

# Conceptual Framework of Financial Sustainability based on Government Policies Interventions: A Modelling Approach

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Corporates around the world are developing policies and strategies which can increase their financial health and life. This study aims to propose an optimised model by using Artificial Neural Networks (ANN) for financial sustainability. Furthermore, government policies intervention framework is developed to conduct a pre and post policy intervention analysis. Predictive Analytics are used to assess which policies are useful for long term survival of the firms. As an example, to further the concept for this study 379 manufacturing sector firms of Pakistan are taken as a sample, and government policies developed over the period of 2005-2019 are included. The manufacturing sector of Pakistan has 25 sub sectors. Vector Auto Regression (VAR) and Structural Vector Auto Regression SVAR are used to test the model. Moreover, Neural Networks (NN) are further applied for prediction and to get the optimal model. This would be helpful in predicting the financial sustainability of firms moreover, predicting the outcome of policies.

**Keywords:** *Financial Sustainability, VAR, SVAR, Artificial Neural Network ANN, Neural Network NN*

## Introduction

After the financial crises, corporates are shifting more towards a long-term perspective, whether it is policy development or continuing concern. In this shift from short-term to long-term perspective it is necessary for the corporates to understand what the framework should be in order to be financially sustainable. What should the policies and strategies be to follow, whether the policies developed by the government or the firm itself are fruitful in the longer term or not? Would these policies be assisting the firm to be financially sustainable or not?

Therefore, the economic aspect impacting the corporates should be studied to see the overall impact of financial sustainability.

The emphasis is shifting after the financial crises from short-term growth to long-term sustainability. Financial sustainability is a broader term encompassing elements other than mere short-term economic growth ensuring high quality growth for a longer period. Incorporating sustainability in the strategies of businesses is the requirement of time, merely knowing the importance and not integrating the operational loopholes can cause problems (Haanaes, 2016). Now corporates are shifting towards doing well by implementing concepts to be sustainable in the market (Busse, 2016), (Chernev & Blair, 2015).

They are developing policies for their workforce, society and the environment now that plays an important role in determining their overall performance in order to maintain their position in the market only in terms of economical aspect (financial impact) (Shank & Shockey, 2016). Irrespective of the mounting social and environmental pressure observed around the globe, it is recommended that these are interlinked and should be studied as an integral part of the economic growth (Corrigan, Crotti, Hanouz, & Serin, 2014).

## Literature Review

### Evolution of Financial Sustainability:

The concept of financial sustainability can be associated to (Hicks, 1945) according to this economist this concept is linked to income. Further, (Stavins, Wagner, & Wagner, 2003) related financial sustainability with growth with dynamic and long-term efficiency keeping in view the future as well. The definition was elaborated when rights of future generations also became the part of financial sustainability (Pezzey & Toman, 2002). Although, sustainability is a complex term with three dimensions i.e. environmental, societal and financial aspects (GRI, 2013). However, global financial and economic crises have highlighted the need for financial sustainability more than the other two aspects (Akbar, Akbar, Tang, & Quresh, 2019), (Afonso & Jalles, 2015). Financial and economic crises over the years have compelled the government and businesses to come up with strategies which contribute towards making them financially sustainable (Pedro & Bolívar, 2016). This concept has been defined by different researchers in different contexts. Financial sustainability is the ability of a business to achieve its goals, and create value for its stakeholders for a longer term. This concept encompasses value and continuity for a business. Financial sustainability is an integral part of corporate sustainability which creates a balance between compatibility of the firm and the operational and financial plans (Raza, Gillani, Ramakrishnan, Gillani, & Qureshi, 2020). These definitions are highlighting the importance of financial sustainability for a corporate: enhanced value, compatibility, better operational and financial plans, and continuity are the strategic goals for any business.

### **Financial Sustainability and Businesses:**

Studies involving the financial sustainability of corporates are recent comparatively. Moreover, there is a need to theoretically conceptualise the concept of sustainability which involves the financial sustainability (one of the three pillars of sustainability) (Purvis, Mao, & Robinson, 2019).

