

Unweaving the Impact of Sustainability in Financial Decision-Making: An Empirical Study

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Abstract

Sustainable finance is a crucial concept as it considers the long-term impact of investments on the environment and society, as well as the financial returns they generate. The study has objective to identify the determinants of sustainability in financial decision-making, to investigate the conceptual relationship and interlinkages between the variables of sustainable financial decision-making. The study identifies 15 variables by conducting a review of the literature and focus-group interviews of industry experts working with top management in various organizations. TISM framework is used to evaluate relation and interrelationships among selected variables. MICMAC is applied subsequently to categorize the variables into driving and dependence power. The paper concludes that sustainable finance drives sustainable performance. The study is valuable to all organizations willing to follow the rule of sustainability in financial decision-making, to contribute to the society and environment.

Keywords: Sustainable finance, MICMAC analysis, TISM framework, ESG goals.

Introduction

The innovative term “sustainable finance” comprises ESG considerations to proceed for long-term investments in economic activities and projects (Durrani et al., 2020). The environmental variables consist of climate change extenuation and adaptation. It also covers the macro aspect of environment conservation and checks on pollution. The social variables denote issues of inequality, human rights, labor conditions and laws, comprehensiveness and human development. The governance variables include managerial structures and their responsibility towards various stakeholders. In this way, sustainable finance also leads to Corporate Social Responsibility (CSR) as CSR takes care of ESG considerations in day to day management of business enterprises, corporate finance and management of investors' funds (Liang & Renneboog, 2020). Over the years, sustainable finance developed as a new factor for the advancement of growth of a green economy, environmental security and enhancing social responsibility

(Zheng et al., 2021). Investors who are responsible socially should make the investment decisions in the companies which focusses on sustainability. Sustainable finance focuses and contribute in assessing the Implication of the environmental and social objectives.(Popescu et al., 2021)That is why sustainable finance is gaining special attention across the Asian region.

Review of Literature

Climate change and its effects have been a big issue that affects developing as well as developed nations (Ngwenya &Simatele, 2020). Therefore, the concept of sustainability came into existence even in the business world. Firms having international presence were found to have higher engagement in SDGs (DasGupta et al., 2022). However, a difference exists between sustainability and sustainable performance. Sustainable performance is a wider term than sustainability. Sustainable performance exists only when a company performs well along with having sustainability in all its areas and for all the variables that are contributing towards sustainable finance (Malsha et al., 2020).Sustainable performance is crucial to stakeholders. Organizations have devoted resources to achieve competitive advantage, and lastly, they get success (Islam &Shamsuddoha, 2021). Over the years, sustainable finance developed as a new factor for the advancement of growth of a green economy, environmental security and enhancing social responsibility (Zheng et al., 2021). Moreover, it also supports banks in taming firms' sustainable performance (Malsha et al., 2020). Sustainable finance is majorly employed in academia and business. However, sustainable finance is a developing concept (Liu et al., 2020) which does not have a universally accepted definition. However, focus isto supervise the progression of financial activities, ecological protection, and environmental conservation to attain long-term objectives (Zhou et al., 2020). As per European Commission, sustainable finance in the financial industry takes care of those investment decisions that work with ESG principles while fulfilling the needs of customers and society (Sustainable Finance, 2018). Sustainable finance is a complete process that uses numerous approaches for the enhancement of the ESG. This performance is measured with pre-specified ESG criteria .

Sustainable finance can be adopted in three steps (Schoenmaker, 2018):It is high time to understand the mindset of top management of the corporate world about sustainable finance so to analyze whether they are in favor of adopting the model of sustainable finance, what are the driving forces behind the concept of sustainable finance and its implication to business in particular and to various stakeholders in general. The present paper is an attempt in this direction. To obtain the determinants of sustainability in financial decision-making and to investigate the conceptual relationship and interlinkages between the variables of sustainable financial decision-making is the objective of the study.

Research Methodology

The variables considered important while making final decisions are obtained from anexisting literature review and interviews with the experts in the finance field and top management of various organizations. The responses were recorded in the form of a Self-Structural Interpretive Matrix. This matrix was then converted to 1's and 0's and was checked for transitivity. The variables were placed at different levels and a digraph was made accordingly. Further, Total Interpretive Structural Modelling (TISM) framework (Warfield, 1974) and MICMAC analysis (Godet &Unesco, 1994)were performed to identify and classify variables into driving and dependence power.

