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Sustainability as Strategic Imperative: Influence on Startup's Financial Performance based on Predictive Modeling

Riya Sharma[1], Sharon Christa[2], Ambica Prakash Mani[3], Suma V[4], and Deepak Kaushal[5]

[1] Department of Commerce, Graphic Era Deemed to be University, Dehradun, India
riyasharma6568@gmail.com
[2] Department of CSE, MIT Art Design and Technology University Pune, India.
sharonchrista@gmail.com
[3] Department of Commerce, Graphic Era Deemed to be University, Dehradun, India
ambicamani9@gmail.com
[4] Professor, Department CSD, Dayananda Sagar College of Engineering Bengaluru, India
sumavdsce@gmail.com
[5] Associate Professor, Department of Management Studies, Graphic era deemed to be university, Dehradun, India.
dipak.kaushal@gmail.com

Abstract

In a dynamic contemporary business landscape sustained longevity of startups depend on the financial performance. While identifying the factors that add value to financial performance, sustainable business practices have emerged as a cornerstone. Integration of socially and environmentally responsible practices aligns the startup with competitive and financial viability. This study analyzes the intricate relationship between sustainable business practices (SBP)and competitive advantage (CA). The synergistic influence of SBP and CA is anticipated to intricately shape and define the Financial Performance (FP) of new enterprise. The study employs a multiple regression analysis to investigate multifaceted impact of sustainability on economic viability of emerging ventures. The study seeks to unveil the complex dynamics governing this tripartite relationship thereby paving way for strategic imperatives that propel startups towards a more resilient and sustainable future.

Keywords— competitive advantage, financial performance, regression, startup, sustainable business practices

1 Introduction

The global startup ecosystem has evolved as a dynamic force in recent decades, dramatically influencing economic development and sustainability around the world. The startup ecosystem has grown into a thriving network of innovative businesses that are transforming industries,

fostering technical improvements, and contributing to economic growth. The world is transitioning on the lines of sustainability. Business houses are adapting sustainable business models on order to sustain in competitive long run [28]. Sustainable businesses rely on unique sets of micro-level practices of creating a supportive environment, challenging normative standards, and redefining the sustainability paradigm [26].

Among all startups are emerging as trend setters by laying down new sustainable ways of doing business. A startup is a business venture setup by an entrepreneur to explore, develop and sustain a scalable business model [5]. Sustainable startups can be defined as business ventures that solves a problem of society at large and adopt environment friendly practices while remaining financially stable [23]. In today's time ventures are inherently sustainable [1] due to the vision of their sustainable entrepreneurs. The sustainable entrepreneurs identify opportunities in social and environmental issues and integrate social and environmental concerns into their business practices but fail to channelize it competitive and financial gains [31].

Past literature [20], [17], [16] has acknowledged the significance of sustainability, however gap exists in comprehending mechanisms through which these practices translate to financial gains in a startup ecosystem [10]. Startups continuously aim to improve their business practices to remain ahead in competition. The key elements of these sustainable businesses are disruptive strategy, social product innovation, and digitalization of processes [15]. These key factors add to the competitive advantage of the startups helping it to reduce the failure rate [11]. Adopting sustainable business practices through energy efficiency, waste reduction, and resource optimization, sustainability measures can contribute to cost savings, which can benefit a startup's bottom line [4]. Studies indicate that sustainability measures have a favorable impact on financial success [21]. Literature presents actual evidence that organizations that embrace sustainability strategies have a higher likelihood of achieving greater financial performance [1]. Current study is in line with the above theories where startups are investigated on the resource and knowledge-based view. Startup usually focus on adopting SBP but fail to develop competitive advantage over it thus making it important to investigate if adoption of sustainable practices really contribute to competitive advantage and financial performance of startups [9]. This study attempts to investigate competitive advantage and financial performance as predictors of sustainable business practices through multiple regression approach.

This paper further presents a brief survey of the research conducted in the area of sustainable startups. Further, methodology adopted to conduct this research is presented followed by data analysis and interpretation, discussion of the findings and finally the conclusion.