Financial sustainability for a business is important not only for the business itself but also for society as well. Every business is operating in a network of external and internal stakeholders. As explained by the Stakeholders Theory presented in 1984 by Freeman, these stakeholders are affected by the financial health of that business. Any financial trouble in the business can directly have an impact on the socio-economic system in which it is operating (Iotti & Bonazzi, 2018), (Iofrida, Luca, Strano, & Gulisano, 2018), (Akbar, Akbar, Tang, & Quresh, 2019). Previous studies have identified factors affecting the long-term financial sustainability of corporates. Bankruptcy risk (Akbar, Akbar, Tang, & Quresh, 2019), financial risk (Lianghua, Jiang, & Han, 2005), Corporate Social Responsibility (CSR) (Miljenović, Maradin, & Prohaska, 2015), Sustainable Value Added (SVA) (Miljenović, 2018), corporate governance and ownership (Salvioni & Gennari, 2016), real earning management keeping CSR as moderator affecting the financial sustainability (Abner & Ferrer, 2019). These research studies have incorporated either one or two variables to see the impact on financial sustainability, whereas in this paper a framework has been developed to have a comprehensive outlook at financial sustainability through an optimised framework.

### **Measuring Financial Sustainability:**

Review of literature has shown that previous studies have used the following to measure financial sustainability:

1. Financial ratios like liquidity ratios, activity ratios, and profitability ratios are used to calculate the financial sustainability (Cernostana, Measuring Financial Sustainability Of Private Higher Education Institutions, 2018).
2. Sustainable Growth Rate SGR is a useful measure to determine the financial sustainability of companies (Raza, Gillani, Ramakrishnan, Gillani, & Qureshi, 2020), (Mubeen & Hanif, 2017).
3. Financial sustainability can be measured in three dimensions: debt, revenue and service (Pedro & Bolívar, 2016).
4. Financial leverage is used to measure the long-term sustainability of firms (Ashmarina, Zotova, & Smolina, 2016).

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### **Theoretical support:**

According to Stakeholder theory, for a corporate to operate in the society with freedom, it needs to satisfy the requirements of society and other stakeholders. Moreover, satisfied stakeholders are a guarantee of survival (Martínez, Fernández, & Fernández, 2016). “Stakeholder Theory is a view of capitalism that stresses the interconnected relationships between a business and its customers, suppliers, employees, investors, communities, and others who have a stake in the organisation. The theory argues that a firm should create value for all stakeholders, not just shareholders” (Freeman, 1984). According to Stakeholder theory, the organisation should not only operate for profit maximisation but also for the interest of all the other stakeholders both internal and external. For an organisation to operate successfully for a longer period it is necessary to take care of the interest of all stakeholders (Clarkson, Overell, & Chapple, 2011). The stakeholder theory helps to identify the determinants of firm performance by identifying the stakeholder and the set of measures which helps to satisfy that stakeholder (Hitt, 1988). Dissatisfaction of any stakeholder can affect the economic outcome of the firm and its long-term future (Clarkson M. B., 1995).

This framework is developed after the review of the literature and the theoretical underpinning and after the meta-analysis of the literature variables affecting financial sustainability were identified. It is supported by the Stakeholder Theory and theoretical framework designed is attached in appendix 1.

