000
GSSTFDCL	0.020	0.012	0.050	0.000	0.020	0.033	0.056	0.040	0.140	0.056	0.000	0.000	0.140	0.053	0.000
GSIDCL	0.017	0.026	0.022	0.040	0.000	0.022	0.014	0.000	0.000	0.000	0.000	0.000	0.140	0.120	0.000
2011-12															
GIDC	0.020	0.048	0.022	0.026	0.017	0.017	0.031	0.022	0.062	0.039	0.040	0.000	0.140	0.024	0.000
EDC	0.006	0.020	0.040	0.014	0.010	0.040	0.024	0.017	0.078	0.024	0.040	0.000	0.021	0.067	0.000
KTCL	0.030	0.060	0.000	0.032	0.006	0.010	0.070	0.050	0.028	0.070	0.040	0.000	0.000	0.041	0.000
GTDC	0.024	0.034	0.028	0.018	0.013	0.000	0.056	0.028	0.093	0.031	0.040	0.000	0.140	0.053	0.000
GMCL	0.000	0.040	0.033	0.022	0.030	0.028	0.000	0.000	0.112	0.000	0.040	0.000	0.140	0.000	0.060
SIDCL	0.010	0.012	0.017	0.000	0.020	0.050	0.039	0.033	0.047	0.046	0.040	0.000	0.140	0.096	0.000
GSSTFDCL	0.013	0.000	0.050	0.008	0.024	0.033	0.046	0.040	0.140	0.056	0.040	0.000	0.140	0.079	0.000
GSIDCL	0.017	0.026	0.010	0.040	0.000	0.022	0.014	0.010	0.000	0.014	0.000	0.000	0.140	0.120	0.000
2012-13															
GIDC	0.020	0.048	0.010	0.008	0.017	0.010	0.031	0.028	0.112	0.031	0.040	0.000	0.140	0.053	0.000
EDC	0.000	0.034	0.040	0.022	0.006	0.040	0.024	0.010	0.078	0.024	0.040	0.000	0.021	0.096	0.000
KTCL	0.030	0.060	0.000	0.026	0.010	0.033	0.070	0.050	0.028	0.070	0.040	0.000	0.000	0.067	0.000
GTDC	0.010	0.026	0.028	0.014	0.013	0.017	0.056	0.017	0.047	0.039	0.040	0.000	0.140	0.079	0.000
GMCL	0.024	0.040	0.033	0.018	0.030	0.000	0.000	0.033	0.093	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.006	0.000	0.022	0.000	0.020	0.050	0.039	0.022	0.047	0.046	0.040	0.000	0.140	0.024	0.000
GSSTFDCL	0.017	0.020	0.050	0.040	0.024	0.028	0.046	0.040	0.140	0.056	0.006	0.000	0.140	0.041	0.000
GSIDCL	0.013	0.012	0.017	0.032	0.000	0.022	0.014	0.000	0.000	0.000	0.000	0.000	0.140	0.120	0.000

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
2013-14															
GIDC	0.020	0.040	0.000	0.032	0.017	0.010	0.031	0.022	0.112	0.039	0.040	0.000	0.140	0.024	0.000
EDC	0.006	0.048	0.050	0.018	0.006	0.050	0.024	0.010	0.093	0.024	0.040	0.000	0.021	0.079	0.000
KTCL	0.030	0.060	0.022	0.022	0.010	0.033	0.070	0.040	0.047	0.070	0.040	0.000	0.000	0.096	0.000
GTDC	0.010	0.034	0.028	0.014	0.013	0.017	0.056	0.050	0.062	0.031	0.040	0.000	0.140	0.041	0.000
GMCL	0.024	0.026	0.033	0.040	0.030	0.000	0.014	0.028	0.078	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.000	0.012	0.010	0.000	0.020	0.040	0.039	0.017	0.000	0.046	0.040	0.000	0.140	0.053	0.000
GSSTFDCL	0.013	0.000	0.040	0.026	0.024	0.028	0.046	0.033	0.140	0.056	0.040	0.000	0.140	0.067	0.000
GSIDCL	0.017	0.020	0.017	0.008	0.000	0.022	0.000	0.000	0.028	0.000	0.000	0.000	0.140	0.120	0.000
2014-15															
GIDC	0.024	0.040	0.028	0.032	0.017	0.017	0.031	0.017	0.140	0.031	0.040	0.000	0.140	0.024	0.000
EDC	0.006	0.048	0.040	0.026	0.006	0.050	0.014	0.010	0.093	0.024	0.040	0.000	0.021	0.096	0.000
KTCL	0.000	0.060	0.017	0.022	0.010	0.040	0.070	0.040	0.062	0.070	0.040	0.000	0.000	0.079	0.000
GTDC	0.013	0.034	0.022	0.014	0.013	0.010	0.056	0.050	0.078	0.039	0.040	0.000	0.140	0.053	0.000
GMCL	0.030	0.026	0.033	0.040	0.030	0.000	0.024	0.022	0.112	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.010	0.000	0.000	0.000	0.020	0.033	0.039	0.028	0.028	0.046	0.040	0.000	0.140	0.067	0.000
GSSTFDCL	0.020	0.012	0.050	0.008	0.024	0.022	0.046	0.033	0.000	0.056	0.000	0.000	0.140	0.041	0.000
GSIDCL	0.017	0.020	0.010	0.018	0.000	0.028	0.000	0.000	0.047	0.000	0.006	0.000	0.140	0.120	0.000
2015-16															
GIDC	0.024	0.048	0.022	0.032	0.017	0.010	0.031	0.010	0.140	0.031	0.040	0.000	0.140	0.024	0.000
EDC	0.006	0.040	0.033	0.018	0.006	0.050	0.024	0.022	0.078	0.024	0.040	0.000	0.035	0.067	0.000
KTCL	0.000	0.034	0.028	0.022	0.010	0.040	0.070	0.040	0.047	0.070	0.040	0.000	0.021	0.096	0.000
GTDC	0.013	0.026	0.010	0.014	0.013	0.000	0.056	0.050	0.093	0.039	0.040	0.000	0.140	0.053	0.000
GMCL	0.030	0.012	0.050	0.040	0.030	0.022	0.014	0.000	0.112	0.014	0.000	0.000	0.140	0.000	0.060

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
SIDCL	0.010	0.060	0.017	0.000	0.020	0.033	0.039	0.028	0.028	0.046	0.040	0.000	0.000	0.079	0.000
GSSTFDCL	0.020	0.020	0.040	0.008	0.024	0.017	0.046	0.033	0.000	0.056	0.040	0.000	0.140	0.041	0.000
GSIDCL	0.017	0.000	0.000	0.026	0.000	0.028	0.000	0.017	0.047	0.000	0.006	0.000	0.140	0.120	0.000
2016-17															
GIDC	0.020	0.040	0.017	0.032	0.017	0.040	0.031	0.000	0.140	0.031	0.040	0.000	0.140	0.024	0.000
EDC	0.000	0.034	0.040	0.018	0.006	0.050	0.014	0.017	0.078	0.024	0.040	0.000	0.021	0.096	0.000
KTCL	0.030	0.060	0.022	0.026	0.010	0.033	0.070	0.040	0.062	0.070	0.040	0.000	0.000	0.079	0.000
GTDC	0.006	0.012	0.033	0.008	0.013	0.000	0.056	0.050	0.093	0.039	0.040	0.000	0.140	0.053	0.000
GMCL	0.024	0.026	0.028	0.040	0.030	0.010	0.024	0.028	0.112	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.017	0.048	0.000	0.000	0.020	0.022	0.046	0.022	0.028	0.046	0.040	0.000	0.140	0.041	0.000
GSSTFDCL	0.010	0.020	0.050	0.022	0.024	0.028	0.039	0.033	0.000	0.056	0.040	0.000	0.140	0.067	0.000
GSIDCL	0.013	0.000	0.010	0.014	0.000	0.017	0.000	0.010	0.047	0.000	0.000	0.000	0.140	0.120	0.000
2017-18															
GIDC	0.006	0.034	0.017	0.014	0.013	0.040	0.031	0.000	0.140	0.031	0.000	0.000	0.140	0.024	0.000
EDC	0.000	0.040	0.040	0.018	0.006	0.050	0.014	0.017	0.078	0.024	0.000	0.000	0.021	0.067	0.000
KTCL	0.030	0.048	0.022	0.022	0.010	0.028	0.070	0.040	0.062	0.070	0.000	0.000	0.000	0.096	0.000
GTDC	0.013	0.020	0.028	0.008	0.017	0.010	0.056	0.050	0.093	0.039	0.000	0.000	0.140	0.053	0.000
GMCL	0.024	0.026	0.033	0.040	0.030	0.000	0.024	0.028	0.112	0.014	0.000	0.000	0.140	0.000	0.060
SIDCL	0.010	0.060	0.000	0.000	0.020	0.033	0.046	0.022	0.000	0.046	0.000	0.000	0.140	0.079	0.000
GSSTFDCL	0.020	0.012	0.050	0.032	0.024	0.017	0.039	0.033	0.028	0.056	0.000	0.000	0.140	0.041	0.000
GSIDCL	0.017	0.000	0.010	0.026	0.000	0.022	0.000	0.010	0.047	0.000	0.000	0.000	0.140	0.120	0.000
2018-19															
GIDC	0.024	0.048	0.000	0.014	0.006	0.040	0.070	0.000	0.140	0.070	0.040	0.000	0.140	0.024	0.000
EDC	0.000	0.034	0.040	0.000	0.010	0.050	0.014	0.022	0.078	0.024	0.040	0.000	0.021	0.067	0.000

SLPE	Performance Parameters														
	Financial performance			Physical performance			Contribution to Economy				Contribution to society				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
KTCL	0.030	0.040	0.028	0.022	0.013	0.028	0.056	0.040	0.062	0.056	0.040	0.000	0.000	0.079	0.000
GTDC	0.010	0.020	0.017	0.032	0.017	0.017	0.039	0.050	0.093	0.031	0.040	0.000	0.140	0.041	0.000
GMCL	0.020	0.026	0.033	0.040	0.030	0.010	0.024	0.010	0.112	0.014	0.040	0.000	0.140	0.000	0.060
SIDCL	0.017	0.060	0.022	0.008	0.020	0.000	0.046	0.028	0.000	0.046	0.040	0.000	0.140	0.096	0.000
GSSTFDCL	0.006	0.012	0.050	0.026	0.024	0.033	0.031	0.033	0.028	0.039	0.040	0.000	0.140	0.053	0.000
GSIDCL	0.013	0.000	0.010	0.018	0.000	0.022	0.000	0.017	0.047	0.000	0.000	0.000	0.140	0.120	0.000
2019-20															
GIDC	0.017	0.040	0.000	0.014	0.013	0.033	0.056	0.000	0.140	0.031	0.000	0.000	0.035	0.000	0.000
EDC	0.000	0.048	0.040	0.018	0.006	0.050	0.014	0.017	0.078	0.024	0.000	0.000	0.021	0.079	0.000
KTCL	0.030	0.034	0.017	0.022	0.010	0.040	0.070	0.040	0.062	0.070	0.000	0.000	0.000	0.096	0.000
GTDC	0.024	0.020	0.022	0.032	0.017	0.010	0.046	0.050	0.112	0.039	0.000	0.000	0.140	0.024	0.000
GMCL	0.020	0.026	0.028	0.040	0.030	0.017	0.024	0.022	0.093	0.014	0.000	0.000	0.140	0.041	0.060
SIDCL	0.013	0.060	0.050	0.000	0.020	0.000	0.039	0.028	0.000	0.056	0.000	0.000	0.140	0.067	0.000
GSSTFDCL	0.006	0.012	0.033	0.008	0.024	0.028	0.031	0.033	0.028	0.046	0.000	0.000	0.140	0.053	0.000
GSIDCL	0.010	0.000	0.010	0.026	0.000	0.022	0.000	0.010	0.047	0.000	0.000	0.000	0.140	0.120	0.000

Source: author's computation.