2 Literature Review

2.1 Sustainable Business Practices

Sustainable business practices refer to the business operations that improves the financial health of the enterprise without compromising with the environment [4]. According to previous work sustainable business practices include implementing sustainability principles into business choices, providing eco-friendly products/services, and adhering to environmental standards in business operations [12]. In the context of a startup, sustainability can be defined by themes such as value creation alongside wealth creation, innovative business model, economic and social gains, ability to survive on own funds, resilience, consistent coverage of the cost of operations, overheads & on-costs, spatial and temporal extent [24]. According to the literature, these themes can be utilized to investigate aspects influencing a startup's sustainability and minimize the high mortality rate of startups [25]. Strategies adopted by organizations to

reduce environmental waste, address social and economic issues, and improve business performance [6]. Recent work by [7] has discovered that improving sustainability orientation by one standard deviation has a positive influence on startup initial valuation, boosting investment amount by 28% thus making inclusion of sustainability an integral responsibility of upcoming ventures.

2.2 Competitive Advantage

Startup sustainability comprise three key elements people, profit, and the environment [13]. Individual, social, organizational, and institutional elements all have an impact on the identity of venture and their financial performance, which adds up to the competitive advantage [8]. Startup's resilience capability is important in achieving and maintaining long-term performance (Finance & 2017, n.d.). Startups that claim to be sustainable should have a mechanism in place to track their own financial performance [30]. Such ventures are under pressure from both internal and external factors, such as investors, shareholders, and policymakers, to enhance their competitive sustainability performance. Literature has identified the critical role of venture capitalists (VCs) in accelerating the competitive strategy process by passing and listing of VC-owned startup firms [14]. VCs can speed up the process by sending directors to new companies and improving risk disclosure, notably under the registration and issuance procedure. Post listings, VC-backed firms perform better[18]. VCs can help startups choose a hot season listing, which has a good timing effect adding up the competitive advantage.

2.3 Financial Performance

Literature defines financial performance as management's ability to handle the company's finances efficiently and successfully during a given time period [3]. Financial performance describes a company's financial situation throughout a specific time period, as assessed by measures such as solvency, profitability and liquidity [29]. Recent studies have discovered that startups with good sustainability strategies outperformed their peers in terms of financial success in their study [27]. Another study by [19] discovered a positive association between sustainable practices and financial success in another investigation. However, some research imply that there is little or no association between sustainable practices and financial performance [2]. A study based in [22] discovered the link between sustainable practices and financial performance varies industry to industry. There are multiple factors highlighted in literature that determines the financial performance of startups.

3 Methodology

The study focused on a comprehensive dataset that included startups from various sectors across India. The primary instrument for data collection was a structured questionnaire on a five-point Likert scale where 1 denotes strongly disagree and 5 denotes strongly agree. Data was gathered using a robust technique that included the distribution of a standardized questionnaire to startup representatives. To ensure broad accessibility, the questionnaire was administered online. Initially, 498 responses were received and in order to assure data integrity and conformance to research requirements, a careful screening process was used. Due to noncompliance with one or more of the research protocol's requirements, 57 responses were removed from the dataset. Further outliers were identified and removed. To offer a thorough perspective of the dataset, descriptive statistical analysis was performed on the remaining 441 responses. The

