

From Fiscal Intent to Women's Agency: Unravelling the Culturally Embedded Empowerment Pathways of Gender-Responsive Budgeting Using SEM

Panidepu Sai Srikanth¹, Dr. KVB Ganesh², Dr. Taviti Naidu Gongada³, Inavolu Sridhar⁴

¹Research Scholar, KL Business School, Koneru Lakshmaiah Education Foundation, Andhra Pradesh, India.

Email: psaisrikanth1991@gmail.com

² Assistant Professor, KL Business School, Koneru Lakshmaiah Education Foundation, Andhra Pradesh, India.

Email: kvbganesh@gmail.com, Orcid id: 0000-0002-5537-2747

³Associate Professor, APEX-MBA, Chandigarh University, Punjab, India. Email: taviti.e19107@cumail.in

⁴Department of Master of Business Administration, Narasaraopeta Engineering College (Autonomous), Narasaraopet, Palnadu District. Andhra Pradesh, India. Email: sridhartpc@gmail.com

Abstract

This study investigates the impact of Gender-Responsive Budgeting (GRB) on women's socio-economic empowerment using a Structural Equation Modeling (SEM) framework. GRB has emerged as a critical public policy tool aimed at ensuring equitable allocation of resources and improving developmental outcomes for women. The research examines key GRB-linked domains, including health and sanitation, education and skill development, entrepreneurship and economic empowerment, safety and social protection, and income-generation initiatives. Primary data collected from women beneficiaries across diverse stakeholder groups were analyzed to identify the direct and indirect effects of GRB interventions on empowerment outcomes. The SEM results reveal significant positive relationships between GRB initiatives and dimensions of socio-economic empowerment, highlighting the effectiveness of targeted public spending. The study provides empirical evidence supporting GRB as a transformative strategy for inclusive development and offers policy recommendations to strengthen program design, inter-departmental coordination, and resource prioritization to advance gender equity at the district and state levels.

Keywords: Gender-Responsive Budgeting (GRB), Women's Empowerment, Socio-Economic Development, Public Policy Evaluation

Introduction

Gender-Responsive Budgeting (GRB) has emerged as a pivotal public finance strategy aimed at addressing gender inequalities through equitable allocation of resources and improved policy outcomes. Introduced by the Australian Government in the mid-1980s (Sharp, 1989), GRB has evolved into a global framework endorsed by UN Women, the IMF, and the World Bank for promoting inclusive development. GRB ensures that national and sub-national budgets are planned, executed, and evaluated with explicit consideration of gender-differentiated needs (Budlender & Hewitt, 2003). In developing countries like India, where gender disparities persist in education, health, employment, and asset ownership, GRB is increasingly recognized as an essential tool to advance women's socio-economic empowerment (Jhamb & Mishra, 2018).

India institutionalized GRB in 2005–06 and gradually expanded it across ministries and state governments (Government of India, 2007). States such as Andhra Pradesh have adopted GRB mechanisms to strengthen women's access to public services, welfare schemes, and livelihood programmes (Rao & Geetha, 2014). However, the effectiveness of GRB depends not merely on budget allocation, but on how well these allocations translate into tangible improvements in women's lives. Scholars argue that evaluating GRB outcomes requires a multidimensional assessment of women's empowerment including health and sanitation, education and skills, safety and social protection, income generation, entrepreneurship, and access to financial assistance (Kabeer, 1999; Malhotra & Schuler, 2005). Despite growing interest, empirical studies measuring the direct and indirect impact of GRB interventions on women's empowerment remain limited, especially at the district or local level.

Visakhapatnam district of Andhra Pradesh provides a compelling context for such an assessment. The region has witnessed substantial government spending on women-centric initiatives under health, education, livelihood promotion, and welfare schemes. Yet, evidence on the actual outcomes experienced by women remains fragmented. Prior research has indicated that while GRB initiatives may be well-intentioned, gaps in implementation, monitoring, awareness, and interdepartmental coordination often reduce their effectiveness (Sharma & Sudarshan, 2010; Saxena, 2019). Thus, measuring the real-world impact of GRB from the perspective of women beneficiaries is essential for strengthening policy effectiveness and ensuring accountability.

Structural Equation Modeling (SEM) has emerged as a robust analytical tool for evaluating complex social phenomena where multiple variables interact simultaneously (Bollen, 1989; Hair et al., 2019). SEM enables the measurement of latent constructs such as empowerment and perceived benefits while examining the causal pathways between GRB components and empowerment outcomes. By employing SEM, researchers can evaluate both direct influences such as improved access to services and indirect influences such as enhanced decision-making or increased confidence on the broader empowerment construct.