### **Purpose of this Research:**

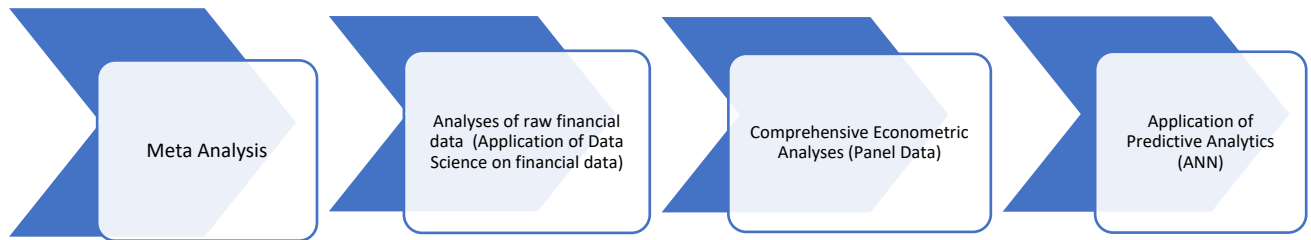
Importance of financial sustainability is a known fact for developed and developing economies, similarly the businesses which are part of these economies. Every economy and every business must make every effort to remain financially healthy for the longer term. Global leaders have come together to make 17 Sustainable Development Goals (SDGs) to make this world a better place for the current generation and for the generations to come (UNESCAP, 2019). Achieving these SGDs would be quite a challenge for a developing nation as sustainable development is not happening on an intended scale for number of reasons like limited capital, lower per capita income, lower GDP growth, external debt etc. In developing economies the risk is higher and ambiguity among investors about the investment decision is also higher. Similarly, businesses in developing countries also need to focus on long-term sustainable development. Pakistan is a developing nation and the government has also taken the Vision 2030 and 17 SDGs initiative to make the economy and the businesses sustainable. To make it a success this framework can be fruitful. Moreover, role of policy in influencing the corporate sustainability remains a question in the existing literature (Markard, Raven, & Truffer, 2012). Policies are an essential part of an organisation; these policies provide a roadmap for all the operations. Moreover, policies support the organisation to capitalise on the strengths and monetise on the opportunities. The process of policy evolution can have an impact on sustainability (Reichardt, Negro, Rogge, & Hekkert, 2016). Policies can be government or organisational policies, and

both have their implications. There is a significant role that a government can play in the emerging economies by intervening through various policies (Itskhoki & Moll, 2019).

## Methodology

### Steps in data analysis:

The methodology adopted for data analysis is as follows:



The aim of any for profit business is to enhance its value and to stay in the market for a sustainable time period. The framework developed after the meta-analysis of the literature would help the organisations to achieve the aim.

To further the concept of this conceptual paper, firms in the manufacturing sector of Pakistan are taken as an example so that the concepts explained in the paper can be applied. This sector is the second largest contributor towards GDP after the service sector. Manufacturing firms are the largest sub sector of the industrial sector contributing more than 60% to the overall industrial sector. Another reason to take this sector was that this sector includes firms from various industries, in total there are 25 sectors within manufacturing and there are 379 firms operating under these 25 sectors.

Afterwards, Data Science is be applied to this framework in order to extract knowledge and patterns in the data to give it a meaning full interpretation. The following econometric equations have been developed to test the framework:

### For Financial Sustainability:

$$FS_{it} = \beta_0 + \beta_1 OP_{it} + \beta_2 FF_{it} + \beta_3 AS_{it} + \beta_4 LQ_{it} + \beta_5 SGR_{it} + \varepsilon_{it}$$

Where: Operating Performance (OP) which is determined through: Operating surplus ratio (%). Fiscal Flexibility (FF) which is determined by Revenue ratio (%), Net financial liabilities ratio (%) and Total debt service cover ratio (times). Liquidity (LQ) is determined by Cash expense cover ratio (months). Asset Sustainability (AS) is determined by Asset sustainability ratio (%). Sustainability Growth Ratio (SGR), for each corporate  $i$  and for each year  $t$

### Equation for Model of the study:

### Mathematical Functions of the Research Study:

$$FS_{it} = f(OP_{it}, FF_{it}, AS_{it}, LQ_{it}, SGR_{it}, CV)$$

Where CV= Control Variables

Where Firm Size, Type of Industry, Firm Age, disclosure, and taxation are control variables.