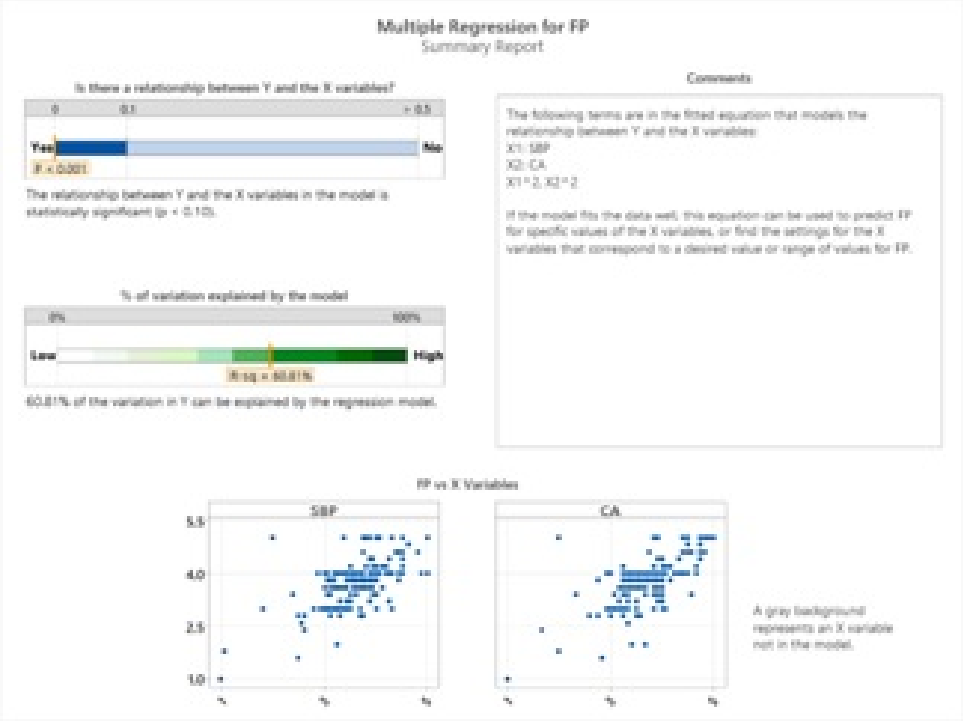

Figure 1: Multiple Regression for Financial Performance

descriptive analysis was performed and internal reliability of the questionnaire items were assessed using a reliability analysis. A multiple regression analysis was performed to investigate the links between Sustainable Business Practices (SBP), Competitive Advantage (CA), and Financial Performance (FP). To extract useful insights from the dataset, the statistical software R was used.

3.1 Data Analysis and Interpretation

The study conducted multiple regression analysis for predicting Financial Performance (FP) using Sustainable Business Practices (SBP) and Competitive Advantage (CA). The multiple regression analysis depicts the relationship between the independent factors and the dependent variable. Multiple regression for Financial Performance is shown in Figure 1.

The coefficients in the equation represent the strength and direction of each variable's relationship. The coefficient for X1 is 0.940, which means that for every unit increase in SBP, FP should rise by 0.940 units. The R-squared value of 60.81% indicates that the model explains a substantial amount of the variation in FP. The p-value for the overall F-statistic is less than 0.001, which indicates that the model is statistically significant. The coefficients for SBP and CA are both positive and statistically significant, suggesting that both variables have a positive relationship with FP.

Figure 2 depicts the multiple regression analysis model which includes a step-by-step summary of the model building process, the final model equation given below as (a), and the impact