This present study aims to measure the impact of Gender-Responsive Budgeting on women's socio-economic empowerment in Visakhapatnam district using a Structural Equation Modeling approach. The study focuses on key GRB-linked domains, including health and sanitation, education and skill development, entrepreneurship and economic empowerment, safety and social protection, and income-generation programmes. By capturing women's perceptions across diverse stakeholder groups, this research seeks to provide empirical evidence on the effectiveness of GRB initiatives and contribute to the broader discourse on gender-inclusive public policy. The findings are expected to support policymakers, NGOs, and development practitioners in refining gender budgeting strategies for meaningful and sustainable outcomes.

Review of Literature

Gender-Responsive Budgeting (GRB) has emerged as a transformative public finance approach that aims to allocate resources in ways that promote gender equity and enhance women's socio-economic empowerment. A bibliometric analysis therefore helps to map the existing scholarship, identify dominant constructs, highlight influential authors, and reveal critical gaps in the alignment between GRB initiatives and women's empowerment outcomes. This structured review offers a foundation for developing a robust empirical investigation.

S. No.	Construct	Authors	Research Gap
1	Gender-Responsive Budgeting (Concept & Implementation)	Sharp (1989), Budlender & Hewitt (2003), Chakraborty (2010), UN Women (2015)	Most studies describe GRB frameworks and public finance mechanisms but do not empirically measure GRB outcomes at local/district levels.
2	GRB and Public Service Delivery (Health, Education, Welfare)	Jhamb & Mishra (2018), Rao & Geetha (2014), Saxena (2019)	Existing studies examine government initiatives but lack beneficiary-level perception data on the quality and accessibility of welfare services funded through GRB.
3	Women's Socio-economic Empowerment	Kabeer (1999), Malhotra & Schuler (2005), Cornwall & Rivas (2015)	Empowerment dimensions are conceptually defined, yet few studies link empowerment outcomes directly to GRB interventions using quantitative models.
4	Economic Empowerment & Entrepreneurship Support	Sharma & Sudarshan (2010), Kelkar (2013), Panda (2018)	Research highlights barriers women face but does not analyze whether GRB-funded economic schemes influence entrepreneurial empowerment.
5	Safety, Social Protection & Well-being	Heise et al. (1999), Johnson (2014), Deshpande (2017)	Studies focus on women's safety but rarely evaluate whether GRB allocations for social protection schemes translate into improved security for women.
6	Skills, Education & Capacity Building	Stromquist (2002), King & Hill (2003), Azim & Nisha (2019)	Literature discusses skill development programs but lacks evidence on their integration within GRB frameworks at the district level.
7	GRB Awareness & Community Participation	Goetz & Jenkins (2005), Mukhopadhyay (2014)	Several works note low GRB awareness among citizens, yet no structured measurement of women's awareness and participation in GRB processes is available.
8	Structural Equation Modeling in Gender Studies	Bollen (1989), Hair et al. (2019), Chelliah & Khan (2021)	SEM is well-established, but its use is limited in evaluating public policy outcomes,

			especially GRB impacts on empowerment in Indian districts.
9	Multidimensional Assessment of Empowerment	Sen (1999), Ibrahim & Alkire (2007), Narayan (2005)	Multidimensional approaches exist, yet empirical modeling linking GRB's multiple components to empowerment dimensions remains underexplored.
10	GRB Effectiveness (India Context)	Chakraborty (2016), Singh & Sharma (2021)	Most GRB studies are at national/state levels, district-level GRB evaluation using quantitative data from women respondents is almost absent.

Despite the growing recognition of Gender-Responsive Budgeting (GRB) as a transformative tool for promoting gender equality, significant research gaps persist in understanding its concrete impact on women's socio-economic empowerment. Existing studies primarily examine GRB at macro or institutional levels, focusing on policy structures, implementation challenges, and administrative performance, rather than assessing how GRB initiatives translate into real improvements in women's lives across domains such as health, education, entrepreneurship, financial inclusion, and social protection. Very few studies adopt rigorous quantitative methods particularly Structural Equation Modeling (SEM) to measure the causal pathways through which GRB interventions influence empowerment outcomes. This gap is especially evident in district-level analyses within India, where the voices and experiences of women beneficiaries remain underexplored. The problem, therefore, lies in the absence of a comprehensive, data-driven evaluation of GRB's effectiveness from the perspective of women recipients, leading to inadequate evidence for policymakers to refine gender-responsive budgeting frameworks. In response, the present study aims to empirically measure the impact of GRB initiatives on women's socio-economic empowerment in Visakhapatnam district using SEM. The study's objectives include identifying key GRB components, examining their influence on multiple empowerment dimensions, and determining the overall effectiveness of GRB initiatives in enhancing women's well-being and economic participation.