Table 7.8 presents the distance for each alternative (S_{ij}).

7.3.6 Utility Measure (S_i), Regret Measure (R_i) and VIKOR Index (Q_i)

Table 7.9: Utility measure (S_i), Regret measure (R_i) and VIKOR Index (Q_i):

SLPE	Performance Criteria											
	Financial performance			Physical performance			Contribution to economy			Contribution to society		
	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i
2008-09												
GIDC	0.076	0.048	0.620	0.050	0.033	0.526	0.075	0.028	0.297	0.204	0.140	0.789
EDC	0.043	0.026	0.000	0.060	0.050	0.895	0.079	0.031	0.332	0.114	0.053	0.020
KTCL	0.090	0.060	0.932	0.028	0.022	0.123	0.190	0.070	1.000	0.107	0.067	0.082
GTDC	0.073	0.033	0.375	0.030	0.017	0.068	0.096	0.046	0.519	0.259	0.140	0.952
GMCL	0.097	0.040	0.699	0.024	0.024	0.105	0.047	0.033	0.263	0.240	0.140	0.894
SIDCL	0.060	0.040	0.351	0.070	0.040	0.846	0.107	0.046	0.552	0.276	0.140	1.000
GSSTFDCL	0.067	0.050	0.568	0.030	0.020	0.110	0.151	0.056	0.762	0.221	0.140	0.837
GSIDCL	0.053	0.028	0.115	0.028	0.028	0.211	0.014	0.014	0.000	0.260	0.140	0.954
2009-10												
GIDC	0.086	0.048	0.734	0.050	0.033	0.375	0.155	0.078	0.509	0.221	0.140	0.830
EDC	0.043	0.026	0.058	0.078	0.050	0.838	0.176	0.112	0.679	0.114	0.053	0.000
KTCL	0.090	0.060	0.932	0.061	0.028	0.377	0.218	0.070	0.590	0.119	0.079	0.169
GTDC	0.067	0.033	0.360	0.044	0.017	0.086	0.150	0.047	0.377	0.247	0.140	0.912
GMCL	0.097	0.040	0.734	0.063	0.030	0.423	0.135	0.093	0.529	0.240	0.140	0.890
SIDCL	0.056	0.040	0.348	0.100	0.040	0.849	0.180	0.062	0.488	0.276	0.140	1.000
GSSTFDCL	0.070	0.050	0.614	0.032	0.024	0.105	0.291	0.140	1.000	0.164	0.140	0.656
GSIDCL	0.051	0.022	0.071	0.054	0.032	0.387	0.014	0.014	0.000	0.266	0.140	0.970
2010-11												
GIDC	0.105	0.048	0.858	0.034	0.018	0.000	0.191	0.093	0.629	0.140	0.140	0.726
EDC	0.044	0.034	0.319	0.074	0.050	1.000	0.143	0.078	0.487	0.088	0.067	0.241
KTCL	0.090	0.060	0.910	0.066	0.032	0.621	0.218	0.070	0.590	0.041	0.041	0.000
GTDC	0.062	0.028	0.363	0.046	0.022	0.218	0.161	0.062	0.453	0.219	0.140	0.907

SLPE	Performance Criteria											
	Financial performance			Physical performance			Contribution to economy			Contribution to society		
	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i
GMCL	0.090	0.040	0.673	0.073	0.030	0.687	0.136	0.112	0.606	0.189	0.140	0.838
SIDCL	0.023	0.017	0.000	0.072	0.040	0.819	0.166	0.047	0.406	0.236	0.140	0.944
GSSTFDCL	0.082	0.050	0.745	0.053	0.033	0.473	0.291	0.140	1.000	0.193	0.140	0.847
GSIDCL	0.065	0.026	0.369	0.062	0.040	0.697	0.014	0.014	0.000	0.260	0.140	1.000
2011-12												
GIDC	0.090	0.048	0.855	0.060	0.026	0.432	0.154	0.062	0.425	0.204	0.140	0.817
EDC	0.066	0.040	0.532	0.064	0.040	0.673	0.143	0.078	0.469	0.128	0.067	0.255
KTCL	0.090	0.060	1.000	0.048	0.032	0.395	0.218	0.070	0.591	0.081	0.041	0.000
GTDC	0.085	0.034	0.648	0.031	0.018	0.000	0.207	0.093	0.658	0.233	0.140	0.890
GMCL	0.073	0.040	0.593	0.080	0.030	0.691	0.112	0.112	0.537	0.240	0.140	0.909
SIDCL	0.039	0.017	0.000	0.070	0.050	0.894	0.166	0.047	0.394	0.276	0.140	1.000
GSSTFDCL	0.063	0.050	0.620	0.065	0.033	0.584	0.282	0.140	1.000	0.259	0.140	0.958
GSIDCL	0.053	0.026	0.249	0.062	0.040	0.661	0.039	0.014	0.000	0.260	0.140	0.960
2012-13												
GIDC	0.078	0.048	0.721	0.035	0.017	0.000	0.201	0.112	0.736	0.233	0.140	0.911
EDC	0.073	0.040	0.596	0.068	0.040	0.639	0.136	0.078	0.482	0.157	0.096	0.357
KTCL	0.090	0.060	0.952	0.070	0.033	0.549	0.218	0.070	0.603	0.107	0.067	0.000
GTDC	0.065	0.028	0.394	0.044	0.017	0.079	0.159	0.056	0.436	0.259	0.140	0.998
GMCL	0.097	0.040	0.764	0.048	0.030	0.309	0.140	0.093	0.546	0.240	0.140	0.935
SIDCL	0.028	0.022	0.059	0.070	0.050	0.806	0.155	0.047	0.395	0.204	0.140	0.818
GSSTFDCL	0.087	0.050	0.815	0.092	0.040	0.849	0.282	0.140	1.000	0.187	0.140	0.760
GSIDCL	0.042	0.017	0.104	0.054	0.032	0.393	0.014	0.014	0.000	0.260	0.140	1.000
2013-14												
GIDC	0.059	0.040	0.494	0.059	0.032	0.523	0.204	0.112	0.727	0.204	0.140	0.777
EDC	0.104	0.050	0.850	0.074	0.050	0.952	0.150	0.093	0.534	0.140	0.079	0.019
KTCL	0.112	0.060	1.000	0.066	0.033	0.612	0.227	0.070	0.589	0.136	0.096	0.134

SLPE	Performance Criteria											
	Financial performance			Physical performance			Contribution to economy			Contribution to society		
	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i
GTDC	0.072	0.034	0.498	0.044	0.017	0.141	0.198	0.062	0.493	0.221	0.140	0.842
GMCL	0.083	0.033	0.558	0.070	0.040	0.762	0.135	0.078	0.439	0.240	0.140	0.920
SIDCL	0.022	0.012	0.000	0.060	0.040	0.652	0.102	0.046	0.230	0.233	0.140	0.891
GSSTFDCL	0.053	0.040	0.460	0.078	0.028	0.667	0.275	0.140	1.000	0.247	0.140	0.948
GSIDCL	0.054	0.020	0.262	0.030	0.022	0.077	0.028	0.028	0.000	0.260	0.140	1.000
2014-15												
GIDC	0.092	0.040	0.783	0.066	0.032	0.565	0.219	0.140	0.941	0.204	0.140	0.790
EDC	0.094	0.048	0.878	0.083	0.050	1.000	0.141	0.093	0.487	0.157	0.096	0.261
KTCL	0.077	0.060	0.900	0.072	0.040	0.749	0.242	0.070	0.627	0.119	0.079	0.000
GTDC	0.069	0.034	0.586	0.037	0.014	0.000	0.223	0.078	0.624	0.233	0.140	0.887
GMCL	0.089	0.033	0.704	0.070	0.040	0.725	0.172	0.112	0.668	0.240	0.140	0.911
SIDCL	0.010	0.010	0.000	0.053	0.033	0.442	0.142	0.046	0.243	0.247	0.140	0.936
GSSTFDCL	0.082	0.050	0.830	0.054	0.024	0.330	0.135	0.056	0.276	0.181	0.140	0.709
GSIDCL	0.047	0.020	0.324	0.046	0.028	0.292	0.047	0.047	0.006	0.266	0.140	1.000
2015-16												
GIDC	0.094	0.048	0.859	0.059	0.032	0.497	0.212	0.140	0.926	0.204	0.140	0.790
EDC	0.079	0.040	0.668	0.074	0.050	0.860	0.148	0.078	0.412	0.142	0.067	0.078
KTCL	0.062	0.034	0.485	0.072	0.040	0.710	0.227	0.070	0.597	0.157	0.096	0.322
GTDC	0.050	0.026	0.327	0.027	0.014	0.000	0.237	0.093	0.747	0.233	0.140	0.887
GMCL	0.092	0.050	0.874	0.092	0.040	0.863	0.140	0.112	0.567	0.200	0.140	0.775
SIDCL	0.087	0.060	0.957	0.053	0.033	0.467	0.142	0.046	0.224	0.119	0.079	0.084
GSSTFDCL	0.080	0.040	0.677	0.049	0.024	0.312	0.135	0.056	0.255	0.221	0.140	0.846
GSIDCL	0.017	0.017	0.000	0.054	0.028	0.409	0.064	0.047	0.006	0.266	0.140	1.000
2016-17												
GIDC	0.076	0.040	0.582	0.088	0.040	0.862	0.202	0.140	0.892	0.204	0.140	0.802
EDC	0.073	0.040	0.566	0.074	0.050	0.890	0.133	0.078	0.376	0.157	0.096	0.267