TISM Framework

Identify variables - Sustainability variables in financial decision-making are identified in the first stage. The variables are selected based on a literature review and by interviewing a panel of experts. Since the project is based on identifying the determinants of sustainable goals in financial decision-making, the panel of experts is comprised of 20 experienced professionals from the top management of various organizations. Table 1 gives the description of variables identified from the review of literature and interviews of experts. A total of fifteen variables are identified and their description along with references are tabulated in Table 1 as A1 to A15 variables.

Table 1: Description of Variables

Variable No	Variable Name	Description	References
A1	Sustainable finance	Financing the business projects in a way that is viable for society, environment and the economy.	(Durrani et al., 2020; Caldecott, 2020;Tirole (2017; Falcone et al., 2018)
A2	Environmental goals	The environmental dimension of SDGs consists of management of chemicals and waste, preserving the natural resources including water, biodiversity and ecosystems, climate change, marine issues management etc.	SDGs, UN Environment Programme
A3	Social goals	The social dimensions of SDGs are working towards social inclusion, eradication of poverty and inequalities and promoting inclusive and participatory decision-making.	SDGs, UN
A4	Governance goals	It aims to promote strong political institutions and processes that must align national policies with the breadth and complexity of sustainability. It also aims to strengthen public servants' awareness towards the achievement of sustainability in its core areas.	(Monkelbaan, 2018)
A5	CSR	Corporate social responsibility (CSR) justifies the existence of any corporate model socially. It is a way by which a company can be made socially responsible to its investors, and the general public.	(Lindgreen & Swaen, 2010;Liang &Renneboog, 2020)
A6	Economic goals	Economic goals basically include economic growth, employment, security, stability, efficiency, equity and economic freedom. These goals concern the impact of organizations on the economic conditions of their stakeholders.	(Malsha et al., 2020) https://www.gpb.org/education/econ-express/economic-social-goals
A7	Regulatory processes	Regulatory process helps to develop a broad global baseline of best quality sustainable standards to work as a unified way on sustainability reports.	(Porter, 1991)
A8	Relationship with stakeholders	The success of the business is influenced by stakeholders that comprise of Employees, investors, customers& suppliers	(Logsdon & Lewellyn, 2000; (Rasche & Esser, 2006)
A9	Competitive advantage	One of the strengths of any organisation that makes it different from its competitors. By giving importance and analysing the benefits and embedding sustainability in the different functions of the organisation, the companies can find a new source of competitive advantage.	(van Huijstee&Glasbergen, 2008)
A10	Risk mitigation	Risk mitigation is a strategy that is used by organisations to reduce the effect of threats faced by businesses. The objective of risk mitigation to achieve sustainability is to grow and sustain taking care of the environment.	(Sillanpää, 1998)

Variable No	Variable Name	Description	References
A11	Revenue enhancement	It is the process of holistic improvement of business model to increase revenues. Governments enhance their tax revenues by pricing carbon emissions and diverting towards sustainable development. Banks enhance revenues by revenue diversification which aids in green recovery and stimulates sustainable development.	(Xie et al., 2022; Zheng et al., 2021)
A12	Capital enhancement	Capital invested in sustainable development goals meets the overall economic goal by not only enhancing the financial, capital human capital, social capital, and environmental capital.	(Tao et al., 2022; Chava, 2014)
A13	Sustainable performance	The performance of a firm inclusive of the achievement of sustainable goals along with monetary benefits from business activities is referred to as the sustainable performance.	(Xue et al., 2022; Zheng et al., 2021)
A14	Impact on energy efficiency and carbon footprint	Goal 7 of the 17 Sustainable Development Goals aims to provide affordable modern energy. Thus, financing renewable energy and producing efficient energy which reduces overall carbon emissions, in turn reducing the carbon footprint is a major area under sustainable financing.	(Xue et al., 2022; Schoenmaker, 2018)
A15	Shift towards climate finance	The 2015 Paris Agreement on climate change has proposed to bring down the estimated temperature increase of 2°C to 1.5°C by bringing down the carbon footprint by about 40 gigatonnes per year. The urgency of the subject has forced the governments to prioritize the projects which work towards reducing carbon footprint. Hence, shifting the focus towards climate financing.	(Schoenmaker, 2018)

Self-structural interpretive matrix – In this step, a relative relationship matrix between the variables is obtained. The opinion of panel of experts noted to identify the interrelationship between these variables. These relationships are represented in terms of V, A, O and X. V - element i(row) influences element j(column), A - element j influences element i, O - i and j influence each other and X - i and j have no relationship. Self-structural interpretive

matrix is represented in Table 2. It is found that A1 influences A6 and A5 and gets influenced by A4, A3, and A2. Variable A5 influences A8 and A7 and variable A6 influences A9. It is also found that A13 is influenced by A7, A8, and A12 respectively and has an influence on A14 and A15. In addition, A9, A10 and A11 are found to influence A10, A11 and A12, respectively. The results also suggest that most of the variables influence each other.