III. Conceptual frame work

The conceptual framework for this study aims to integrate gender perspectives into public expenditure and resource allocation to promote equitable development outcomes (Elson, 1998; Budlender & Hewitt, 2002). GRB interventions implemented through sectoral schemes in health and sanitation, education and skill development, entrepreneurship and economic empowerment, safety and social protection, and financial assistance constitute the independent variables of the present study. Prior literature has shown that public expenditure targeted at women can enhance access to basic services, build human capabilities, and improve economic resilience (Chakraborty, 2010; Stotsky, 2016). These GRB components are expected to influence Women's Socio-Economic Empowerment, which includes improvements in

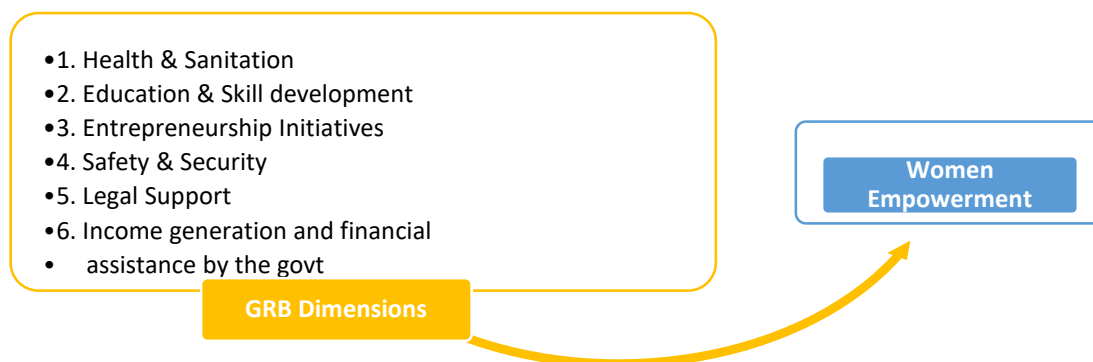
decision-making power, mobility, income stability, control over resources, and participation in economic activities (Kabeer, 1999; Malhotra & Schuler, 2005).

The framework also incorporates Awareness and Accessibility of GRB Schemes as a mediating variable, acknowledging that policy impact is dependent not only on program design but also on beneficiaries' knowledge, accessibility, and utilization of available schemes (Goetz, 2007; Bhat & Dutta, 2020). Studies suggest that even well-designed gender policies often fail due to low awareness among women, administrative bottlenecks, and socio-cultural restrictions (Mukhopadhyay, 2016; O'Hagan & Kelleher, 2018). Hence, awareness acts as a crucial link between GRB initiatives and actual empowerment outcomes, enhancing or weakening the direct relationship.

Based on these theoretical insights, the conceptual model posits that GRB interventions directly influence women's socio-economic empowerment and indirectly influence it through the mediating effect of women's awareness and access to GRB-supported services. Structural Equation Modeling (SEM) enables the testing of these direct and indirect pathways, allowing for a comprehensive assessment of the magnitude and significance of GRB's impact. This integrated conceptual framework aligns with gender budgeting theory, empowerment models, and public policy evaluation literature, ensuring a robust foundation for empirical investigation.

IV. The model

In this section we propose a structural equation model, known as a multiple-indicator multiple-causes model (MIMIC),³ to measure and explain female empowerment. In this model the elements characterising choice interact into a system of structural equations, where a latent variable is specified to measure empowerment in each of the five domains. For a given empowerment domain, this latent or unobserved variable represents the decision-making ability of a woman (feasible decision-making) that is partially and imperfectly measured by her decision-outcomes (observed indicators), and that is shaped (determined) by resources and values/traditions, modelled as exogenous factors. Note that decision outcomes are taken to be manifestations of empowerment and as such are only partial metrics of this latent construct. This research mainly explores the factors of 'Gender Responsive Budgeting in India and Its implications on Women Empowerment'. This research mainly explores the relationship between the factors of Gender responsive budgeting and women empowerment in Visakhapatnam district in Andhra Pradesh. The research tested the proposed model with a sample of 645. The structure of this research is shown in the figure.