SLPE	Performance Criteria											
	Financial performance			Physical performance			Contribution to economy			Contribution to society		
	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i
KTCL	0.112	0.060	1.000	0.070	0.033	0.629	0.242	0.070	0.627	0.119	0.079	0.000
GTDC	0.051	0.033	0.370	0.021	0.013	0.000	0.237	0.093	0.736	0.233	0.140	0.904
GMCL	0.078	0.028	0.467	0.080	0.040	0.802	0.177	0.112	0.674	0.240	0.140	0.929
SIDCL	0.065	0.048	0.602	0.042	0.022	0.273	0.143	0.046	0.232	0.221	0.140	0.860
GSSTFDCL	0.081	0.050	0.715	0.074	0.028	0.594	0.128	0.056	0.242	0.247	0.140	0.954
GSIDCL	0.023	0.013	0.000	0.031	0.017	0.119	0.058	0.047	0.006	0.260	0.140	1.000
2017-18												
GIDC	0.057	0.034	0.398	0.067	0.040	0.755	0.202	0.140	0.892	0.164	0.140	0.722
EDC	0.079	0.040	0.627	0.074	0.050	1.000	0.133	0.078	0.376	0.088	0.067	0.000
KTCL	0.100	0.048	0.859	0.061	0.028	0.497	0.242	0.070	0.627	0.096	0.096	0.217
GTDC	0.062	0.028	0.367	0.035	0.017	0.000	0.237	0.093	0.736	0.193	0.140	0.805
GMCL	0.083	0.033	0.575	0.070	0.040	0.801	0.177	0.112	0.674	0.200	0.140	0.825
SIDCL	0.070	0.060	0.797	0.053	0.033	0.475	0.115	0.046	0.155	0.219	0.140	0.882
GSSTFDCL	0.082	0.050	0.762	0.073	0.032	0.714	0.156	0.056	0.319	0.181	0.140	0.769
GSIDCL	0.027	0.017	0.000	0.048	0.026	0.319	0.058	0.047	0.006	0.260	0.140	1.000
2018-19												
GIDC	0.072	0.048	0.690	0.059	0.040	0.616	0.280	0.140	1.000	0.204	0.140	0.772
EDC	0.073	0.040	0.616	0.060	0.050	0.791	0.138	0.078	0.366	0.128	0.067	0.028
KTCL	0.098	0.040	0.775	0.064	0.028	0.456	0.213	0.062	0.456	0.119	0.079	0.084
GTDC	0.047	0.020	0.236	0.066	0.032	0.539	0.213	0.093	0.608	0.221	0.140	0.824
GMCL	0.079	0.033	0.583	0.080	0.040	0.805	0.160	0.112	0.580	0.240	0.140	0.886
SIDCL	0.099	0.060	1.000	0.028	0.020	0.000	0.121	0.046	0.165	0.276	0.140	1.000
GSSTFDCL	0.068	0.050	0.691	0.083	0.033	0.719	0.132	0.039	0.156	0.233	0.140	0.863
GSIDCL	0.023	0.013	0.000	0.040	0.022	0.142	0.064	0.047	0.041	0.260	0.140	0.950
2019-20												
GIDC	0.056	0.040	0.471	0.060	0.033	0.517	0.227	0.140	0.946	0.035	0.035	0.000

SLPE	Performance Criteria											
	Financial performance			Physical performance			Contribution to economy			Contribution to society		
	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i	S_i	R_i	Q_i
EDC	0.088	0.048	0.705	0.074	0.050	0.902	0.133	0.078	0.371	0.100	0.079	0.356
KTCL	0.081	0.034	0.527	0.072	0.040	0.723	0.242	0.070	0.612	0.096	0.096	0.423
GTDC	0.066	0.024	0.361	0.059	0.032	0.490	0.247	0.112	0.848	0.164	0.140	0.788
GMCL	0.074	0.028	0.441	0.087	0.040	0.834	0.153	0.093	0.498	0.241	0.140	0.957
SIDCL	0.123	0.060	1.000	0.020	0.020	0.000	0.123	0.056	0.223	0.207	0.140	0.882
GSSTFDCL	0.051	0.033	0.380	0.060	0.028	0.434	0.139	0.046	0.214	0.193	0.140	0.851
GSIDCL	0.020	0.010	0.000	0.048	0.026	0.323	0.058	0.047	0.006	0.260	0.140	1.000

Source: Author's computation

Table 7.9 shows the utility measure (S_i), regret measure (R_i) and VIKOR index (Q_i). The VIKOR index (Q_i) is calculated with the help of utility measures (S_i) and regret measures (R_i). The VIKOR index (Q_i) is useful to rank the alternatives (SLPEs) in the descending order of (Q_i) (the alternative having the smallest VIKOR value is determined to be the best alternative).

7.4 Ranking of Enterprises

Table 7.10: Ranking of enterprises

Tables from 7.10. a to 7.10.e shows rankings of the enterprise criteria-wise and overall performance rank based on VIKOR analysis.

Table 7.10.a: Ranking based on Financial Performance

SLPE	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Average	Overall rank
GIDC	6	6	7	7	6	4	5	6	5	3	5	5	**5.45**	**7**
EDC	1	1	2	3	1	7	7	5	4	5	4	7	**3.64**	**3**
KTCL	8	8	8	8	8	8	8	3	8	8	6	6	**7.36**	**8**
GTDC	4	4	3	6	4	5	3	2	2	2	2	2	**3.36**	**2**
GMCL	7	6	5	4	7	6	4	7	3	4	3	4	**5.09**	**5**
SIDCL	3	3	1	1	3	1	1	8	6	7	8	8	**3.82**	**4**
GSSTFDCL	5	5	6	5	5	3	6	4	7	6	7	3	**5.36**	**6**
GSIDCL	2	2	4	2	2	2	2	1	1	1	1	1	**1.82**	**1**

Table 7.10.a shows the ranking of the alternatives based on their financial performance during the period from 2008-09 to 2019-20 and also the aggregate rank. Based on the aggregate ranking GSIDCL ranks first followed by GTDC and then EDC. KTCL is at the lowest rank among the SLPEs under study.

Table 7.10.b: Ranking based on Physical Performance

SLPE	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Average	Overall rank
GIDC	6	3	1	3	1	7	5	5	7	6	5	5	**4.45**	**4**
EDC	8	7	8	6	6	4	8	7	8	8	7	8	**7.00**	**8**
KTCL	4	4	4	2	5	5	7	6	5	4	3	6	**4.45**	**4**
GTDC	1	1	2	1	2	8	1	1	1	1	4	4	**2.09**	**1**
GMCL	2	6	5	7	3	6	6	8	6	7	8	7	**5.82**	**7**
SIDCL	7	8	7	8	7	1	4	4	3	3	1	1	**4.82**	**6**
GSSTFDCL	3	2	3	4	8	2	3	2	4	5	6	3	**3.82**	**3**
GSIDCL	5	5	6	5	4	3	2	3	2	2	2	2	**3.55**	**2**

Table 7.10.b. presents the ranking of the alternatives based on their physical performance during the period from 2008-09 to 2019-20 and also the aggregate rank. Based on the aggregate ranking GTDC, GSIDCL and GSSTFDCL are the top three whereas EDC is at the lowest rank among the SLPEs under study.

Table 7.10.c: Ranking based on Contribution to Economy

SLPE	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Average	Overall rank
GIDC	3	4	7	3	7	7	8	8	8	8	8	8	**6.45**	**8**
EDC	4	7	4	4	4	5	4	4	4	4	4	4	**4.36**	**3**
KTCL	8	6	5	6	6	6	5	6	5	5	5	6	**5.73**	**7**
GTDC	5	2	3	7	3	4	6	7	7	7	7	7	**5.27**	**5**
GMCL	2	5	6	5	5	3	7	5	6	6	6	5	**5.09**	**4**
SIDCL	6	3	2	2	2	2	2	2	2	2	3	3	**2.55**	**2**
GSSTFDCL	7	8	8	8	8	8	3	3	3	3	2	2	**5.55**	**6**
GSIDCL	1	1	1	1	1	1	1	1	1	1	1	1	**1.00**	**1**

Table 7.10.c presents the ranking of the alternatives based on their contribution to society during the period from 2008-09 to 2019-20 and also the aggregate rank. Based on the aggregate ranking GSIDCL, SIDCL and EDC are the top three whereas GIDC is at the lowest rank among the SLPEs under study.

Table 7.10.d: Ranking based on Contribution to Society

SLPE	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Average	Overall rank
GIDC	3	4	3	3	5	3	4	5	3	3	3	1	**3.55**	**3**
EDC	1	1	2	2	2	1	2	1	2	1	1	2	**1.45**	**1**
KTCL	2	2	1	1	1	2	1	3	1	2	2	3	**1.64**	**2**
GTDC	6	6	6	4	7	4	5	7	5	5	4	4	**5.36**	**5**
GMCL	5	5	4	5	6	6	6	4	6	6	6	7	**5.36**	**5**
SIDCL	8	8	7	8	4	5	7	2	4	7	8	6	**6.18**	**7**
GSSTFDCL	4	3	5	6	3	7	3	6	7	4	5	5	**4.82**	**4**
GSIDCL	7	7	8	7	8	8	8	8	8	8	7	8	**7.64**	**8**

Table 7.10.d presents the ranking of the alternatives based on their contribution to society during the period from 2008-09 to 2019-20 and also the aggregate rank. Based on the aggregate ranking EDC, KTCL and GIDC are the top three whereas GSIDCL is at the lowest rank among the SLPEs under study.

Table 7.10.e: Ranking based on Overall Performance

SLPE	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Average	Overall rank
GIDC	3	3	6	5	6	5	7	7	6	4	7	3	**5.17**	**5**
EDC	1	1	1	1	2	3	3	3	2	1	1	1	**1.67**	**1**
KTCL	4	5	5	3	5	6	5	4	7	7	6	6	**5.25**	**6**
GTDC	6	4	4	6	4	4	6	6	4	6	4	7	**5.08**	**4**
GMCL	8	8	8	8	8	8	8	8	8	8	8	8	**8.00**	**8**
SIDCL	7	7	3	4	3	1	2	1	3	3	5	5	**3.67**	**3**
GSSTFDCL	5	6	7	7	7	7	4	5	5	5	3	4	**5.42**	**7**
GSIDCL	2	2	2	2	1	2	1	2	1	2	2	2	**1.75**	**2**

Table 7.10.e presents the ranking of the alternatives based on their overall performance during the period from 2008-09 to 2019-20 and also the overall aggregate rank. Based on the aggregate ranking EDC ranks first, GSIDCL ranks second and SIDCL ranks third. Among the rest, GMCL is at the lowest rank.

7.5 Overall Relative Performance of the State Public Sector Enterprises

Table 7.11: Summary of the Relative Performance of the State Public Sector Enterprises

Aggregate Rank	Financial performance	Physical performance	Contribution to economy	Contribution to society	Overall performance
1	GSIDCL	GTDC	GSIDCL	EDC	EDC
2	GTDC	GSIDCL	SIDCL	KTCL	GSIDCL
3	EDC	GSSTFDCL	EDC	GIDC	SIDCL
4	SIDCL	GIDC & KTCL	GMCL	GSSTFDCL	GTDC
5	GMCL	___	GTDC	GTDC & GMCL	GIDC
6	GSSTFDCL	SIDCL	GSSTFDCL	____	KTCL
7	GIDC	GMCL	KTCL	SIDCL	GSSTFDCL
8	KTCL	EDC	GIDC	GSIDCL	GMCL

The arrangement of the SLPEs as per their aggregate ranks under each criterion as well as overall performance is summarised in table 7.11. EDC, which ranks first in the overall performance ranking, has been performing its best in terms of contribution to society which carries the highest weightage as per the weightage derived through AHP. At the same time, GSIDCL is ranked second in its overall performance and is ranked first in financial performance and contribution to the economy. SIDCL is ranked third in its overall performance followed by GTDC ranked fourth, GIDC ranked fifth, KTCL ranked sixth, GSSTFDCL ranked seventh and GMCL being at eighth place.

Thus, the proposed method of relative performance evaluation was validated with a notional example of eight state-level public enterprises in Goa taken as a sample to demonstrate the methodology. It is found that the method is effective in performing the relative performance evaluation among the firms and augments the objectivity of the concept of performance evaluation.

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Chapter Eight
Findings, Conclusion and Suggestion

This chapter seeks to summarise the findings of the study, identify conclusions derived from the findings and make meaningful suggestions. At the same time, the chapter also points out the policy implications of the study, the contribution of the study, limitations and scope for further research.

The public sector enterprises hold an eminent place in the Indian economy and shoulder larger social accountability compared to private enterprises. Considering the social role along with the commercial role of these enterprises and the absence of well-defined criteria and goals, the assessment of their performance to enhance their efficiency has resulted in a thought-provoking situation for economists and researchers. Evaluating the performance of public enterprises using financial dimension has been a common practice in many studies in the past but it fails to justify its existence in society and its contribution to the economy as well as fails to identify whether the enterprise serves its purpose or is a burden on the public exchequer. Till today, there is no academic consensus as to the criteria for performance evaluation of public enterprises, especially for state enterprises. Thus, the absence of well-defined criteria for the performance evaluation of public sector enterprises and a well-established framework for the performance evaluation of public sector enterprises is a significant gap in the literature. The basis of this study has been to address this problem and propose a framework to evaluate the performance of public enterprises. However, the findings of the study cannot be a complete solution to the problem, it just acts as a pointer to the solution and contributes to the existing literature.

The study intended to apprehend the problem in the performance evaluation of public enterprises, identify suitable criteria for measuring the performance of public enterprises and develop a composite model to calculate the performance score of the enterprise. The study assumed a multi-dimensional approach to develop the framework. The study covered two major facets of performance evaluation of public sector enterprises. The first part of the study developed a comprehensive framework and a generic model for the performance evaluation of public sector enterprises using the Analytical Hierarchy Process. The second part of the study demonstrated the developed framework through a

notional example of select public sector enterprises. Further, the study also demonstrated an MCDM-based methodology for relative performance analysis and ranking among the firms using the VIKOR method. The study has used both primary and secondary data as per the requirement to accomplish its objectives of the study. The secondary data collected from the study units have been analysed to make it suitable as per the methodology adopted.

8.1 Findings of the Study

8.1.1 Problems in Performance Evaluation of Public Sector Enterprises

The following problems in the performance evaluation of public sector enterprises are identified through a review of available literature in the area of research:

- ✓ Public sector enterprises, being an important segment of the economy in most developing countries, are expected to accomplish the cherished goal of promoting economic growth along with maximum social gain.
- ✓ To improve the efficiency of an enterprise, it is necessary to evaluate and manage its performance. Moreover, using suitable criteria for evaluating the performance is equally important.
- ✓ The inefficiencies of public sector enterprises not only levy a huge cost to the economy but also distress the social well-being of the community.
- ✓ At a global level, the problems of public enterprises are noticed mainly due to inefficient performance evaluation systems.
- ✓ In most cases the performance of public sector enterprises is measured using the parameter of financial profitability as that of private enterprise ignoring their economic and social contributions.
- ✓ The performance of public enterprise is guided by multiple commercial and non-commercial goals which are contradictory in nature. Thus, the selection of criteria to evaluate its performance is the major problem.
- ✓ Quantification of non-commercial goals is another challenge in the performance evaluation of public enterprises.
- ✓ A public enterprise has an enterprise purpose to fulfil and also contribute to social welfare. Thus, the controversy between financial viability and social profitability keeps tossing each other.

- ✓ Along with the multi-dimensional nature of objectives, multiple stakeholders and lack of assessment data make performance evaluation of public enterprises more difficult.
- ✓ The existence of multiple agencies with differing objectives of evaluation leads to conflicting interests.
- ✓ The objectives of the public enterprise are persuaded by the politico-economic policy of the government. This brings practical difficulties in its operations.
- ✓ A socially effective enterprise cannot justify its financial performance and an inefficient enterprise hides its inefficiency in the name of its social obligations.
- ✓ Moreover, there is no specific framework defined by the government considering the multi-dimensional purview of the performance of public enterprises.
- ✓ Various reforms are ushered from time to time by the Indian Government to enhance the performance of public sector enterprises. Two major reforms among these are the MOU system and the introduction of corporate governance practices.
- ✓ These reforms have shown significant improvement in the performance of central public sector enterprises. However, state-level public enterprises are still not mandated with these reforms as they involve operational interference from the government.

8.1.2 Key Performance Indicators

The problem of performance measurement of public sector enterprises seems more complex in pursuance of multiple conflicting criteria having a high stake and affecting multiple stakeholders. These reasons necessitate structuring a robust framework of performance evaluation for public sector enterprises taking into account the multiple objectives of the enterprise. The past studies in this direction were helpful in identifying the criteria and parameters to be considered for the evaluation of the overall performance of public sector enterprises. The parameters instrumental in the performance of public sector enterprises are viewed not only from a narrow commercial angle but also from balancing both commercial and non-commercial objectives of the enterprise. Considering the fact that public sector enterprises need to function in a more corporate way retaining their social and strategic role, financial performance parameters are combined with its physical performance, and contribution to the economy and society to assess the overall

performance. Further, the parameters under each criterion are identified from the literature. All together 15 parameters under the four criteria are considered for developing the model and for analysis of the performance. Thus, the criteria suggested are

- ✓ ***Financial performance***:

  Financial performance is an important criterion to assess the financial efficiency of the enterprise. The parameters considered to assess the financial performance are profitability measured in terms of return on assets ratio, liquidity measured in terms of current ratio and debt asset ratio to measure the solvency position of the companies.

- ✓ ***Physical performance:***

  The goods and services delivered by these enterprises reflect their significance in the overall social and economic progress of the country. Therefore, the criterion of physical performance is important to know how effectively each of these enterprise are managed and their relative performance in contributing to the economy. The parameters of physical performance considered in the study are output/deliverables measured through the growth rate in output, impact of the activity measured using the ratio of turnover of the enterprise to the state's GDP and efficiency of operation measured in terms of cost of revenue ratio.

- ✓ ***Contribution to the economy***:

  The economic efficiency of Public Sector Enterprise relates to the net contribution made by the enterprise to output and growth of the economy. The parameters considered in the study to assess the contribution of the enterprise to the economy are Internal resource generation, contribution to the exchequer, the growth rate of employment generated in the enterprise and value addition made by the enterprises.

- ✓ ***Contribution to society***:

  Society's stake in the Public Sector Enterprise is more than its owners. Thus, its social efficiency is important to be analysed in terms of its contribution towards social obligations benefitting various stakeholders. The parameters to assess the contribution to society are promoting research and development, protection and conservation of the environment, community welfare, Human resource development and corporate governance.

8.1.3 Performance Evaluation Model

A unified model is developed to assess the performance of public enterprises using the identified performance indicators. For framing the structured equation each parameter is weighed by application of the most widely used MCDM technique- the conventional Analytical Hierarchy Process (AHP). The criteria and parameter weights are as follows:

Table 8.1: Weights of criteria & parameters based on AHP analysis

	Performance Parameters														
	Financial performance (0.14)			Physical performance (0.12)			Contribution to Economy (0.33)				Contribution to society (0.41)				
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
Weights	0.03	0.06	0.05	0.04	0.03	0.05	0.07	0.05	0.14	0.07	0.04	0.05	0.14	0.12	0.06

- ✓ Contribution to society holds the highest weightage for overall performance evaluation of SLPEs.
- ✓ Among the financial performance parameters, liquidity holds the highest importance followed by solvency and then profitability.
- ✓ Among physical performance parameters, the efficiency of operations holds higher weightage followed by output and then impact.
- ✓ Among the parameters to assess the contribution made by the SLPEs to the economy, experts have given the highest weightage to Employment generation.
- ✓ In terms of the contribution of the SLPE towards society, the highest-ranked parameter is community welfare.

Table 8.2: Developed Performance Evaluation Model

$$Performance\ Score\ = 0.03P_1 + 0.06P_2 + 0.05P_3 + 0.04P_4 + 0.03P_5 + 0.05P_6 + 0.07P_7 + 0.05P_8 + 0.14P_9 + 0.07P_{10} + 0.04P_{11} + 0.05P_{12} + 0.14P_{13} + 0.12P_{14} + 0.06P_{15}$$

Source: Author's computation

The developed performance evaluation model as shown in table 8.2 can be used as a unified framework for evaluating the performance of the enterprise and obtaining a performance score.

8.1.4 Macro Analysis of State Public Sector Enterprises in Goa

- ✓ As per the CAG Report for the year ended 31st March 2019, there are 16 state public sector undertakings other than the Power Sector which includes 14 Government Companies (including one subsidiary company GEL) and 02 Statutory Corporations (GIDC and GITDCL). Of these public sector undertakings, the State Government invested funds in 15 undertakings excluding one active subsidiary company. The majority of the enterprises are concentrated in the social sector.
- ✓ The arrears of accounts of the state public sector enterprises range from 1 to 14 years. The arrears of accounts may result in the risk of fraud and leakage of public money apart from violation of the provision of the relevant statutes. Moreover, due to arrears of accounts, the actual contribution of the state public sector enterprises to State GDP for the year cannot be ascertained and their contribution to the State exchequer cannot be reported to the State Legislature.
- ✓ The number of profit-making enterprises has increased since 2008-09 which is a positive sign but there was no stability in the profit earned by these profit-making enterprises. A 3 per cent CAGR in profits earned is observed, at the same time the loss sustained over the period also shows a CAGR of 3 per cent. Over the years EDC, GIDC, GSIDCL and SIDCGL were the major contributors of profit among the profit-making units and KTCL, GTDC, and GFDCL were incurring heavy losses among the loss-making units.
- ✓ As owners, the Government of Goa has a huge financial stake in these enterprises in the form of share capital and loans, special financial support and guarantees.
- ✓ The total investment in SPSEs in the form of equity and loans which was ₹492.14 crores in 2008-09 has grown to ₹ 1347.66 crores in 2018-19 recording a compounded annual growth rate of 10 per cent and average annual growth rate of 12.70 per cent. The total investment of the state government in the enterprises over the period has grown from ₹293.88 crores in 2008-09 to ₹1209.26 crores in 2018-19 with a compounded annual growth rate of 14 per cent and an average

annual growth rate of 15.25 per cent. Out of the total investment as of 31st March 2019, 72.92 per cent is in the form of grants and subsidies. It is an indicator of the extent to which the operations and losses of the SPSEs are financed by the State Government reflecting a drain on the state resources.

- ✓ The investment of the state government in the form of equity has grown from ₹210.63 crores to ₹312.08 crores recording a compounded annual growth rate of 4 percent and annual average growth rate of 4.11 percent. The outstanding interest-free loans provided to the SPSEs that stand to be ₹3.3 crores in 2018-19 record a compounded annual growth rate of 6 per cent and an average annual growth rate of 28.99 per cent. The grants and subsidy provided to the SPSEs has increased from ₹81.54 crores in 2008-09 to ₹ 893.88 crores in 2018-19. The compounded annual growth rate of grants and subsidies to SPSEs has been 24 per cent against the average annual growth rate of 27.81 per cent.
- ✓ The sector-wise analysis of annual investment in the SPSEs shows that funds infused in the social sector show a compounded annual growth rate of 15 per cent and an average annual growth rate of 32.64 per cent. The funds infused by the state government in the enterprises operating in competitive environments recorded a compounded annual growth rate of 25 per cent and an average annual growth rate of 128.85 per cent. On the contrary, the investment in enterprises in other sectors shows a CAGR of (183) per cent and an average annual growth rate of (16.50) per cent. The total funds infused each year show a CAGR of 16 per cent and an AAGR of 31.17 per cent. Thus, the thrust of investment in the SPSEs by the state government has been in the enterprises operating in the competitive sector and mainly as grants and subsidies towards their operational expenses or losses.
- ✓ The present value of investment calculated taking into account the average rate of interest on government borrowings is ₹2221.49 crores showing a CAGR of 15 per cent. Over the years huge amounts have been invested towards grants and subsidies for SPSEs recording a CAGR of 42 per cent which is a huge financial burden on the state finances.
- ✓ The total budgetary outgo has increased from ₹139.31 crores in 2008-09 to ₹653.74 crores in 2018-19 recording a CAGR of 15 per cent. A large portion of

the budget each year has been provided for grants and subsidies for capital and revenue purposes.

- ✓ The turnover of the SPSEs taken together has recorded growth over the period from 2008-09 to 2018-19. The annual growth in turnover shows an increasing trend whereas the GSDP also has increased over the period but the annual growth rate has been diminishing. The turnover that has increased from ₹459.33 crores in 2008-09 to ₹1103.42 in 2018-19 shows an AAGR of 9.66 per cent and CAGR of 8 per cent against the GSDP that shows an AAGR of 12.08 per cent and CAGR of 11 per cent. The share of turnover of SPSEs in the GSDP ranges from 1.06 per cent to 1.81 per cent with fluctuations seen over the period.
- ✓ The number of employees shows a decline from 2008-09 till 2013-14. Thereafter it showed an increasing trend up to a maximum of 3706 employees in the year 2018-19. The CAGR recorded is 1 per cent and the AAGR is 1.21 per cent.
- ✓ The total paid-up capital over the period has increased from ₹ 200.62 crores to ₹ 377.81 crores recording an AAGR of 7.17 percent and CAGR of 6 percent.
- ✓ The debt position of SPSEs shows a higher increasing rate as compared to capital. The AAGR of Debt is 24.29 per cent and the CAGR is 14 per cent.
- ✓ The positive sign about the financial position of the SPSEs is the decline in the accumulated losses at an annual average rate of 28.14%.
- ✓ The interest payments have increased from ₹27.62 crores in 2008-09 to ₹114.3 crores in 2018-19 recording an AAGR of 16.15 per cent and CAGR of 14 per cent. This continues to be worrisome as a substantial portion of the revenue of SPSEs is washed in interest payments.
- ✓ The capital employed represents the sum total of investment in the net gross block and working capital or sum total of investment in equity, debts and internal resources. The capital employed in the SPSEs has grown at an AAGR of 11.43% and a CAGR of 9% with the increased budgetary support from the state government.
- ✓ The net worth has registered an increasing trend from ₹118.16 crores in 2008-09 to ₹441.06 crores in 2018-19 except in 2013-14 and 2014-15 which recorded a decline in the net worth. The net worth shows an AAGR of 17.43 per cent and a CAGR of 13 per cent. The increased net worth is the result of reduced accumulated losses and increased profit reported by the profit-making SPSEs in

comparison to the losses sustained by the loss-making units. Thus, the overall net worth was positive and increasing.

- ✓ The return on the net worth ratio for the period from 2008-09 to 2018-19 has been below 15 per cent in all the years except 2015-16 and even negative in 2011-12. The positive return on net worth ratios has been fluctuating from a minimum of 2.38 per cent to 15.20 per cent.
- ✓ The rate of return on investment (at historical cost) ranged between the lowest mark of (30) per cent to the highest mark of 8.35 per cent showing a CAGR of (6) per cent.
- ✓ The rate of return on the present value of investment ranged from a minimum of (18) per cent and a maximum of 5.21 per cent with a CAGR of (7) per cent. The SPSEs are expected to earn a return of 6 to 7.5 per cent on the present value of the investment of the state government. Thus overall, the SPSEs are seen to be underperforming and are unable to recover the cost of investment incurred by the state government.
- ✓ The return on capital employed ranged between 7.28 per cent lowest in 2010-11 and 21.64 per cent in 2008-09 registering a CAGR of (4) per cent. The ROCE is seen diminishing from 2008-09 to 2011-12 and has been improving since 2012-13 except in 2016-17.

8.1.5 Performance Analysis of Select State Public Sector Enterprises in Goa.

- ✓ Out of the eight public sector enterprises from Goa selected as samples for analysis based on the availability of data, four belong to the social sector, two operate in the competitive environment and two are in the other sector.
- ✓ The state government has invested huge funds in these enterprises by way of capital, loans, grants and subsidies and also in the form of guarantees for loans availed by the enterprises from financial institutions with major investments made in KTCL, SIDCGL and GSSTFDCL.
- ✓ The shareholder's equity in the case of EDC, SIDCL, SSTFDCL and GSIDC shows an increasing trend over the period whereas in the case of GIDC, GTDC and GMCL it fluctuates throughout the period.
- ✓ The net worth of GMCL has been constantly decreasing since 2016-17 due to large payments or accumulated losses which have depleted the retained earnings. The

net worth of KTCL is found to be negative throughout the period which is a cautioning sign that the company is in financial distress. EDC has the highest equity averaging ₹363.46 crores.

- ✓ The capital employed in EDC, SIDCL, SSTFDCL and GSIDC has substantially increased during the period. Also, negative capital employed has been noticed in the case of KTCL from 2008-09 till 2012-13 and then has improved since 2013-14. GIDC showed negative capital employed in the year 2012-13. The highest capital employed is in EDC with an average of ₹367.33 crores followed by GSIDCL ₹357.55 crores.
- ✓ The total assets position of all the select SOEs over the period from 2008-09 to 2019-20 has substantially improved which is a good sign as it improves the company's ability to pay its debt obligations. GSIDCL has the highest total assets averaging ₹665.12 crores with the highest SD of 420.56 followed by EDC ₹623.93 crores and GIDC with ₹479.91 crores. GMCL has the lowest average total assets of ₹9.01 crores.
- ✓ There is substantial growth seen in the total revenue of all the state enterprises under study except GMCL and SIDCL showing regular fluctuations in their total revenue. GSIDC has shown exquisite growth in its total revenue with an average of ₹385.25 crores over the period followed by KTCL ₹129.66 crores and EDC ₹75.89 crores.
- ✓ The profitability measured through NPAT of the enterprises does not present a very impressive scenario. Among these units, only EDC, GSIDC and GSSTFDCL showed profit earned throughout the period and SIDCL has also generated profit during the period except in 2018-19 and 2019-20. Whereas the rest units showed a dismal picture of profitability. EDC is found to be the most profitable enterprise.

8.1.6 Performance Analysis Based on Developed Framework

The performance analysis of the select state enterprises is done using fifteen parameters broadly classified into four major criteria: financial performance, physical performance, contribution to the economy and contribution to the society. The developed model is used as a basis to calculate the criteria and overall performance score of the enterprises. The analysis led to the conclusion that:

8.1.6a Analysis of Financial Performance

- ✓ Only 4 out of 8 state-owned enterprises i.e., EDC, SIDCL, GSSTFDCL and GSIDC showed a positive average ROA ratio. Of these, only EDC has an average ROA ratio slightly higher than 5%, whereas SIDCL, GSSTFDCL and GSIDC have a ratio of less than 5%. ROA ratio of less than 5% is generally considered low and above 20% is excellent. But this may vary from industry to industry as there is no such ideal ROA ratio. As a whole the assets of the firms are not effectively utilised in generating income.
- ✓ GIDC and KTCL have an average liquidity ratio of less than one which indicates poor liquidity and shortage of working capital in these firms. Other enterprises have better liquidity positions except GSSTFDCL and SIDCL which have average liquidity ratios noticeably higher than the standard.
- ✓ All the enterprises under study except KTCL and SIDCL, have an average debt-to-asset ratio below 1 and are financially safe as major portions of their assets are financed out of equity.

8.1.6.b Analysis of Physical Performance

- ✓ Constant fluctuations are observed in the output of all the SOEs. The high standard deviation also reflects the data is more spread out for all SOEs. The average growth rate in output of SIDCGL is the highest i.e., 2,228.44 especially due high rate of deliverables between 2011-12 and 2017-18. At the same time, the rate of deliverables of GTDC and GMCL has decreased tremendously in 2018-19 and 2019-20.
- ✓ All the enterprises have a very thin share in the GSDP. Thus, creating a very low impact of their activity in the economy. The ratio has been constantly fluctuating during the period of study.
- ✓ The efficiency of operation measured in terms of the cost of revenue to total revenue of the enterprise revealed that the average cost-revenue ratio of all the SOEs is less than 1 except GTDC and GMCL showing high operating costs. EDC is found to be the most efficient in its operation with the lowest cost of operation.

8.1.6.c Analysis of Contribution to Economy

- ✓ It is observed that a substantial contribution to the exchequer is from GIDC followed by GSIDC which is on an average of 0.80 and 0.43. Nominal contributions are also made from EDC, GMCL and SIDCL. But in the case of GTDC and KTCL, the ratio is negative as subsidies received from the government are more than the contribution to the exchequer. Thus, these enterprises are more dependent on support from the government for maintaining their operations. GSSTFDCL has no contribution to the exchequer throughout the period.
- ✓ On an average the growth rate in employment is found to be favourable i.e., above 100 per cent in the case of SIDCL, GSSTFDCL, GSIDC and KTCL. High deviation is observed in the employment situation of SIDCL and GSSTFDCL with a sharp increasing trend seen from 2014-15 onwards. Whereas in the case of GTDC, GMCL, EDC and GIDC a gradual decline is observed.
- ✓ Only KTCL has a negative value addition to total investment throughout the period due to its huge accumulated losses. The highest average value addition ratio is observed of GSIDC i.e., 17.31 times of the funds invested in the enterprise.

8.1.6.d Analysis of Contribution to Society

- ✓ Expenditure on R&D is an essential requirement recommended by DPE, Govt of India, for public enterprises to provide better goods and services and improve competitiveness. However, as per the analysis, during the period of study, only GMCL has spent an average of 4.3 per cent of total revenue, GSSTFDCL has spent an average of 0.12 per cent and GSIDCL has spent an average of 0.09 per cent of their total revenue on upgrading the technology.
- ✓ As per the recommendations of DPE, Govt. of India, public enterprises should play an active role in the protection of the environment by implementing strategies that reduce pollution in the environment. However, none of the enterprises has spent any amount on the protection and conservation of the environment during the period under study.
- ✓ KTCL has been the highest contributor towards social overhead by spending on average 35.57 per cent of its total turnover for subsidies to the public. EDC also has spent an average of 2.04 per cent of its total revenue on social overheads by

way of subsidies on loans granted to the public. The contribution to community welfare from other enterprises has been negligible.

- ✓ The ratio of the amount spent by state enterprises on the development of human resources to total revenue over the period is less than 10 per cent of total revenue in all the enterprises except in GIDC where 11 per cent and GMCL where 16 per cent of the total revenue is spent on HRD.
- ✓ All the state enterprises under study are complying with the basic corporate governance requirements for efficient functioning and maintaining transparency of operations. Only in the case of GMCL, the independence of the board is not compiled in all the years and also the minimum number of board meetings was not held in 2009-10, 2012-13 and 2013-14.

8.1.7 Performance Scores

Table 8.3: Criteria-wise Average Performance Score

Criteria-wise average performance score (in percentage)								
Criteria	**GIDC**	**EDC**	**KTCL**	**GTDC**	**GMCL**	**SIDCL**	**GSSTFDCL**	**GSIDC**
Financial performance (14%)	7.938	8.162	3.303	4.818	4.629	3.686	3.678	10.833
Physical performance (12%)	4.373	8.145	8.818	10.020	6.706	4.045	6.304	8.318
Contribution to the economy (33%)	14.21	23.02	1.12	12.48	21.77	17.64	7.79	20.75
Contribution to society (41%)	12.21	17.36	20.59	16.26	12.73	9.92	12.52	19.40

- ✓ GSIDCL, EDC and GIDC are the top three enterprises in financial performance.
- ✓ GTDC, KTCL and GSIDC are the top three enterprises in physical performance.
- ✓ EDC, GMCL and GSIDCL are the top three contributors to the economy.
- ✓ GSIDC, KTCL and EDC are the top three contributors to society.

The findings support the findings of (H. Gupta, 2017) that the financially sound public enterprise can make a significant contribution to the society. But at the same time, the proposition made by (S. Gupta, 2010) is found suitable for KTCL as its financial

performance score is the lowest but has the highest score for contribution to society. Thus, it is worth mentioning that the poor financial performance of public enterprises

Table 8.4: Average Overall Performance Score

SLPSE	GIDC	EDC	KTCL	GTDC	GMCL	SIDCL	GSSTFDCL	GSIDC
Mean %	39.895	56.691	33.834	43.587	43.964	35.285	31.459	61.400

Source: Author's computation

Based on the average overall performance score, GSIDC ranks first, second being EDC followed by GMCL and GTDC.

Table 8.5: Ratings of the enterprises based on average overall performance score

Average overall performance score (in percentage)	Rating	SLPEs
90-100	Excellent	--
70-90	Very Good	--
50-70	Good	GSIDC, EDC
33-50	Fair	GIDC, GTDC, KTCL GMCL, SIDCL
0-33	Poor	GSSTFDCL

Ratings based on the overall performance scores, only two enterprises EDC and GSIDC are rated as "Good" as their overall average score is above 50 per cent. GIDC, KTCL, GTDC, GMCL, SIDCL and GSSTFDCL are rated "Fair" as their performance scores are between 33-50 per cent.

8.1.8 Relative Performance Evaluation

The study also presented the MCDM-based VIKOR method in combination with AHP for relative performance evaluation of the enterprises. The AHP-VIKOR duo is found effective in performing the relative performance evaluation among the firms and augments the objectivity of the concept of performance evaluation. The findings of the analysis are as follows:

Table 8.6: Summary of Relative Performance Evaluation (Ranking) of the select State Public Sector Enterprises

Aggregate Rank	Financial performance	Physical performance	Contribution to economy	Contribution to society	Overall performance
1	GSIDCL	GTDC	GSIDCL	EDC	EDC
2	GTDC	GSIDCL	SIDCL	KTCL	GSIDCL
3	EDC	GSSTFDCL	EDC	GIDC	SIDCL
4	SIDCL	GIDC & KTCL	GMCL	GSSTFDCL	GTDC
5	GMCL	-	GTDC	GTDC & GMCL	GIDC
6	GSSTFDCL	SIDCL	GSSTFDCL	-	KTCL
7	GIDC	GMCL	KTCL	SIDCL	GSSTFDCL
8	KTCL	EDC	GIDC	GSIDCL	GMCL

- ✓ EDC ranked first in the overall performance ranking and has been performing its best in terms of contribution to society which carries highest weightage as per the weightage derived through AHP.
- ✓ GSIDCL is ranked second in its overall performance and is ranked first in financial performance and contribution to the economy.
- ✓ SIDCL ranked third in its overall performance and second in contribution to the economy.
- ✓ GTDC ranked fourth in overall performance and first in physical performance.
- ✓ GIDC ranked fifth in overall performance followed by KTCL ranked sixth, GSSTFDCL ranked seventh and GMCL was in eighth place.

8.2 Conclusion

Performance management aims at improving efficiency to achieve better outcomes as Peter Drucker rightly said "What gets measured gets improved." The discipline of performance management has a long tradition in the private sector. However, in recent times it has gained importance also in public sector enterprises, though the metrics for measuring the performance may not be the same. Financial indicators cannot be a yardstick to measure the performance according to the type and mission of public sector enterprises. Studies have advocated the need for a multidimensional approach to the performance evaluation of public enterprises in pursuance of their multiple objectives. The study is an attempt to devise a comprehensive framework for the performance evaluation of public sector enterprises. As public

enterprises are mandated with multiple and varied objectives, the MCDM approach for its performance evaluation is a befitted methodology. The study has identified the suitable criteria and parameters under each criterion for objective performance analysis of state-level public enterprises. The criteria and parameters are weighted using the most commonly used MCDM technique - AHP (Analytical Hierarchy Process). The model developed using the derived criteria weights becomes a unified framework for evaluating the performance of the enterprise and obtaining a performance score. Considering the fact that public sector enterprises need to function in a more corporate way retaining their social and strategic role, financial performance parameters are combined with its physical performance, and contribution to the economy and society to assess the overall performance. All together 15 parameters under the four criteria are considered for developing the model and for analysis of the performance. The framework developed and demonstrated through this study is robust and easy to compute the performance score and ranking of the enterprises not only in the public sector but also in the private sector using multiple criteria.

Based on the AHP analysis, the criterion contribution to society holds the highest weightage for the overall performance evaluation of SLPEs followed by a contribution to the economy, financial performance and physical performance. In terms of contribution to society, the parameter community welfare has gained the highest importance. The findings are in line with the mandate of setting up of public sector enterprises. The performance scores calculated using the developed model help to give ratings to the observed units. As per the aggregate performance score, the study evidenced that only two out of the eight SLPEs in Goa under study are rated as “Good”, four are rated “Fair” whereas one enterprise is rated as “Poor”.

In addition, the study also performed a relative performance analysis among the firms and ranked them by applying the VIKOR method. Each criterion and parameter contribute to determining the overall performance of the enterprises and is ranked accordingly. As per the overall performance ranking obtained using the VIKOR method, EDC is ranked first, followed by GSIDCL and SIDCL.

The overall scenario of the public sector enterprises in the state of Goa reflects that the majority of the public sector enterprises are concentrated in the social sector. However, the thrust of investment in the SLPEs by the state government has been in the enterprises operating in the competitive sector. A large portion of the investment is in the form of grants and subsidies. It is an indicator of the extent to which the operations

and losses of the SLPEs are financed by the State Government and also reflects a drain on the state resources. An increase in profit number of profit-making units, an increasing trend in turnover as well as the share of turnover in the GSDP, decline in accumulated losses and improved net worth are the positive observations made through the study. But there is a concern about the increasing rate of debt, interest payments, arrears of accounts and a negative return on investment which is an indicator of underperformance of the public sector enterprises in the state of Goa.

8.3 Suggestions

8.3.1 General Suggestions

- ✓ Performance evaluation system for public enterprises should be developed considering its multiple objectives and goals.
- ✓ There should not be any scope for disagreement between financial profitability and social profitability as the latter without the former is not possible.
- ✓ Proper theory and concept of performance evaluation for public enterprises specifically state-level enterprises are needed to enhance the performance of public enterprises in the country.
- ✓ Social obligations of public enterprises need to be clearly and objectively defined.
- ✓ The social burden of a public enterprise should be accounted for before evaluating its commercial performance.
- ✓ The boards of the public enterprises should be empowered to make relevant decisions in the interest of all the stakeholders.
- ✓ Government interference in the functioning of the state enterprises should be minimized.
- ✓ The present accounting system in public enterprises needs to be integrated with its commercial and non-commercial objectives to reflect the true and fair view of its performance.

8.3.2 Suggestions Specific to State Public Sector Enterprises in Goa

- ✓ Effective measures are required to clear the backlog of accounts of the state enterprises and ensure that the accounts are maintained up to date.
- ✓ The enterprises should pursue and maintain a definite dividend policy.

- ✓ The state government should reflect on devising a systematic performance evaluation system for state public enterprises to enhance their performance.
- ✓ The state enterprises need to focus on research and development at all levels to improve their efficiency and aid professionalism in their operations.
- ✓ There is a need to emphasise human resource development to improve their productivity and efficiency.
- ✓ The enterprises need to be more responsive towards the achievement of their objectives.
- ✓ The profitability of the enterprises is low due to its high cost of operation. Thus, there is a need to focus on cost control and cost reduction.

8.4 Implications of the Study

Our study presents an important subject related to criteria and methodology for performance evaluation of public sector enterprises The analytical framework presented through the study serves as a guideline on how multiple criteria can be incorporated and weighted for objective performance evaluation of public sector enterprises. The proposed methodology suggests how the MCDM-based performance measurement approach can be developed and used to evaluate the performance.

8.5 Contribution of the Study

This study productively adds to the existing rare literature on performance evaluation systems for public sector enterprises based on multiple criteria. The multi-dimensional framework developed through this study is a novel approach for the objective performance evaluation of the state public sector enterprises by quantifying the performance of the enterprise in the form of a performance score. The framework used in the acts as a guideline to identify the performance indicators, generate weights for the indicators and develop a model. Further, the study also demonstrates a system for relative performance analysis among the firms and ranks them accordingly. This study offers a solution to the problem of quantifying the performance of public sector enterprises in terms of the results that a public enterprise is expected to achieve. Finally, the results of the study will also help the policymakers and managers in proper planning and implementation of performance evaluation systems in the enterprise.

8.6 Limitations of the Study

- ✓ The indicators identified for developing the framework are based on the review of available literature.
- ✓ All the 15 performance indicators identified for the study are those that can be quantified and expressed in operational form but are not exhaustive in measuring the performance.
- ✓ The social/non-commercial indicators of public enterprise are not spelt out anywhere in the literature and are difficult to quantify.
- ✓ The study has made an attempt to define some physical and social performance indicators and express them in quantifiable terms which can be a limitation of this study.
- ✓ Other ratios can be used instead of the ones which are used in the study.
- ✓ The developed model is based on the qualitative data collected from the experts who are the stakeholders of the public sector undertakings. The perspective of the participants may vary as they are not from the same functional role in the enterprise.
- ✓ The period for the study is only 12 years which could have been more if the data could be made available.
- ✓ Availability of analogous uniform data has been a major problem.
- ✓ All the enterprises selected for study belong to different businesses having diverse objectives. Thus, all the performance measures may not be uniformly applied.

8.7 Scope for Further Research

. The avenues for further research are as follows:

- ✓ The performance indicators can be chosen and adjusted according to the requirements of the study.
- ✓ The study can be extended to central public sector enterprises or even private sector enterprises with suitable indicators of their performance.
- ✓ There is an immense opportunity to conduct a study with the application of other MCDM techniques available in the literature.

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Annexure I

QUESTIONNAIRE FOR STUDY

ON

PERFORMANCE EVALUATION OF PUBLIC SECTOR ENTERPRISES

Dear Respondent,

I am a research scholar pursuing a part-time PhD at the Research Centre, Government College of Arts and Commerce, Pernem, affiliated with Goa Business School under the guidance of Prof. Sanjay P. Sawant Dessai. The title of our study is "PERFORMANCE EVALUATION OF PUBLIC SECTOR ENTERPRISES". Our study aims at developing a framework to evaluate the performance of public sector enterprises. This questionnaire is *a* tool used to set priorities and generate weights for each criterion and parameter identified for the purpose of analysis. The weights will be generated based on the decision maker's pair-wise comparison of the criteria. Thank you for being one of the decision-makers in the process of the survey. You are requested to kindly fill out this questionnaire. A brief description of the purpose of the survey and instructions are provided for your reference. The data collected through this questionnaire will be used purely for academic research purposes.

Table 1: Profile of the respondent

Designation	Higher Managerial level in PSE	☐
	Functional Managerial level in PSE	☐
	Employee in PSE	☐
	Academician (Representing the general public)	☐
Educational Background (can choose more than one option)	Computer / IT	☐
	Engineering	☐
	Management	☐
	Economics	☐
	Accounting	☐
	Other discipline	☐

About the study:

For developing the framework, we propose to use the Analytical Hierarchy Process introduced by Thomas Saaty in the 1970s. It is an effective multi-criteria decision-making tool used to set priorities and generate weights for each evaluation criterion based on the decision maker's pair-wise comparison of the criteria. The higher the weight more important is the corresponding criteria.