Table 2: Self-Structural Interpretive Matrix

F	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1
A1	○	○	○	○	○	○	○	○	○	V	V	A	A	A	X
A2	○	○	○	○	○	○	○	○	○	○	○	○	○	X	
A3	○	○	○	○	○	○	○	○	○	○	○	○	X		
A4	○	○	○	○	○	○	○	○	○	○	○	X			
A5	○	○	○	○	○	○	○	V	V	○	X				
A6	○	○	○	○	○	○	V	○	○	X					
A7	○	○	V	○	○	○	○	○	X						
A8	○	○	V	○	○	○	○	X							
A9	○	○	○	○	○	V	X								
A10	○	○	○	○	V	X									
A11	○	○	○	V	X										
A12	○	○	V	X											
A13	V	V	X												
A14	○	X													
A15	X														

Source: Authors

Initial reachability matrix – Further, to obtain the initial reachability matrix, transformations were made for V, A, O and X into 1s and 0s based on rules of V, A, O and X.

Final reachability matrix - The driving and dependence variables are calculated to obtain the matrix.

Level partitioning –The matrix obtained in step 4 is further used to reachability and antecedent set. An intersection set is calculated for each variable which is the intersection of variables in the reachability set and antecedent set. If reachability set is the same as values obtained in intersection set for a variable, which should be placed at one level. Multiple variables can be placed at one level. The procedure is iterated until the last variable is placed at a level.

Digraph – Further, a digraph is developed. It reflects the significant transitive and direct relationships and stages of partitions.

Interpretive matrix - An interpretive matrix is formed representing the links between each variable in the digraph.

Interpretation of links – Finally, each link formed between variables is interpreted.

MICMAC Analysis

To study the strength of the relationship between variables MICMAC analysis is implemented. It classifies the variables in four quadrants. The graph is constructed based on the 2 different powers to identify the autonomous, linkage, dependent, and independent variables. Autonomous indicators (Quadrant I): The driving and dependence power are weak. They are comparatively not much of connected with processes.

Dependent indicators (Quadrant II): The power of driving in this quadrant is weak but dependence power has more impact. Linkage indicators

(Quadrant III): Both the power for the quadrant is strong. Any action on these variables affects others, it has an impact on the other variables.

Independent indicators (Quadrant IV): The driving power for the quadrant is strong but power dependence is less which require more attention.

Findings of TISM and MICMAC Analysis

Table 3 reports initial reachability matrix wherein the VOAX results of Table 2 are converted and tabulated in binary form of 1s and 0s. The cells with V and X are given the value of 1 and the cells with the value of A and O are denoted as 0.

Table 3: Initial Reachability Matrix

F	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
A1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
A2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
A3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
A4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
A5	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
A6	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
A7	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
A8	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
A9	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
A10	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
A11	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
A12	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
A13	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
A14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
A15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Source: Authors

Table 4 reports the results for the Final Reachability matrix wherein 1 represents dependence of j on i and 1* shows the transitivity link. A1 variable drives maximum in present study. A1 drives A5 and A6 directly and drives A7, A8, and A9 transitively. However, A13 is the most dependent

variable as it is driven by the maximum number of variables. A7, A8 and A12 drive A13 directly and A5 and A11 drive A13 transitively. It is also found that A2, A3 and A4 are not dependent on any of the variables and variables A14 and A15 do not drive any variable.

Table 4: Final Reachability Matrix

F	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	Driving Power
A1	1	0	0	0	1	1	1*	1*	1*	0	0	0	0	0	0	6
A2	1	1	0	0	1*	1*	1*	0	0	0	0	0	0	0	0	4
A3	1	0	1	0	1*	1*	0	1*	0	0	0	0	0	0	0	4
A4	1	0	0	1	1*	1*	0	0	0	0	0	1*	0	0	0	4
A5	0	0	0	0	1	0	1	1	0	0	0	0	1*	0	0	4
A6	0	0	0	0	0	1	0	0	1	1*	0	0	0	0	0	3
A7	0	0	0	0	0	0	1	0	0	0	0	0	1	1*	1*	4
A8	0	0	0	0	0	0	0	1	0	0	0	0	1	1*	1*	4
A9	0	0	0	0	0	0	0	0	1	1	1*	0	0	0	0	3
A10	0	0	0	0	0	0	0	0	0	1	1	1*	0	0	0	3
A11	0	0	0	0	0	0	0	0	0	0	1	1	1*	0	0	3
A12	0	0	0	0	0	0	0	0	0	0	0	1	1	1*	1*	4
A13	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
A14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
A15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Dependence Power	4	1	1	1	5	5	4	4	3	3	3	4	6	5	5	