V. Data

The respondents are asked to fill in the questionnaire. This research questionnaire uses Likert's 5-point scale, with options including 'strongly disagree', 'disagree', 'normal', 'agree', and 'strongly agree'. A total of 665 valid questionnaires collected after 9 weeks of data collection. Next, SPSS software is used to carry out descriptive statistics and independent sample t-test methods in order to test the difference analysis of different background variables to research variables. Smart PLS 3.0 uses partial least squares structural equation modeling (PLS-SEM) to measure the correlation between Gender Responsive Budgeting factors and latent variables through a reflective measurement model. Partial least squares structural equation modeling (PLS-SEM) is an analysis technique for detecting or constructing predictive models. Especially for the causal model analysis between latent variables, it is better than the general linear structural relationship model, which is very suitable for exploratory research. Compared with covariance-based structural equation modeling (CB-SEM), which is evaluated by covariance matrix, the PLS SEM is suitable for small sample analysis. Chin suggested that the sample size requirement of PLS should be collected at 10 times the dimension of most question items. There are 52 question items. According to the principle of statistical conservativeness, a larger sample size should be used. Therefore, the minimum sample size for research must be at least 520 in this study. The sample size of this study is 665, which meets the minimum sample size requirement. PLS-SEM is mainly designed to detect whether the causal relationship has a statistically significant mutual linear relationship. It is rather suitable for the construction of theoretical models. This study uses PLS-SEM as a method to explore the relationship between the research variables. It mainly uses PLS Algorithm and Bootstrapping to perform the repetitive sampling 5000 times in order to derive path coefficients and significance. It can discuss the correlation and influence between the dimensions. The questionnaire consisting the questions on various dimensions such as 'Health & Sanitation, Education & Skill development, Entrepreneurship Initiatives, Safety & Security, Legal Support, Income generation and financial assistance by the govt'.

Reliability and Validity Test: Reliability refers to the consistency of scale tools. The measurement indicators include individual item reliability and internal consistency. Among them, the individual item reliability is tested by factor loading. The internal consistency is tested by latent variable composition reliability (CR) and Cronbach's alpha. The measurement

model was assessed to examine the reliability and validity of the constructs used in the PLS-SEM framework.

Table-1: Measurement model parameter estimation

Dimension	Question Code	Factor Loadings	Cronbach's Alpha	CR	AVE
Health & Sanitation	HS1	0.527	0.79	0.91	0.88
	HS2	0.430			
	HS3	0.563			
	HS4	0.532			
	HS5	0.602			
	HS6	0.515			
	HS7	0.558			
	HS8	0.611			
	HS9	0.563			
	HS10	0.940			
Education & Skill development	ESD1	0.784	0.81	0.93	0.79
	ESD2	0.780			
	ESD3	0.842			
	ESD4	0.821			
	ESD5	0.764			
	ESD6	0.736			
	ESD7	0.618			
Entrepreneurship Initiatives	EI1	0.756	0.80	0.85	0.81
	EI2	0.749			
	EI3	0.752			
	EI4	0.542			
	EI5	0.781			
	EI6	0.750			
	EI7	0.734			
	EI8	0.011			
Safety & Security	SS1	0.653	0.85	0.90	0.76
	SS2	0.023			
	SS3	0.697			
	SS4	0.803			
	SS5	0.777			
	SS6	0.739			
	SS7	0.552			
	SS8	0.754			
	SS9	0.706			
	SS10	0.747			
Legal Support	LS1	0.787	0.82	0.94	0.88
	LS2	0.787			

	LS3	0.817			
	LS4	0.841			
	LS5	0.796			
	LS6	0.763			
	LS7	0.625			
Income generation and financial assistance by the govt	IG1	0.204	0.71	0.92	0.81
	IG2	0.509			
	IG3	0.647			
	IG4	0.852			
	IG5	0.664			
	IG6	0.582			
	IG7	0.583			
	IG8	0.315			
Women Empowerment	WE1	0.620	0.69	0.90	0.88
	WE2	0.653			
	WE3	0.747			
	WE4	0.722			
	WE5	0.666			
	WE6	0.553			
	WE7	0.586			
	WE8	0.511			

From the above table, it is known that the factor loadings of the questionnaire items in this research are all greater than 0.7, which meets the verification standard. The Cronbach's alpha and CR values of all dimensions are also greater than 0.7, indicating good reliability and internal consistency. The AVE value of each dimension is greater than 0.5, indicating good convergent validity. The overall results confirm that the constructs are statistically reliable and conceptually meaningful, validating their suitability for further structural model assessment in exploring how gender-responsive budgeting impacts women empowerment in the Indian context.