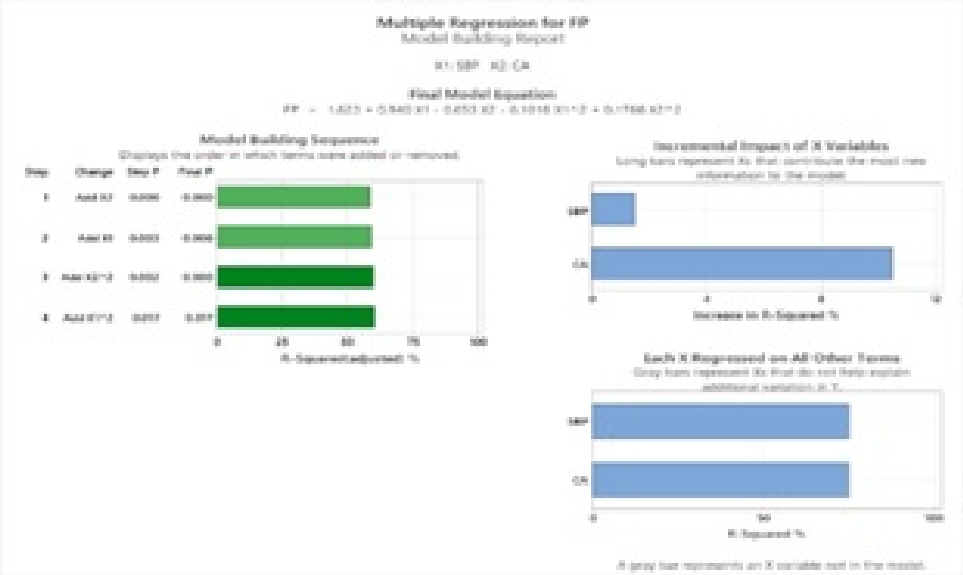

Figure 2: Multiple regression for financial performance

of individual predictor variables (SBP and CA) on the model.

$$FP = 1.623 + 0.940X1 - 0.653X2 - 0.1018X1^2 + 0.176X2^2$$

The Equation 3.1 suggests FP is modeled as a quadratic function of the predictors SBP (X1) and CA (X2). Both linear and squared terms of the predictors are included, indicating a non-linear relationship between the predictors and the dependent variable. The bar graph shows the stepwise addition of variables to the model and the associated change in the R-squared value, which measures the proportion of variance in the dependent variable that is predictable from the independent variables.

Step 1: Adding X1 to the model resulted in an R-squared of approximately 0.5.

Step 2: Including X2 improved the R-squared significantly, suggesting that CA contributes additional important information for predicting FP.

Step 3: Adding the squared term of X1 ($X1\hat{2}$) further increased R-squared, though the increase appears marginal.

Step 4: Finally, incorporating the squared term of X2 ($X2\hat{2}$) again resulted in a slight increase in R-squared.

The change in R-squared at each step is quite small, especially for the squared terms, indicating that the primary predictive power comes from the linear terms of the predictors.

The incremental impact of variables is given as in first bar chart labeled "Increase in R-Squared" visualizes the individual contribution of each term to the R-squared statistic. X1 has the largest individual effect, followed by X2, with the quadratic terms having less impact. The second bar chart labeled "Each X Regressed on All Other Terms" represents a partial regression

plot for each predictor. These plots show how much of the variance in FP is explained by each predictor independently when controlling for the other variables in the model. The grey bars indicate that the terms are included in the model, with their widths likely corresponding to the impact or significance of each term. The SBP (X1) appears to have the greatest impact, followed by CA (X2), and the quadratic terms have lesser but still significant impacts. The model implies that FP is most strongly influenced by X1 and X2 linear terms, with a curvilinear (quadratic) relationship also present. The stepwise approach taken in the model building suggests a careful process to ensure each additional term provided a statistically significant improvement in model fit.

The multiple regression analysis focused on optimizing a specific response variable financial performance as depicted in figure 3. The analysis includes two predictor variables namely X1 and X2, labeled as SBP and CA, respectively. The model predicts the value of FP with a mean value of 4.94937. The 95% prediction interval (PI) for the model's prediction ranges from approximately 4.0911 to 5.8077 suggesting with 95% confidence, that the true value of FP will fall within this range for a new observation given the model. For SBP the optimal setting for X1 to maximize FP is around 5.49596 and for CA maximize FP is approximately 4.49996. The two subplots represent the sensitivity of the predicted FP to changes in X1 (SBP) and X2 (CA). The solid lines indicate how the predicted FP changes as each predictor is varied, holding the other predictor constant at its optimal setting.

This subplot of SBP shows that the predicted FP reaches a peak at the optimal setting of SBP, suggesting that this is a local maximum. As SBP moves away from the optimal setting in either direction, the predicted FP decreases. Similarly, the CA subplot shows that the predicted FP peaks at the optimal setting of CA. Moving CA away from this point leads to lower predicted FP values. Further, FP is predicted for all sample points depicted in the residual plot showing the predicted FP values for all observations in the dataset against their residuals, which are the differences between observed and predicted FP values. Most residuals cluster around zero, which is a good sign, indicating that the model's predictions are accurate for those points.

The Model building sequence table in Figure 3 provides the next best sets of values for X1 (SBP) and X2 (CA) after the optimal settings that could yield high values of predicted FP. The purpose of presenting alternative solutions is often to provide options in case the optimal settings are not feasible for some reason.