Source: Authors

Further, level partitioning is done and reported in Table 5. The level partitioning helps in constructing a directed digraph which is depicted in Figure 1. The diagram gives the model which shows the relationships between the variables. The digraph puts the driving variables at the bottom levels and dependent variables are placed on top levels. The digraph gives the direction of the relationship

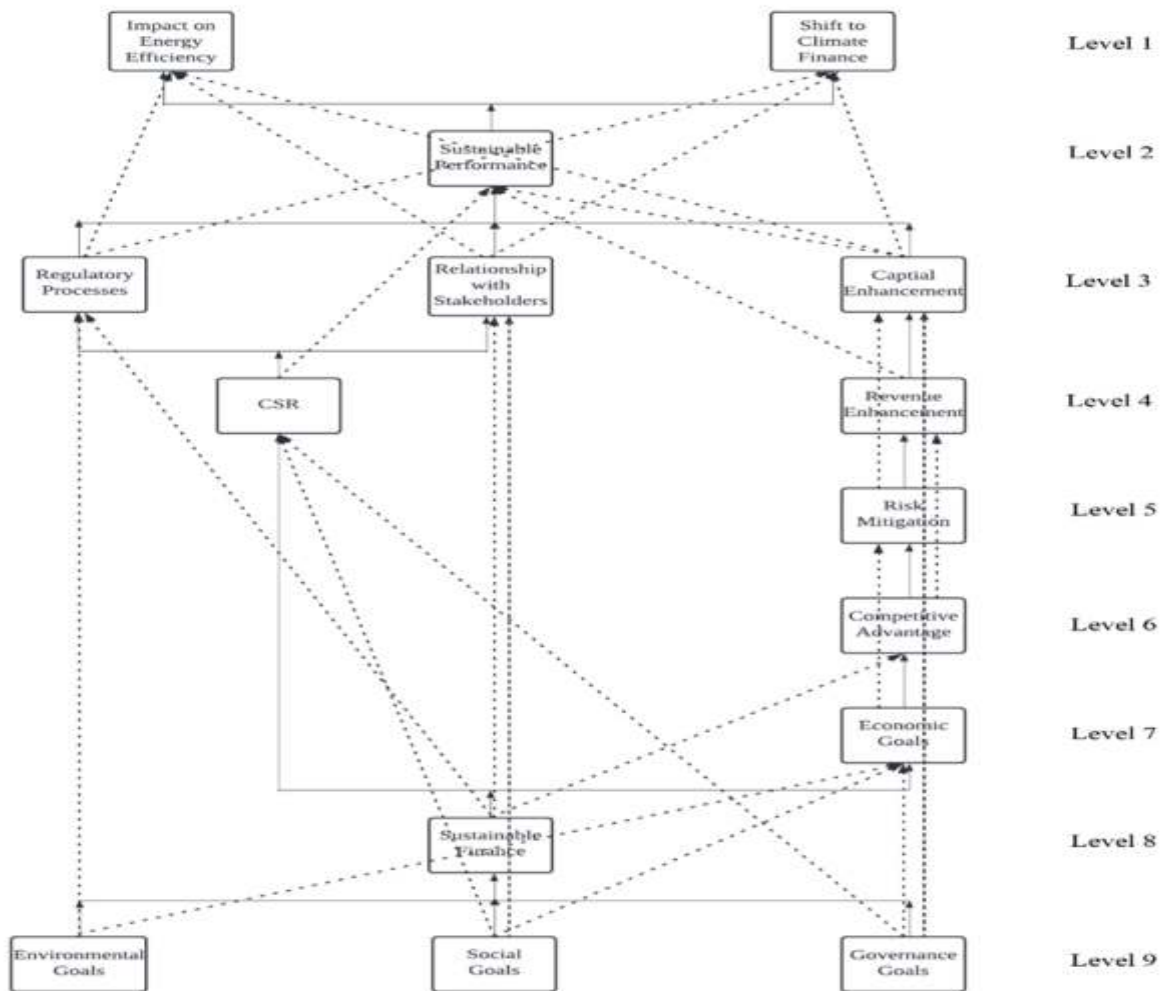
between driving and dependent variables from bottom to top. The digraph can be studied from Level 9 (at the bottom) to Level 1 (on top). Level 9 comprises three driving variables namely, environmental, social and governance goals and Level 1 comprises two dependent variables namely, impact on energy efficiency and carbon footprint and shift towards climate finance.