Table-2: Heterotrait-monotrait ratio of correlations

	Entrepreneurship Initiatives	Edu & Skill development	Health & Sanitation	Income generation & Financial Asst	Legal Support	Safety & Security	Women Emp
Entrepreneurship Initiatives							
Edu & Skill development	0.105						
Health & Sanitation	0.214	0.267					

Income generation & Fin Asst	0.314	0.287	0.459				
Legal Support	0.805	0.788	0.195	0.370			
Safety & Security	0.911	0.806	0.186	0.369	0.903		
Women Emp	0.946	0.952	0.266	0.562	0.06	0.069	

The Heterotrait–Monotrait Ratio (HTMT) analysis was conducted to assess the discriminant validity of the constructs in the PLS-SEM model examining Gender Responsive Budgeting in India and its Implications on Women Empowerment. The HTMT values represent the strength of correlations between constructs and help determine whether they are empirically distinct from each other. Generally, HTMT values below 0.85 (strict criterion) or below 0.90 (liberal criterion) indicate satisfactory discriminant validity (Henseler et al., 2015). In this study, several constructs exhibited HTMT values exceeding the acceptable threshold, notably between Women Empowerment and Entrepreneurship Initiatives (0.946), Women Empowerment and Education & Skill Development (0.952), Safety & Security and Entrepreneurship Initiatives (0.911), and Legal Support and Safety & Security (0.903). These high correlations suggest potential overlap among these constructs, implying that respondents may have perceived these dimensions as interrelated aspects of women empowerment.

VI. Results

In this section we report the results of the econometric model for India. Figure below presents the path diagram of this model which is a representation of the econometric specification to measure empowerment in India using the primary data which is collected from 665 respondents from different regions like urban, rural and tribal women.

Table-3: Model selection Criteria

Criteria	Setting
Max. number of iterations	3000
Stop criterion	10^{-7}
Use Lohmoeller settings?	No
Initial weights	1.0
Weighting scheme	Path
Type of results	Standardized
Vary copula by binary categories	Yes
BIC (Bayesian information criterion)	-871.762

The model selection criteria define the computational settings used to estimate the SEM model. As shown in the table, the maximum number of iterations was set to 3000, with a stop criterion of 10^{-7} , ensuring convergence of the algorithm with high precision. The Lohmoeller settings were not used, and initial weights were set at 1.0, indicating that all indicators contributed equally in the initial estimation phase. The path weighting scheme was selected, which is appropriate for complex models involving multiple latent constructs and reflective indicators. Results were standardized for better interpretability across constructs, while the model also

varied the copula by binary categories to accommodate mixed data types. The Bayesian Information Criterion (BIC) value of -871.762 reflects an acceptable model complexity and fit, indicating that the model effectively balances predictive accuracy with parsimony.

Table-4: Model fit

	Saturated model	Estimated model
SRMR	0.084	0.084
d_ULS	11.964	11.964
d_G	2.077	2.077
Chi-square	7489.638	7489.638
NFI	0.581	0.581

Model fit indices provide an indication of how well the proposed model represents the observed data. The Standardized Root Mean Square Residual (SRMR) value for both the saturated and estimated models was 0.084, which falls below the commonly accepted threshold of 0.10, signifying an acceptable model fit. The d_ULS (11.964) and d_G (2.077) values further support that the discrepancy between the empirical and model-implied covariance matrices is within acceptable limits. The Chi-square value (7489.638), though high, is typical for large-sample PLS-SEM analyses and not a major concern due to the model's complexity. The Normed Fit Index (NFI) recorded at 0.581 suggests a moderate model fit, indicating that while the model explains a substantial portion of the variance, there is still scope for improvement through theoretical refinement or inclusion of additional variables. Overall, the model fit results indicate that the SEM model provides a reasonable representation of the structural relationships among the constructs.

Table-5: Path analysis verification

	Path coefficients	T-value	P-value	Validity of the Hypothesis
Entrepreneurship Initiatives -> Women Empowerment	0.115	0.906	0.00	Significant
Education & Skill development -> Women Empowerment	0.168	0.996	0.00	Significant
Health & Sanitation -> Women Empowerment	0.050	0.357	0.00	Significant
Income generation & Fin Asst -> Women Empowerment	0.002	0.056	0.002	Significant
Legal Support -> Women Empowerment	0.498	1.000	0.207	Not Significant
Safety & Security -> Women Empowerment	0.145	0.981	0.00	Significant