### Equation for the Model:

#### OLS Equation:

$$FS_{it} = \beta_0 + \beta_1 FiP_{it} + \beta_2 FIN_{it} + \beta_3 EM_{it} + \beta_4 Po_{it} + \beta_5 CGM_{it} + \beta_6 Firm Size_{it} + \beta_7 Type\ of\ industry_{it} + \beta_8 Firm\ Age_{it} + \beta_9 Dis_{it} + \beta_{10} Tax_{it} + \varepsilon_{it}$$

### Equation for Panel Data Analyses:

#### Fixed Effects Model:

$$FS_{it} = \beta_1 FiP_{it} + \beta_2 FIN_{it} + \beta_3 EM_{it} + \beta_4 Po_{it} + \beta_5 CGM_{it} + \beta_6 Firm\ Size_{it} + \beta_7 Type\ of\ industry_{it} + \beta_8 Firm\ Age_{it} + \beta_9 Dis_{it} + \beta_{10} Tax_{it} + \alpha_i + \varepsilon_{it}$$

Where:  $\alpha_i$  is the unknown intercept for each entity.

#### Random Effects Model:

$$FS_{it} = \beta_1 FiP_{it} + \beta_2 FIN_{it} + \beta_3 EM_{it} + \beta_4 Po_{it} + \beta_5 CGM_{it} + \beta_6 Firm\ Size_{it} + \beta_7 Type\ of\ industry_{it} + \beta_8 Firm\ Age_{it} + \beta_9 Dis_{it} + \beta_{10} Tax_{it} + u_{it} + \varepsilon_{it}$$

Whereas:  $u_{it}$  is the between entity error term and  $\varepsilon_{it}$  is the within entity error term.

### For Policy Intervention:

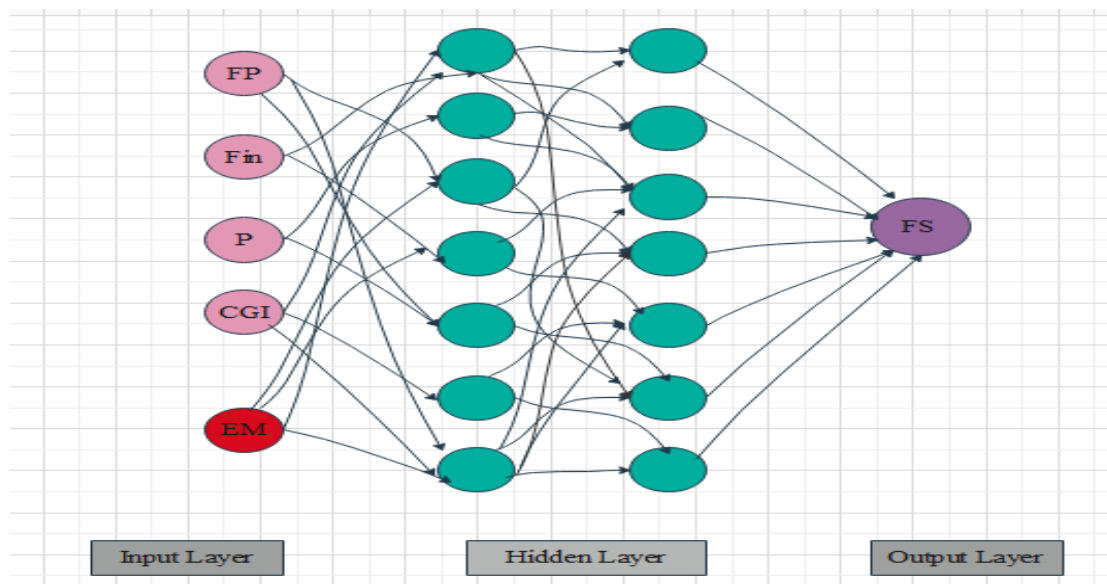
A dummy variable is created to analyse the policy intervention. First of all government policies affecting the sub sectors are identified and numbered. In the next step number 0 or 1 is assigned to the sub sectors. 1 is assigned to sub sector where the policy has an impact and 0 for otherwise. Policies identified during the sample period are attached in appendix 3.

Furthermore, data is be tested using Panel Vector Auto Regression (PVAR). VAR helps to study the dynamic behaviour of economic and financial variables. It is used instead of AR, ARMA or ARIMA because VAR is bi-directional in which the variables influence each other.

Variables in VAR are treated as endogenous and predictors are nothing but the lag values of the series. Additionally, SVAR is used to study the dynamics of the model by subjecting it to shocks. Impulse Response Function IRF is a technique in VAR which helps to identify the shocks during the analysis time period.