Table 5: Level Partitioning

Variable Names	Reachability Set	Antecedents Set	Intersection Set	Level		
A1	A1 A5 A6 A7 A8 A9	A1 A2 A3 A4	A1	0	Level 1	
A2	A1 A2 A5 A6	A2	A2	0		
A3	A1 A3 A5 A6	A3	A3	0		
A4	A1 A4 A5 A6	A4	A4	0		
A5	A5 A7 A8 A13	A1 A2 A3 A4 A5	A5	0		
A6	A6 A9 A10	A1 A2 A3 A4 A6	A6	0		
A7	A7 A13 A14 A15	A1 A5 A7	A7	0		
A8	A8 A13 A14 A15	A1 A5 A8	A8	0		
A9	A9 A10 A11	A1 A6 A9	A9	0		
A10	A10 A11 A12	A6 A9 A10	A10	0		
A11	A11 A12 A13	A9 A10 A11	A11	0		
A12	A12 A13 A14 A15	A10 A11 A12	A12	0		
A13	A13 A14 A15	A5 A7 A8 A11 A12 A13	A13	0		
A14	A14	A7 A8 A12 A13 A14	A14	1		
A15	A15	A7 A8 A12 A13 A15	A15	1		
A1	A1 A5 A6 A7 A8 A9	A1 A2 A3 A4	A1	0	Level 2	
A2	A1 A2 A5 A6	A2	A2	0		
A3	A1 A3 A5 A6	A3	A3	0		
A4	A1 A4 A5 A6	A4	A4	0		
A5	A5 A7 A8 A13	A1 A2 A3 A4 A5	A5	0		
A6	A6 A9 A10	A1 A2 A3 A4 A6	A6	0		
A7	A7 A13	A1 A5 A7	A7	0		
A8	A8 A13	A1 A5 A8	A8	0		
A9	A9 A10 A11	A1 A6 A9	A9	0		
A10	A10 A11 A12	A6 A9 A10	A10	0		
A11	A11 A12 A13	A9 A10 A11	A11	0		
A12	A12 A13	A10 A11 A12	A12	0		
A13	A13	A5 A7 A8 A11 A12 A13	A13	2		
A1	A1 A5 A6 A7 A8 A9	A1 A2 A3 A4	A1	0	Level 3	
A2	A1 A2 A5 A6	A2	A2	0		
A3	A1 A3 A5 A6	A3	A3	0		
A4	A1 A4 A5 A6	A4	A4	0		
A5	A5 A7 A8	A1 A2 A3 A4 A5	A5	0		
A6	A6 A9 A10	A1 A2 A3 A4 A6	A6	0		
A7	A7	A1 A5 A7	A7	3		
A8	A8	A1 A5 A8	A8	3		
A9	A9 A10 A11	A1 A6 A9	A9	0		
A10	A10 A11 A12	A6 A9 A10	A10	0		
A11	A11 A12	A9 A10 A11	A11	0		
A12	A12	A10 A11 A12	A12	3		
A1	A1 A5 A6 A9	A1 A2 A3 A4	A1	0	Level 4	
A2	A1 A2 A5 A6	A2	A2	0		
A3	A1 A3 A5 A6	A3	A3	0		
A4	A1 A4 A5 A6	A4	A4	0		
A5	A5	A1 A2 A3 A4 A5	A5	4		
A6	A6 A9 A10	A1 A2 A3 A4 A6	A6	0		
A9	A9 A10 A11	A1 A6 A9	A9	0		
A10	A10 A11	A6 A9 A10	A10	0		
A11	A11	A9 A10 A11	A11	4		
A1	A1 A6 A9	A1 A2 A3 A4	A1	0		Level 5
A2	A1 A2 A6	A2	A2	0		
A3	A1 A3 A6	A3	A3	0		
A4	A1 A4 A6	A4	A4	0		
A6	A6 A9 A10	A1 A2 A3 A4 A6	A6	0		
A9	A9 A10	A1 A6 A9	A9	0		
A10	A10	A6 A9 A10	A10	5		