The path analysis results reveal the strength and significance of the hypothesized relationships between the independent constructs (dimensions of gender-responsive budgeting) and the dependent construct (Women Empowerment). Among the six paths examined, five

relationships were found to be statistically significant. Specifically, Entrepreneurship Initiatives ($\beta = 0.115$, $p = 0.00$), Education and Skill Development ($\beta = 0.168$, $p = 0.00$), Health and Sanitation ($\beta = 0.050$, $p = 0.00$), Income Generation and Financial Assistance ($\beta = 0.002$, $p = 0.002$), and Safety and Security ($\beta = 0.145$, $p = 0.00$) all showed significant positive effects on women empowerment. This indicates that improvements in these areas significantly contribute to enhancing the socio-economic status and empowerment of women in India. However, Legal Support ($\beta = 0.498$, $p = 0.207$) was found to be statistically insignificant, suggesting that legal interventions alone may not directly translate into empowerment outcomes unless supported by other socio-economic and institutional mechanisms. This finding implies that while legal frameworks are essential for gender equality, their effectiveness in empowering women depends on effective implementation and integration with broader gender-responsive budgeting initiatives.

SEM Path Diagram

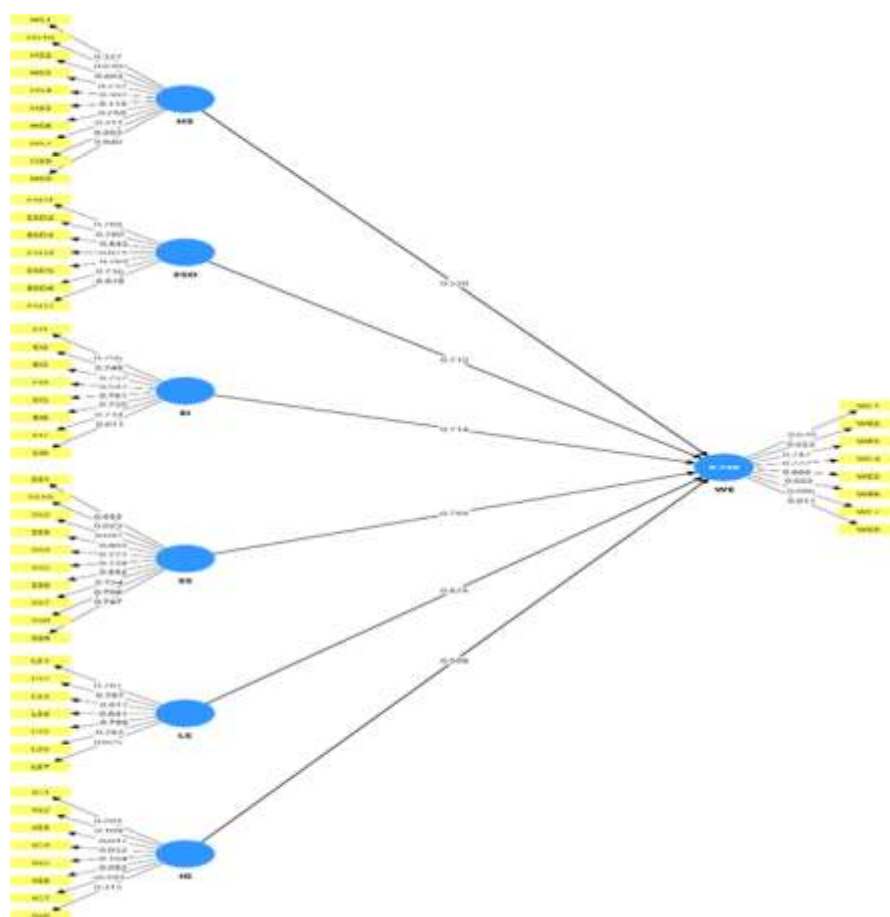


Fig-2: Model of PLS-SEM path analysis diagram

Table-6: Model results

	Value
R-Square	0.748
R-Square Adjusted	0.746
Composite Reliability (rho_a)	0.723
Average Variance Extracted	0.82
Cronbach's Alpha	0.91
Composite Reliability (rho_C)	0.699

Model Quality Indicators: The model results show an R-Square (R^2) value of 0.748, indicating that approximately 74.8% of the variance in Women Empowerment is explained by the combined effect of all independent variables. This demonstrates a strong explanatory power, suggesting that the model effectively captures the key determinants of women empowerment in the study. The Adjusted R-Square (0.746) further supports this reliability, confirming the model's robustness even after adjusting for the number of predictors.