Table 2 given below presents the hierarchical structure of the performance indicators identified to develop the framework. All together 15 parameters are categorised into four criteria and further classified into sub-criteria under each criterion.

Table 2: Hierarchical structure of criteria

Overall Performance			
Financial performance (C1)	**Physical Performance (Enterprise Specific) (C2)**	**Contribution to economy (C3)**	**Contribution to the Society (C4)**
Profitability	Output/ Deliverables	Internal Resource Generation	Promoting Research & Development, Innovation and Technological up-gradation
Liquidity	Impact of Activity	Contribution to Exchequer	Protection and Conservation of the Environment
Solvency	Efficiency of Operation	Employment Generation	Community Welfare
		Value Addition	Human Resource Development
			Corporate governance

Table 3 below provides the judgement scale suggested by Satty to set relative importance between the two criteria. The numerical scale of judgement ranges from 1-9 representing how much one criterion dominates another.

Table 3: Judgement Scale

Scale	Definition	Explanation
1	Equal importance	Two indicators contribute equally to the objective
3	Moderate importance	Judgement moderately favours one indicator over another
5	Essential or strong importance	Judgement strongly favours one indicator over another
7	Very strong importance	Judgement very strongly favours one indicator over another
9	Extreme importance	Judgement extremely favours one indicator over another in the highest order of affirmation.
2,4,6,8	Intermediate values between two adjacent judgements.	When compromise between two scales of judgment is needed.

Instructions to fill the questionnaire:

- In the pair-wise comparison tables given below, you will find indicators at two ends of the table - extreme left and extreme right and a numerical judgement scale in between the indicators to be compared row-wise.
- According to your judgement and experience:
  - ✓ If the indicator in the left column of the table is more important than the indicator in the right column (in the same row) then mark one of the checkboxes located in the left side of "equal" (equal =1) based on the level of importance in comparison of two indicators. The importance of the indicator to the left in comparison to the indicator to the right decreases from left to right.
  - ✓ If you find that the indicator in the right column of the table is more important than the indicator in the left column (in the same row) then mark one of the checkboxes located on the right side of "equal" (equal =1) based on the level of importance in comparison of two indicators. The importance of the indicator

to the right in comparison to the indicator to the left decreases from right to left.

Mark your opinion about the relative importance of the factors given on the two sides of the scales

Refer to the scoring pattern and put tick marks on the number of your choice on each scale.

Table 4: Scoring pattern

Judgement scale																
LHS: A ⇦									⇨ **RHS: B**							
9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**

If 'A' is more important, use the left-hand side (LHS) of the scale.

If 'A' and 'B' are equally important, put a tick mark on the centre portion (MIDDLE) of the scale.

If 'B' is more important, use the right-hand side (RHS) of the scale.

- Please maintain the logical consistency of your responses.

  (e.g. A is more important than B, B is more important than C, therefore A should be more important than C)

Table 5: Pairwise comparison between the criteria of performance evaluation of public enterprise.

Please determine the level of importance of criteria on the left side of the table in comparison to the right side of the table with regard to the overall performance evaluation of the public enterprise. The comparison will help to determine the weightage for each criterion in the overall performance evaluation of the public enterprise.

{Tick ☑in the appropriate column of the judgement scale}

Criteria	**Judgement scale**																	**Criteria**
	9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**	
Financial performance																		Physical performance
Physical performance																		Contribution to society
Physical performance																		Contribution to the economy
Financial performance																		Contribution to the economy
Financial performance																		Contribution to society
Contribution to the economy																		Contribution to society

Table 6: Pairwise comparison between the parameters of financial performance of public sector enterprises.

Please determine the level of importance of parameters on the left side of the table compared to the right side of the table regarding the examination of the financial performance of public sector enterprises. The comparison will help to determine the weightage for each parameter in the examination of the financial performance of public sector enterprises.

{Tick ☑in the appropriate column of judgement scale}

Criteria	**Judgement scale**																	**Criteria**
	9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**	
Profitability																		Liquidity
Liquidity																		Solvency
Profitability																		Solvency

Table 7: Pairwise comparison between the parameters of physical performance of public sector enterprises.

Please determine the level of importance of parameters on the left side of the table compared to the right side of the table regarding the examination of the physical performance of the public enterprise. The comparison will help to determine the weightage for each parameter in the examination of the physical performance of the enterprise.

{Tick ☑in the appropriate column of judgement scale}

Criteria	**Judgement scale**																	**Criteria**
	9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**	
Output																		Impact
Impact																		Efficiency of operation
Efficiency of operation																		Output

Table 8 : Pairwise comparison between the parameters of Contribution of public sector enterprises to the economy.

Please determine the level of importance of parameters to the left side of the table compared to the right side of the table regarding assessing the contribution of public sector enterprises to the economy. The comparison will help to determine the weightage for each parameter in assessing the contribution of public sector enterprises to the economy.

{Tick ☑in the appropriate column of judgement scale}

Criteria	**Judgement scale**																	**Criteria**
	9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**	
Internal resource generation																		Contribution to exchequer
Contribution to exchequer																		Employment generation
Employment generation																		Value addition
Value addition																		Internal resource generation
Employment generation																		Internal resource generation
Contribution to exchequer																		Value addition

Table 9 : Pairwise comparison between the parameters of the contribution of public sector enterprises to the society.

Please determine the level of importance of parameters to the left side of the table in comparison to the right side of the table with regard to assessing the contribution of public sector enterprises to society. The comparison will help to determine the weightage for each parameter in assessing the contribution of public sector enterprises to society.

{Tick ☑in the appropriate column of judgement scale}

Criteria	**Judgement scale**																	**Criteria**
	9	8	**7**	6	**5**	4	**3**	2	**1**	2	**3**	4	**5**	6	**7**	8	**9**	
Promoting research & development, innovation and technological up-gradation																		Protection & conservation of environment
Protection & conservation of environment																		Community welfare
Community welfare																		Human resource development
Human resource development																		Promoting research & development, innovation and technological up-gradation
Corporate Governance																		Promoting research & development, innovation and

																		technological up-gradation
Protection & conservation of environment																		Human resource development
Promoting research & development, innovation and technological up-gradation																		Community welfare
Protection & conservation of environment																		Corporate Governance
Community welfare																		Corporate Governance
Corporate Governance																		Human resource development

Annexure II

QUESTIONAIRE FOR STUDY

ON

PERFORMANCE EVALUATION OF PUBLIC SECTOR ENTERPRISES

(For State Public Sector Enterprises in Goa)

Dear Respondent,

I am a research scholar pursuing part-time PhD at Research Centre, Government College of Arts and Commerce, Pernem, affiliated to Goa Business School under the guidance of Prof. Sanjay P. Sawant Dessai. The title of our study is "PERFORMANCE EVAUATION OF PUBLIC SECTOR ENTERPRISES". Our study aims at developing a framework for performance analysis of Public Sector Enterprises and demonstrate the developed framework through performance analysis of public sector enterprises in Goa. This questionnaire is prepared to collect the data from the state-level public sector enterprises to evaluate their performance using the developed framework.

We request you to kindly provide us with the data asked in the questionnaire for the period from 2008-09 to 2019-20. The data collected through this questionnaire will be used purely for academic research purposes.

Table 1: Profile of the Enterprise

Name of the enterprise	
Category	Government Company/ Statutory Corporation
Sector	**Social** ☐ **Economic Environment** ☐ **Others** ☐
Date of Incorporation	
Age of the enterprise (in years)	
Main activities of the undertaking including products/services	

(Attach brief information)	
Mission/vision/objective Of the undertaking (Mandate of formation)	
Year of last finalisation and submission of Accounts	

Table 2: Number of Employee details

(Please provide data from 2008-09 to 2019-20)

Year	No. of employees
2008-09	
2009-10	
2010-11	
2011-12	
2012-13	
2013-14	
2014-15	
2015-16	
2016-17	
2017-18	
2018-19	
2019-20	

Table 3 : Investment of the State Government in the State-Owned Enterprises:

(Please provide data from 2008-09 to 2019-20) (Amount in crores)

	Capital	Loans		Total
		Interest-free loans	Other Long-term Loans	
2008-09				
2009-10				
2010-11				
2011-12				
2012-13				
2013-14				
2014-15				
2015-16				
2016-17				
2017-18				
2018-19				
2019-20				

Table 4 Budgetary Support from the Government

(Please provide data from 2008-09 to 2019-20) (Amount in crores)

Year	Capital	Loan	Grants and Subsidy	Total
2008-09				
2009-10				
2010-11				
2011-12				
2012-13				
2013-14				
2014-15				
2015-16				
2016-17				
2017-18				
2018-19				
2019-20				

Table 5 : Details of welfare expenditure:

(Please provide data from 2008-09 to 2019-20 (Amount in crores)

Year	Expenditure on research & development, innovations and technological up-gradation (such as automation, developing ICT solutions, developing patents, introduction of time and energy saving methods, etc)	Expenditure on Social overheads/ Community welfare (such as- developing social infrastructure, improving physical resources in the state, education, health, sports, etc.)	Expenditure on conservation of environment (such as waste management, energy conservation, reduction of environmental impacts, etc.)
2008-09			
2009-10			
2010-11			
2011-12			
2012-13			
2013-14			
2014-15			
2015-16			
2016-17			
2017-18			
2018-19			
2019-20			

Table 6: Contribution to State Exchequer (Actual on Cash Basis)

(Please provide data from 2008-09 to 2019-20) (Amount in crores)

Year	Interest on State Government Loans	Dividend on State Government Equity	Taxes & Duties	Payment of Royalty / Rent / Cess	Subsidies / Grants received
2008-09					
2009-10					
2010-11					
2011-12					
2012-13					
2013-14					
2014-15					
2015-16					
2016-17					
2017-18					
2018-19					
2019-20					

Table 7: Details of Financial performance:

(Please provide data from 2008-09 to 2019-20 (Amount in crores)

Year	Turnover (Revenue from the operation)	Other Revenue	Operating profit	Profit before Interest and Tax	Profit before tax	Profit after tax
2008-09						
2009-10						
2010-11						
2011-12						
2012-13						
2013-14						
2014-15						
2015-16						
2016-17						
2017-18						
2018-19						
2019-20						

Table 8 : Details of Financial position:

(Please provide data from 2008-09 to 2019-20) (Amount in crores)

Year	Share capital	Reserves and surplus	Long term Debt	Total current liabilities	Total Current assets	Total fixed assets	Total Assets
2008-09							
2009-10							
2010-11							
2011-12							
2012-13							
2013-14							
2014-15							
2015-16							
2016-17							
2017-18							
2018-19							
2019-20							

Table 9: Details of Internal Resource Generation:

(Please provide data from 2008-09 to 2019-20) (Amount in crores)

Year	Depreciation	Retained earnings	Deferred Revenue expenditure written off	Total
2008-09				
2009-10				
2010-11				
2011-12				
2012-13				
2013-14				
2014-15				
2015-16				
2016-17				
2017-18				
2018-19				
2019-20				

Table 10: Details of Value Addition:

(Please provide data from 2008-09 to 2020) (Amount in crores)

Year	Interest	Dividend	Taxes	Employee remuneration	Retained profits	Total
2008-09						
2009-10						
2010-11						
2011-12						
2012-13						
2013-14						
2014-15						
2015-16						
2016-17						
2017-18						
2018-19						
2019-20						

Table 11: Details of Employee cost:

(Please provide data from 2008-09 to 2019-20) (Amount in crores)

Year	Employee remuneration	Human Resource development expenses (such as expenditure on improvement of working and living conditions of employees, expenses on training, coaching, mentoring and career development of employees, expenditure on health and safety of employees., any other expenses on employee wellness.)	Total
2008-09			
2009-10			
2010-11			
2011-12			
2012-13			
2013-14			
2014-15			
2015-16			
2016-17			
2017-18			
2018-19			
2019-20			

Table 12: Governance in the organisation:

(Please provide data from 2008-09 to 2019-20)

Year	Number of Board members	Number of independent directors	Number of Board meetings in the year	Date of submission of accounts for the year	Internal audit done during the year (Yes/No)
2008-09					
2009-10					
2010-11					
2011-12					
2012-13					
2013-14					
2014-15					
2015-16					
2016-17					
2017-18					
2018-19					
2019-20					

Table 13: Physical Performance:

(Please provide data from 2008-09 to 2019-20)

Year	Units of goods or services provided	Turnover	Cost of Revenue
2008-09			
2009-10			
2010-11			
2011-12			
2012-13			
2013-14			
2014-15			
2015-16			
2016-17			
2017-18			
2018-19			
2019-20			

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Annexure III

CONTENT VALIDITY OF QUESTIONNAIRE THROUGH EXPERT RATINGS

Dear Sir/Madam

Subject: Request for input for Content Validity of Questionnaire.