Variable Names	Reachability Set	Antecedents Set	Intersection Set	Level	
A1	A1 A6 A9	A1 A2 A3 A4	A1	0	Level 6
A2	A1 A2 A6	A2	A2	0	
A3	A1 A3 A6	A3	A3	0	
A4	A1 A4 A6	A4	A4	0	
A6	A6 A9	A1 A2 A3 A4 A6	A6	0	
A9	A9	A1 A6 A9	A9	6	
A1	A1 A6	A1 A2 A3 A4	A1	0	Level 7
A2	A1 A2 A6	A2	A2	0	
A3	A1 A3 A6	A3	A3	0	
A4	A1 A4 A6	A4	A4	0	
A6	A6	A1 A2 A3 A4 A6	A6	7	
A1	A1	A1 A2 A3 A4	A1	8	Level 8
A2	A1 A2	A2	A2	0	
A3	A1 A3	A3	A3	0	
A4	A1 A4	A4	A4	0	
A2	A2	A2	A2	9	Level 9
A3	A3	A3	A3	9	
A4	A4	A4	A4	9	

Figure 1: Digraph



Source: Authors

The final step of the TISM framework is the construction of an interpretive matrix and establishing the links between

the variables. Table 6 reports interpretive matrix. In total 36 linkages are found which are denoted from L1 to L36.

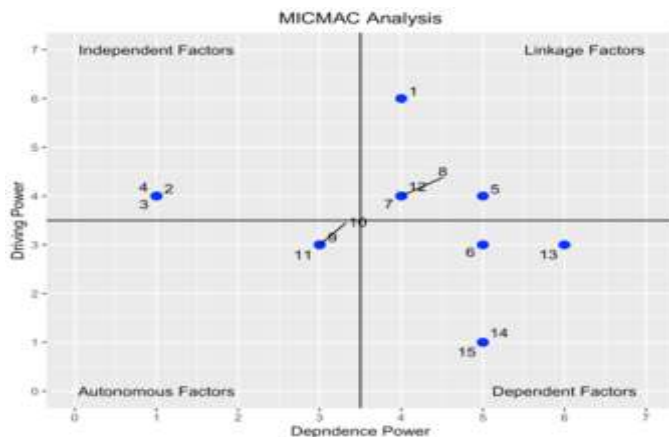
Table 6: Interpretive Matrix

F	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
A1					L10	L11	L12	L13	L14						
A2	L1				L2	L3									
A3	L4				L5	L6									
A4	L7				L8	L9									
A5							L15	L16					L17		
A6									L18	L19					
A7													L20	L21	L22
A8													L23	L24	L25
A9										L26	L27				
A10											L28	L29			
A11												L30	L31		
A12													L32	L33	L34
A13														L35	L36
A14															
A15															

Source: Authors

The data was further analyzed using MICMAC analysis which is reported in Figure 2. For this purpose, a graph of driving variables and dependent variables is plotted which has four quadrants: autonomous, independent, linkage and dependent variables. This study identified three autonomous variables, A9, A10 and A11. This study identified four dependent variables, A6, A13, A14 and A15. This study identified five linkage variables, A1, A5, A7, A8 and A12. This study identified three independent variables, A2, A3 and A4.

Figure 2: MICMAC Analysis



Source: Authors

Conclusion

The result from the analysis suggests that sustainable finance influences CSR activities and economic goals. Sustainable performance which has an impact on reducing carbon footprint and leads to efficient energy utilization, which in turn suggests a shift of focus towards climate finance. The sustainable performance of the companies is majorly influenced by regulatory processes, maintenance of good relationship with stakeholders, and capital enhancement. The TISM framework suggests that sustainable finance has the maximum driving power whereas sustainable performance is the dependent variable in the study. The MICMAC analysis suggests that environmental, social, governance goals along sustainable finance are the major driving forces for sustainable financing. On the other hand, CSR, economic goals, regulatory processes, relationship with stakeholders, competitive advantage, risk mitigation, revenue enhancement, capital enhancement, sustainable performance, impact on energy efficiency and carbon footprint and shift towards climate finance are dependent on sustainable financing. It was found that 4 variables (A1,

A2, A3 and A4) are in cause category and other remaining 11 variables are in the effect category. Thus, the result indicates that sustainable finance, environmental goals, social goals and governance goals are key cause variables that impact a companies' sustainable performance. Future research can be done to do the comparative study using various type of multi criteria decision making model like fuzzy TOPSIS-AHP, etc

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