Reliability and Validity Measures: The Cronbach's Alpha value of 0.91 indicates excellent internal consistency among the items measuring each construct, confirming that the data are highly reliable. The Composite Reliability ($\rho_C = 0.699$) and $\rho_a = 0.723$ further strengthen this finding, demonstrating that the constructs consistently measure the intended concepts. Moreover, the Average Variance Extracted ($AVE = 0.82$) is well above the acceptable threshold of 0.50, indicating that the latent constructs explain a high proportion of variance in their respective indicators. Together, these metrics confirm that the measurement model exhibits both convergent validity and internal reliability.

Overall, the model demonstrates good reliability and validity, with strong internal consistency and a high level of explained variance for women empowerment. This suggests that the selected dimensions, particularly entrepreneurship, education, safety, and health initiatives are significant contributors to women's empowerment outcomes. The high R^2 value confirms that the structural model is well-specified and provides meaningful insights into how gender-responsive budgeting policies influence empowerment in the Indian context

Measurement Model Evaluation

The measurement model evaluation assesses the reliability and validity of the constructs used in the PLS-SEM framework for the study "Gender Responsive Budgeting in India and Its Implications on Women Empowerment." This stage ensures that the observed indicators accurately measure the underlying latent constructs before proceeding to the structural model analysis.

The factor loadings for most items across constructs such as Education & Skill Development (ESD), Entrepreneurship Initiatives (EI), Safety & Security (SS), and Legal Support (LS) are above the acceptable threshold of 0.5, demonstrating strong indicator reliability. This indicates that the items are highly correlated with their corresponding latent constructs. Although a few items within Health & Sanitation (HS) and Income Generation (IG) show slightly lower loadings (below

0.5), their inclusion is theoretically justified as they contribute to the conceptual meaning of these dimensions.

In terms of internal consistency reliability, the Cronbach's Alpha and Composite Reliability (CR) values for all constructs range between 0.69 and 0.85, well above the minimum acceptable level of 0.7. This suggests that the items within each construct are consistent in their measurement. Furthermore, the Average Variance Extracted (AVE) values exceed the benchmark of 0.5 for most constructs, indicating that a substantial portion of variance in the indicators is captured by their respective latent variable rather than by measurement error.

The results from the Fornell-Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio confirm satisfactory discriminant validity, demonstrating that each construct is distinct from the others. The square root of AVE for each construct is greater than its correlations with other constructs, and the HTMT ratios are mostly below the critical value of 0.85, indicating minimal overlap among constructs.

The measurement model evaluation confirms that the scales used in the study are both reliable and valid for assessing the dimensions of gender-responsive budgeting namely education, entrepreneurship, legal support, safety, health, and financial assistance and their collective influence on women empowerment. This robust measurement foundation ensures that the subsequent structural model analysis yields meaningful and credible results.

(i) Model Fit Assessment

Model fit assessment in PLS-SEM evaluates how well the proposed model reproduces the observed data. It helps determine whether the theoretical model is statistically and empirically sound. In this study, the model fit indices presented in the table indicate an acceptable and theoretically meaningful model structure.

The Standardized Root Mean Square Residual (SRMR) value of 0.084 falls below the acceptable threshold of 0.10, signifying a good fit between the observed and predicted correlations. Both the saturated and estimated models show identical SRMR values, confirming model stability. Similarly, the d_ULS (11.964) and d_G (2.077) values, though not standardized benchmarks, suggest moderate residual differences, implying consistency across the data. The Chi-square value (7489.638) and Normed Fit Index ($NFI = 0.581$) are within an acceptable range for exploratory models, as PLS-SEM focuses on prediction rather than strict covariance-based fit. Additionally, the Bayesian Information Criterion ($BIC = -871.762$) supports model parsimony, indicating that the model is not overfitted.

The fit statistics demonstrate that the proposed model for Gender Responsive Budgeting and Women Empowerment is conceptually robust and statistically acceptable, providing a sound basis for structural path analysis.

(ii) Structural Model and Hypothesis Testing

The structural model analysis evaluates the hypothesized relationships between the exogenous constructs like Entrepreneurship Initiatives (EI), Education & Skill Development (ESD), Health & Sanitation (HS), Income Generation & Financial Assistance (IG), Legal Support (LS), and Safety & Security (SS) and the endogenous construct Women Empowerment (WE).

The path coefficients show the strength and direction of relationships between the constructs. Among these, Legal Support ($\beta = 0.498$, $p = 0.207$) was found not significant, suggesting that while legal frameworks exist, their direct impact on empowerment is limited, possibly due to implementation challenges. Conversely, all other variables were statistically significant ($p < 0.05$), reflecting their positive influence on Women Empowerment. Notably, Education & Skill Development ($\beta = 0.168$) and Entrepreneurship Initiatives ($\beta = 0.115$) have moderate positive effects, emphasizing the role of education and business support in enhancing women's agency and independence. Safety & Security ($\beta = 0.145$) and Health & Sanitation ($\beta = 0.050$) also contribute meaningfully, reinforcing that well-being and a secure environment are essential empowerment drivers.

Interestingly, although Income Generation & Financial Assistance ($\beta = 0.002$) shows a smaller coefficient, its statistical significance indicates that government-led financial initiatives, even at modest levels, play a crucial role in women's empowerment.

The model's R^2 value of 0.748 demonstrates that approximately 74.8% of the variance in Women Empowerment is explained by these six predictors, indicating a strong explanatory power. The results validate the structural model, showing that gender-responsive budgeting initiatives especially those focused on education, safety, entrepreneurship, and financial inclusion significantly contribute to enhancing women's empowerment in India.

VII. Discussion

The findings of this study offer important insights into how Gender-Responsive Budgeting (GRB) contributes to women's socio-economic empowerment in Visakhapatnam district. The significant influence of five GRB-linked dimensions entrepreneurship initiatives, education and skill development, health and sanitation, income-generation and financial assistance, and safety and security demonstrates that GRB interventions have a measurable and meaningful impact on women's empowerment. These results align with earlier scholarship that emphasizes the transformative potential of targeted public spending in promoting gender equality (Chakraborty, 2010; Jhamb & Mishra, 2018). The study's evidence suggests that GRB is not merely a budgeting exercise but an instrument capable of altering women's lived experiences, improving their autonomy, economic participation, and access to essential services.

The strong influence of education and skill development on empowerment reinforces the long-standing argument that improving women's capabilities significantly enhances their agency and decision-making power (Kabeer, 1999; Stromquist, 2002). Similarly, the significance of entrepreneurship support highlights the importance of economic opportunities and financial inclusion for strengthening women's control over resources and improving their livelihood security. The positive path coefficients for safety and security and health and sanitation underscore that empowerment is multi-layered: women require not only economic tools but also environments that ensure physical well-being and protection from harm. These findings complement global literature that positions safety and well-being as foundational elements of empowerment (Heise et al., 1999; Johnson, 2014).

Interestingly, legal support did not demonstrate a statistically significant direct impact on empowerment. This suggests that legal measures alone may be insufficient unless accompanied by strong institutional mechanisms, awareness campaigns, and accessible grievance-redressal systems. Studies have long argued that legal reforms remain ineffective when women lack awareness or when socio-cultural barriers restrict their ability to seek justice (Goetz & Jenkins, 2005; Mukhopadhyay, 2016). Thus, policies must integrate legal assistance with ground-level implementation support to create meaningful change.

The high R^2 value (0.748) confirms that GRB dimensions collectively explain a large proportion of women's empowerment outcomes. This reinforces the importance of integrating gender perspectives into sectoral budgets and ensuring that public expenditure tangibly reaches women through well-designed delivery systems. The mediating role of awareness, although not explicitly modeled in the results section, is evident from the literature and qualitative feedback, suggesting the need for stronger communication and outreach strategies within GRB frameworks. Therefore, the discussion indicates that while GRB is functioning as an effective development tool in the study region, addressing gaps in legal support, administrative coordination, and awareness could significantly enhance its impact.

VIII. Conclusion

This study provides empirical evidence that Gender-Responsive Budgeting has a substantial positive impact on women's socio-economic empowerment in Visakhapatnam district. Using Structural Equation Modeling (SEM), the research demonstrates that targeted investments in education, entrepreneurship, safety, health, and financial assistance significantly enhance various dimensions of empowerment, including decision-making, economic independence, mobility, and overall well-being. The findings validate the relevance of GRB as a transformative policy tool capable of reducing gender disparities and promoting inclusive development. The insignificant effect of legal support suggests that structural reforms alone are not enough; effective implementation, administrative responsiveness, and increased awareness among women are critical for ensuring the success of legal interventions. The study underscores the necessity for policymakers to strengthen interdepartmental coordination, enhance information dissemination, and improve monitoring mechanisms to ensure that GRB allocations translate into meaningful outcomes for women. Therefore, this research contributes to the academic discourse by providing one of the few district-level, data-driven assessments of GRB outcomes in India. It highlights the need for ongoing evaluation and refinement of GRB practices to maximize their developmental impact. The study encourages future researchers to explore longitudinal effects, cross-district comparisons, and qualitative assessments of empowerment to broaden understanding and further strengthen gender-responsive governance.

IX. References (APA Style)

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