Thus, it can be concluded that the multiple regression model has identified an optimal set of conditions for the predictors that maximize the response variable FP. The sensitivity plots illustrate that these conditions represent a peak in the model's predictive surface, and the residual plot indicates the model's predictions are generally accurate. The alternative solutions provide backup options for near-optimal results.

4 Findings and Discussion

The findings suggest that both sustainable business and competitive advantage plays a significant role in determining the financial performance of startups. The results imply those startups that adopt sustainable business practices and invest in competitive advantage, which is more likely to achieve higher financial performance. Startups should focus on developing and implementing sustainable business practices, such as reducing their environmental impact and improving their social and ethical performance. Businesses should also invest in building a strong competitive advantage, such as by developing innovative products and services, differentiating themselves from competitors and creating a strong brand reputation.

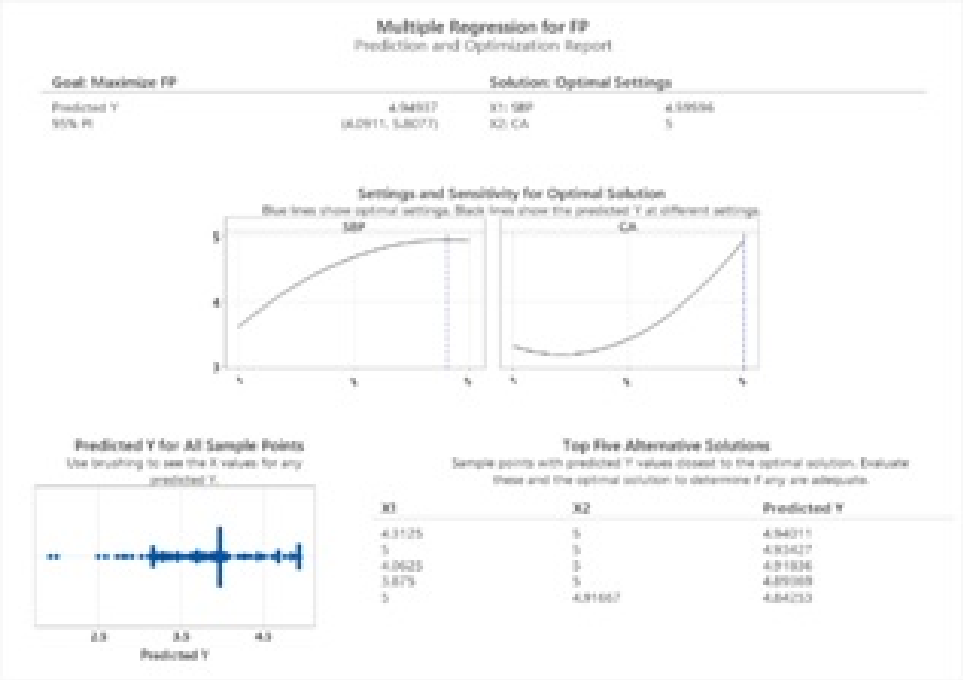

Figure 3: Prediction and Optimization Report of Financial Performance

5 Conclusion

The study's findings indicate that the linear components of SBP and CA have the great influence on FP, emphasizing their significance in predicting the outcome variable. The inclusion of quadratic elements indicates a nonlinear relationship, which adds complexities to the predictive model. The stepwise approach to model construction ensures that each additional term produces a statistically significant improvement in model fit, hence increasing the robustness of the final regression equation. The findings of this study will add substantial knowledge to the existing literature also it will help the stakeholders to incorporate sustainable practices in their business model. The findings also suggest government public policy formulation to develop policies that foster entrepreneurial growth and development. However, it is important to note that the results of this study are based on a single regression model. It is possible that other variables, such as industry, size, and age of the firm, could also influence FP. Additionally, the study is cross-sectional, so it cannot establish a causal relationship between sustainable business practices, competitive advantage and financial performance. It is possible that other factors, such as unmeasured confounders, could explain the observed relationships and can be explored in future work.

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