VAR and SVAR can be further taken towards forecasting and prediction. Financial sustainability by definition is the ability of the business to stay in the market for a longer time period and this framework helps to identify, under VAR and SVAR, how businesses have performed and would tend to perform in the future.

Moreover, to apply the predictive analytics, Artificial Neural Networks is applied to the designed framework to get the optimised model with least error. A sample neural network for the framework is as follows:



ANN model would help to identify the predictors which are affecting financial sustainability of the businesses.

Moreover, this framework with the application of predictive analytics ANN would be useful to analyse the policy interventions. Pre and post policy era would be analysed to see the effectiveness of a policy. Businesses operate under the policies of government and their own policies. This framework can incorporate both the public and private policies to see the impact of these policies on their financial sustainability.

Results from the research would be very fruitful for businesses and the government as well. As predictive analytics technique would support to identify the policies that are feasible for the financial sustainability of the businesses. Predictive analytics would be beneficial for future



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implication of these policies to recognise the effectiveness of the policies, serving the corporates to improve their long-term financial health.

### **Conclusion**

This study helps to identify a framework which can be useful in predicting the financial sustainability of the corporates. Vector Auto Regression (VAR) and Structural Vector Auto Regression SVAR are used to test the model. Moreover, Neural Networks (NN) are further applied for prediction and to get the optimal model. This would be helpful in predicting the financial sustainability of the firms, moreover, predicting the outcome of policies. This model can be applied on sectoral or firm level policies. Moreover, the same can be conducted with a different population and sample.

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### **Authors' Contributions**

SA conceptualised the paper under the guidance of AT.

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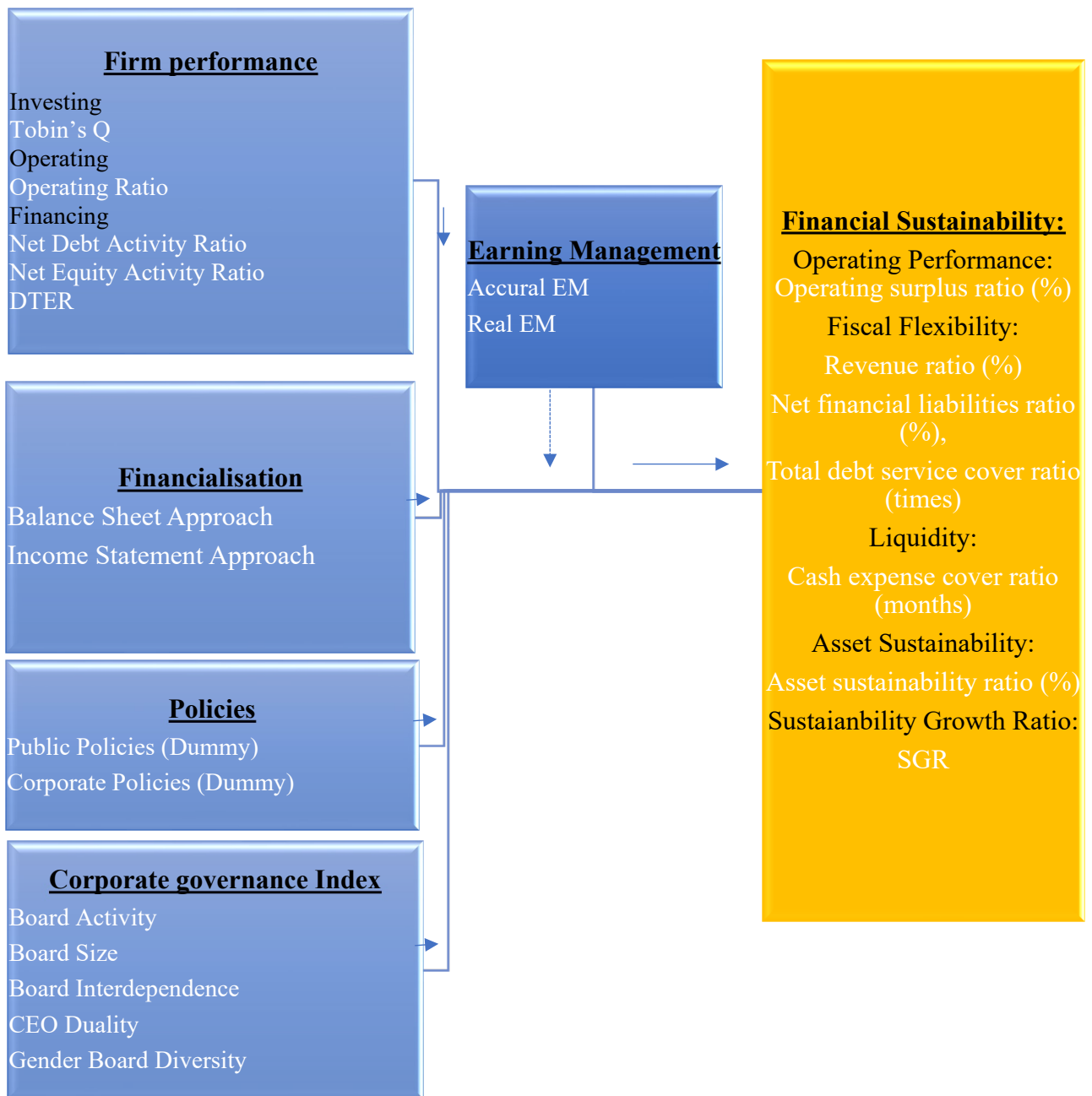
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**Appendix**