I am a research scholar in the subject of Commerce, pursuing my Ph.D. research under the guidance of Professor Sanjay P. Sawant Dessai. The topic of my research is "Performance Evaluation of Public Sector Enterprises". The study aims to develop a unified framework to evaluate the performance of Public Sector enterprises. For the same, we propose to use the AHP model (Analytical Hierarchy Process). The AHP is an effective multi-criteria decision-making tool used to set priorities and generate weights for each evaluation criterion based on the decision maker's pair-wise comparison of the criteria. The developed model can be used to monitor the performance of public enterprises either at the individual entity's level over a period of time or to evaluate and compare the overall performance of different entities with respect to each other and rank them. For generating the weights for the criteria and sub-criteria, their pairwise comparison will be done through a structured questionnaire. As a part of the validation of said questionnaire, it has to go through the content validity. So, I sincerely request you to kindly give your valuable suggestions and expert guidance to make this study complete and influential.

I request you to check the developed Questionnaire for the appropriateness of:

i) Relevance

ii) Clarity

iii) Suitability

Please find attached the draft questionnaire, a brief description of the study and operational definitions of the criteria and parameters under each criterion framed in the questionnaire are also provided with the content validity sheet.

Thank you in anticipation,

Yours faithfully,

Ms.Resham Kaur Bhambra

Content Validity Sheet

SCORE AND ITS DESCRIPTION	
For RELEVANCE	1 – not relevant 2 - item needs some revision 3 - relevant but need minor revision 4 - relevant
For CLARITY	1 – not clear 2 - item needs some revision 3 - clear but need minor revision 4 - clear
For SUITABILITY	1 – not suitable 2- item needs some revision 3- suitable but need minor revision 4- suitable

Sr.no	Criteria and Parameters of each criterion	Relevance (1 -4)	Clarity (1 -4)	Suitability (1 -4)
C1	**FINANCIAL PERFORMANCE**			
P1	Profitability			
P2	Liquidity			
P3	Solvency			
C2	**PHYSICAL PERFORMANCE**			
P4	Output			
P5	Impact			
P6	Efficiency of operation			
C3	**CONTRIBUTION TO ECONOMY**			
P7	Internal Resource Generation			
P8	Contribution to exchequer			
P9	Employment generation			

P10	Value addition			
C4	**CONTRIBUTION TO SOCIETY**			
P11	Promoting Research & Development and technological self-reliance			
P12	Protection and conservation of environment			
P13	Social Sensitivity/Community welfare			
P14	Human Resource development			
P15	Corporate governance			

Suggestion/comment:

Filled by:

Designation:

Date:

ANNEXURE IV

FACE VALIDITY OF THE QUESTIONNAIRE

Dear Sir/Madam

Subject: Request for face validity input of Questionnaire.

I am a research scholar in the subject of Commerce, pursuing my PhD research under the guidance of Professor Sanjay P. Sawant Dessai. The topic of my research is "Performance Evaluation of Public Sector Enterprises".

I need to collect the data for my study through a questionnaire. As a part of the validation of said questionnaire, it has to go through the Face validity (i.e., to check the extent of appropriateness of the questionnaire to claim the validity and ability to measure the purpose). So, I sincerely request you to go through the below information and instructions and give your valuable input in the response sheet on the next page.

Points to be noted:

- Review the hard copy of the questionnaire enclosed herewith considering the content of the Questionnaire
- Provide your response for the questions in "Yes or No" form.
- After answering, mention your remark (if any) and fill in the required information below the response sheet.
- In the remark section, you can give the recommendation and suggestions to improve the structure of the content and questionnaire as a whole.

Thank you in anticipation,

Yours faithfully,

Ms. Resham kaur Bhambra

Face Validity Response Sheet

Sr. No	Criteria to rate	Answer	
1	Appropriate vocabulary and structure of sentences.	[ ] Yes	[ ] No
2	Clarity of items in the questionnaire.	[ ] Yes	[ ] No
3	Correct spellings and grammar.	[ ] Yes	[ ] No
4	Logical sequencing of items in the questionnaire.	[ ] Yes	[ ] No
5	Appropriate font size and space.	[ ] Yes	[ ] No
6	Appropriate length of the questionnaire.	[ ] Yes	[ ] No
7	Adequacy of instruction on the instrument.	[ ] Yes	[ ] No
8	Well-structured instrument in terms of construction and format.	[ ] Yes	[ ] No
9	Appropriateness of difficulty level of the instrument for the respondents.	[ ] Yes	[ ] No
10	Reasonableness of items based on the purpose of the instrument.	[ ] Yes	[ ] No
11	Appropriateness of judgement scale.	[ ] Yes	[ ] No
12.	The instrument covers the area and objective of the research.	[ ] Yes	[ ] No

Suggestion/comment:

Filled by:

Designation:

Date:

ANNEXURE V
INTER-RATER AGREEMENT

Dear Sir/Madam

Subject: Request for input for Inter-rater agreement for the development of a scale for the research work.

I am a research scholar in the subject of Commerce, pursuing my Ph.D. research under the guidance of Professor Sanjay P. Sawant Dessai. The topic of my research is "Performance Evaluation of Public Sector Enterprises".

Public Sector Enterprises are instrumental in accelerating the economic and social development of a nation. Therefore, it becomes important to evaluate their performance on a continuous basis in order to ensure the development of the economy as a whole. The absence of clearly quantifiable objectives and multiplicity of goals make measuring of performance of Public Sector Enterprises more complex. Therefore, it necessitates for a comprehensive performance evaluation method for public sector enterprises. However, there is no academic consensus on how to evaluate the performance of public-sector enterprises**.**

Considering the corporate nature and strategic social role of the Public Sector Enterprises, the study is mainly focused on developing a common set of parameters to evaluate the overall performance of public sector enterprises integrating the financial, physical, economic and social performance criteria and inter-relate these dimensions to device a performance evaluation framework for evaluating the overall performance of the public sector enterprises.

For developing the index, we propose to use the AHP technique (Analytical Hierarchy Process). The AHP technique was introduced in 1970s by Thomas Saaty as an effective multi-criteria decision-making tool to set priorities and generate weights for each evaluation criterion and sub-criterion. The weights are generated based on the decision maker's pair-wise comparison of the criteria. For generating the weights, the pairwise comparison of criteria will be done through a structured questionnaire. The respondents for the same will be experts/stakeholders of public sector enterprises.

Based on the literature review I have identified the criteria and parameters to develop the overall performance evaluation index for Public Sector Enterprises. I need your judgment to improve on the identified parameters. The inter-rater form is attached herewith.

It consists of criteria for overall performance evaluation and parameters under each criterion to measure the: i) Financial performance ii) Physical performance iii) Contribution to the economy and iv) contribution to society.

Please find attached the operational definitions of the identified performance indicators.

Thanking you in anticipation,

Yours faithfully,

Ms.Resham Kaur Bhambra

Inter-rater form

I) Ratings for the Criteria:

Please rate the above three criteria based on your agreement with a tick mark (√) as per the 5-point scale.

Criteria	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Financial efficiency					
Physical performance					
Contribution to economy					
Contribution to society					

Suggestion/comment:

II) Ratings for the parameters of financial performance:

Please rate the above parameters to measure the financial efficiency of public sector enterprises based on your agreement with a tick mark (√) as per the 5-point scale.

Parameters of Financial Efficiency	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Profitability					
Liquidity					
Solvency					

Suggestion/comment:

III) Ratings for the parameters of physical performance:

Please rate the above parameters to measure the physical performance of public sector enterprises based on your agreement with a tick mark (√) as per the 5-point scale.

Parameters of Financial Efficiency	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Output					
Impact					
Efficiency of operation					

Suggestion/comment:

IV) Ratings for parameters of contribution to the economy:

Please rate the above parameters to measure the economic efficiency of public sector enterprises based on your agreement with a tick mark (√) as per the 5-point scale.

Parameters of Economic Efficiency	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Internal Resource Generation					
Contribution to exchequer					
Employment generation					
Value addition					

Suggestion/comment:

Rating for parameters for contribution to society:

Please rate the above parameters to measure the social effectiveness of public sector enterprises based on your agreement with a tick mark (√) as per the 5-point scale.

Parameters of Social Effectiveness	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Promoting Research & Development and Technological Self-reliance					
Protection and Conservation of the Environment					
Social Sensitivity/Community Welfare					
Human Resource Development					
Corporate Governance					

Suggestion/comment:

Filled by:

Designation:

Date:

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ANNEXURE VI

Publications

Sr. No.	Publication details
1.	"Performance Evaluation of State-owned Enterprises- A Systemic Approach", Vindhya Bharti, UGC approved journal no. 41669, ISSN 0976-9986, Vol.1, no.17, Jan 2019
2.	"Framework for performance evaluation of public sector enterprises: A multi-criteria decision-making approach", International Journal of Public Sector Performance Management, SCOPUS Indexed Journal. (Paper accepted, appears in the list of forthcoming articles) **DOI:** 10.1504/IJPSPM.2024.10054263 **ISSN online:** 1741-105X **ISSN print:** 1741-1041 **Cite Score:** 0.9 (2022)
3.	"Measuring financial health of State-owned Enterprises using Altman's Z Score Model", International Journal of Public Sector Performance Management, SCOPUS Indexed Journal. (Paper accepted, appears in the list of forthcoming articles) **DOI:** 10.1504/IJPSPM.2022.10054260 **ISSN online:** 1741-105X **ISSN print:** 1741-1041 **Cite Score:** 0.9 (2022)

ANNEXURE VII

Conference Presentations

Sr. No.	Title of the paper presented / Title of paper published/ Title of Lecture Delivered	Title of Conference/ Seminar / Workshop	Year	Level (International / National/ State level)
1.	Performance Evaluation of State-Owned Enterprises- A Systemic Approach	1st India Greater Mekong Sub-Region International Conference	2018-19	International
2.	Analysis of Value Addition: a tool for analysis of public sector enterprises with a social perspective	National Conference on "Innovations and Integration in Financial Markets"	2019-20	National
3.	Performance Evaluation System for State-owned Enterprises	International Virtual Doctoral Colloquium on Driving Agenda 2030: Research for Societal and Business Sustainability	2021-22	International