**1:**



**Appendix 2: Reference for the variables of the study:**

<p><b><u>Firm performance</u></b> Investing:  <ul style="list-style-type: none"> <li>• Tobin's Q</li> </ul> Operating:  <ul style="list-style-type: none"> <li>• Operating Ratio</li> </ul> Financing:  <ul style="list-style-type: none"> <li>• Net Debt Activity Ratio</li> <li>• Net Equity Activity Ratio</li> <li>• DTER</li> <li>• Net Debt</li> </ul> </p>	<p>(Wernerfelt &amp; Montgomery, 1988), (Grewatsch &amp; Kleindienst, 2017) (Verona, 2020) (Dinson, 2017) (Zeller &amp; Figlewicz, 1990) (Borhan, Mohamed, &amp; Azmi, 2014) (Dierker, Lee, &amp; Seo, 2019)</p>
<p>Financialisation</p>	<p>(Davis, 2017), (Orhangazi, 2008)</p>
<p>Policies</p>	<p>Dummies for public and business policies</p>
<p>Corporate governance Index:  <ul style="list-style-type: none"> <li>• Board Activity</li> <li>• Board Independence</li> <li>• Board Size</li> <li>• CEO Duality</li> <li>• Gender Diversity</li> </ul> </p>	<p>(Gill, Biger, &amp; Obradovich, 2015) (Ajanthan &amp; Kumara, 2017) (Zulfiqar &amp; Malik, 2019)</p>
<p>Earning Management</p>	<p>(Irfan, 2019), (Shaikh, Fei, Shaique, &amp; Nazir, 2019)</p>
<p>Policies and VAR, SVAR</p>	<p>(Bruneau &amp; Bandt, 2003), (Mahfoudh, 2014),</p>
<p>Financial Sustainability  <ul style="list-style-type: none"> <li>• Operating Performance: Operating surplus ratio (%)</li> <li>• Fiscal Flexibility: Revenue ratio (%), Net financial liabilities ratio (%), Total debt service cover ratio (times)</li> <li>• Liquidity: Cash expense cover ratio (months)</li> <li>• Asset Sustainability: Asset sustainability ratio (%)</li> </ul> </p>	<p>(Cernostana, 2018), (Wasilewski, 2019), (State of Queensland, 2013).</p>
<p>Sustainable growth rate</p>	<p>(Raza, Gillani, Ramakrishnan, Gillani, &amp; Qureshi, 2020), (Amouzesh, Moeinfar, &amp; Mousavi, 2011).</p>



### Appendix 3: Policies:

