International Journal of Social Economics

Identifying critical success factors for sustainable growth of Indian banking sector using interpretive structural modeling (ISM)

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Received 19 October 2017
Revised 27 January 2018
Accepted 1 March 2018

Abstract

Purpose – The purpose of this paper is to identify the critical success factors for sustainable growth of the Indian banking sector and develop a model for Indian banks by using interpretive structural modelling (ISM). It suggests some of the critical measures of sustainability for Indian banks.

Design/methodology/approach – This paper aims to establish a relationship among the factors of sustainable banking through the opinion of experts from the banking sector. ISM approach is applied to bring down the complexity of relationship among factors. ISM ranked the factors as per their ability to facilitate and dependence on other factors and helps to develop a comprehensive, systematic model based on the relationship amongst those factors. After developing the model, second reviews by the experts are conducted for their comments and thus, the final model comes into existence.

Findings – Legal and environmental compliance is determined as the key factor which is driving the other factors of sustainable banking. It will surely going to pose a challenge for business concerns for initiating various sustainable steps that will be a motivational factor for generating business opportunities and sustainable collaboration.

Practical implications – The study provides a comprehensive framework of sustainable banking which can be applied to various Indian banks. It helps to develop coherence between conventional and sustainable dimensions of banking.

Originality/value – The ISM is applied for the first time in case of sustainability in the banking sector to bring about a model for sustainable banking in India.

Keywords Interpretive structural modelling, Indian banking sector, Legal and environment compliance, Sustainable banking, Sustainable collaboration

Paper type Research paper

1. Introduction

The importance of sustainability for the development of a nation has been well documented in recent times. It has been widely accepted that the adoption of sustainability policies is a key for the overall development of India as a nation. Environmental and social issues are playing a major role among the lenders and borrowers. Major corporations have started realising the importance of sustainability in their daily affairs and started paying more attention towards it. Similarly, stakeholders are also moving towards environment friendly corporations to achieve the desired results.

There came a new approach to sustainability through the banking sector known as sustainable banking. The whole financial sector, including the banking sector did not see themselves as environmental polluters and thus they took a very long span of time in

The authors of this paper have not made their research data set openly available. Any enquiries regarding the data set can be directed to the corresponding author.

International Journal of Social Economics
Vol. 45 No. 8, 2018
pp. 1189-1204

0306-8293
DOI 10.1108/IJSE-10-2017-0436

recognising the concept of sustainable development. There are certain factors which plays an important role in the development of sustainable banking in India. However, there is a need for developing a comprehensive framework of sustainable banking that highlights the importance of these critical factors.

In the words of Hoijtinkm (2005), banking can play an effective role in achieving the environmental, economic and social sustainability of any nation. Environmental sustainability states that how a bank is restructuring its activities in the favour of environment such as the use of renewable energy, less paper consumption, minimising the use of water and motivating the employees to use government run transportation, restricting lending activities only for environment friendly projects and to promote environment friendly products such as micro loans, investment opportunities in green funds, environment friendly bonds, etc. Similarly, economic sustainability deals with the aspects a bank is following as regards to its operations and support to the economy which includes corporate etiquettes, assimilation of sustainability parameters, clarity of bank operations, administration and norms and making economically viable investments. Lastly, social sustainability includes the development of society, development of bank's human resource including shareholders, equal opportunities to women employees and to other minority groups. It also includes the concurrence of stakeholders in all the decisions and to follow the internationally laid down rules and regulations of sustainability.

As mentioned by Tara *et al.* (2015), sustainability in the banking sector means the overall development of environment, society and economy with the help of new and innovative techniques. These techniques are less paper consumption, green service counters, green finance, green credit, education and hospital facilities for the poor and needy ones, etc. Sustainable banking also promotes those projects which aim at reducing their carbon production by adopting new methods and are of environment friendly nature.

2. Indian banking sector and its contribution in the growth of Indian economy

As mentioned by Chakraborty (2010) and Shimizu (2010), under the economic reform policy of 1991, India's financial sector has undergone major reforms. In the words of Dinodia Capital Advisors (2013), the financial system of any economy, especially the banking sector, plays an important role in running the economy smoothly as per the laid down standards.

Chakraborty (2013), in a report by Klynveld Peat Marwick Goerdeler in association with Confederation of Indian Industry, has mentioned that the Indian banking sector is expected to become the fifth largest in the world by 2020 and the third largest by 2025. The Indian banking industry is currently worth US$1.31 trillion and expected to cross US$28.5 trillion by 2025. It is majorly divided into two segments, the first is scheduled commercial banks and the second is scheduled cooperative banks. The scheduled commercial banks are further subdivided into public sector banks, private sector banks, foreign banks and regional rural banks, while on the other hand scheduled cooperative banks did not have any further division. According to India Brand Equity Foundation (IBEF), an initiative of the Ministry of Commerce & Industry, Government of India, "the Indian banking system consists of 27 public sector banks, 26 private sector banks, 46 foreign banks, 56 regional rural banks, 1,574 urban cooperative banks and 93,913 rural cooperative banks, in addition to cooperative credit institutions". Public sector banks control more than 70 per cent of the banking system assets, thereby leaving a comparatively smaller share for its private peers. Banks are also encouraging their customers to manage their finances using internet and mobile phones.

2.1 Factors promoting growth of the Indian banking sector

According to the July 2017 report of IBEF, the following advancements are achieved by the Indian banking sector:

- The off-take of credit has been flowing rapidly from past few years; it is supported by strong economic growth, rising in disposable income, increasing in consumerism and easy availability of credit.
- The amount of total credit extended has increased to US$1,223.81bn by the end of financial year 2016–2017.
- Credit allowed to non-food industries has increased from US$983bn to US$1,000 bn (9.06 per cent) from April 2016 to March 2017.
- There is a growth in the demand of corporate and retail loans in services, real estate, consumer durables and agriculture sector.
- The outstanding credit to non-banking finance companies (NBFCs) was US$55.27bn in November 2016 and it is annually growing at a rate of 25 per cent. The credit granted to NBFCs by banks was the highest in three years. Bank deposits also grew at a compound annual growth rate of 12.03 per cent and have reached to US$1.54 trillion in the financial year 2016–2017. The main reason for strong growth in savings is the rise in the level of disposable income.
- Because of continuous efforts of the government, the accessibility to banking system has improved over the last few years. Promotion of banking technology and expansion of banking services in unbanked and rural areas are the main factors used for increasing accessibility.
- The Indian banking sector has remained stable despite major turbulence in the global economy and hence gained the confidence and trust of the public.
- Pradhan Mantri Jan Dhan Yojana (PMJDY), prime minister's people money scheme is India's National Mission for Financial Inclusion to ensure access to financial services, also played an important role in financial inclusion and an amount of US$6,971m was received by banks under PMJDY and 255.1m new accounts were opened by November 2016.

2.2 Environmental sustainability

In the words of Morelli (2011), environmental sustainability is a state in which the demands placed on the environment for our needs can be better utilised without reducing its capacity for the future so that all people can use it now and in the future as well. It is a condition which focusses on balance, resilience and interconnectedness and allows the human society to fulfil its needs without damaging the ecosystem and without affecting its capacity to revitalise those needs for the use of future generations. Similarly, Stockholm Environment Institute report predicts that in the developing world of industrialised nations, the issue of environmental sustainability have become censorious. This is due to the reasons that for growth and development, these nations are mostly depending on the available natural resources, therefore, there is a pressing need of proper plans and policies and their implementation for a sustainable environment and economy. According to Bowonder (1986), in India, there is an alarming situation of poor environmental management system because of the impact of increasing urbanisation, industrialisation and the density of population. These issues can be undertaken only by a proper environment management system and by using the natural resources in a more sustainable manner by taking care of demand of our future generations.

2.3 Green banking

Dash (2008) in his study stated about Triodos bank, which started its operations in 1980 in the Netherlands, claimed to be a pioneer in ethical banking. In 1990, it launched the "Green fund" which totally aimed at funding those projects which are environment friendly and at a later stage started many such funds focussed on sustainability. Many banks around the globe get influenced from the policies of Triodos bank and started taking sustainable decisions to move themselves on the path of sustainability.

Similarly, in the words of Schultz (2013), green banking focusses on promoting and practising the environment friendly activities to reduce the amount of carbon footprint from the banking sector. The Institute for Development and Research in banking technology defines the term "Green Banking" as an umbrella term that focusses on practices and guidelines that helps the bank to achieve the triple bottom line sustainability (economic, environmental and social). It focusses on use of information technology and physical infrastructure in an efficient and effective manner without impacting the environment. In the words of Jha and Bhome (2013), green banking is a means of promotion of environment friendly activities and reduction of carbon footprints from the very initial stage of any project to its completion.

It has been found out with the help of available literature that not much work has been done in the area of sustainable banking in India, so it becomes a necessity to address upon this issue with a new approach of interpretive structural modelling (ISM) in the area of sustainable banking. ISM is applied to establish a hierarchal relationship among the identified 11 factors of sustainable banking in the Indian context. ISM is a modelling approach which helps us to identify the strength and order of dimensions of the available factors. The identified 11 factors of sustainable banking are: growing environmental concern, business opportunities, sustainable collaboration, legal and environmental compliance, green products and services, sustainable reporting system, banking structures and sustainability, sustainability of bank service channels, rural sustainability, lender's liability and the borrower's ability to meet financial obligations. These factors are arranged according to their levels by using the concept of ISM and they are ranked according to their dependency and driving powers. Lastly, they are categorised into four groups by Matriced' Impacts Croise's Multiplication Appliquée a UN Classement (MICMAC) analysis. The current study tries to achieve the following two objectives:

(1) to identify the critical success factors of sustainability for Indian banks; and

(2) to develop a sustainable banking model for Indian banks using ISM approach.

3. Literature review

Birindelli *et al.* (2015) argued that banks are making a move towards becoming a socially responsible industry and can enhance their approach of being social by disclosure on corporate social responsibility (CSR) through the adoption of the approach of triple bottom line. But in case of global consensus, affirmations and evidence, there is a need for improvement. Much of the international standards and principles are not yet followed and hence there is a need of more ethical/quality certifications and inclusion.

A study of Hoijtink (2005) identified that the concept of sustainability is a new concept and has developed remarkably over last few decades. But the banking industry had started it a bit later. Some of the Western world banks have adopted it at a much faster pace and tried their best to eliminate those projects which are against the society and environment by implementing an environmental management system. Many other banks also started to offer the investment opportunity, which is socially responsible, they also provide environment-related insurances, green debit and credit cards to support those people who

are performing environment friendly activities and some of the other banks are also trading in renewable energy certificates and emissions. In another study, Vaithilingam *et al.* (2006) empirically examined the effect of six Is (intellectual capital, infrastructure, integrity, institutions, innovation and interaction) on the stability of banks in advanced, developing and under developed nations.

Korslund (2013) in his study showed the results of new research comparing sustainable banks and Global Systemically Important Financial Institutions relative to the several key questions and find out that based on the principles of sustainable banking, the new models of banks are offering a fascinating way to a more substantial and sustainable banking sector. In the same year, Fokus Financial Services (2013) stated that sustainability is all about the efficient and effective utilisation of available natural resources but if it is seen as a part of core strategy, then it is much more than the concept of being an energy saver, green investor or CO_2 emissions reducer. In case of the banking industry, sustainability is all about how a bank constructs and executes its business in the long run by following the six Cs of sustainable banking: clients, culture, compliance, compensation, costs and capital. In the next year, Yadav and Pathak (2013) revealed that the Indian banking sector has started working on various tools and techniques to promote the concept of green banking. The findings also revealed that the banks of public sector are more responsive towards sustainability as compared to the banks of private sector.

As quoted by Singh and Singh (2013) in their study, the Indian banks need to be more focussed on the environmental and social aspects of banking and have to come at par with the developed world banks. Their research revealed that there is an utmost need of awareness among the Indian banks regarding innovative and environment friendly technologies. There are tremendous opportunities available for Indian banks as regards to the funding of sustainable projects but the need of the hour is to grab those opportunities to resolve the social and environmental issues. They argued that the survival of the banking industry is inversely proportional to the level of global warming. Similarly in another study, Alapati and Rao (2013) argued that qualitative measures within the system have to take care of environmental aspects which can be linked to the new initiative called "Green banking". Technological advancements have brought in both lean and green banking in the banks in India over a period which is certainly healthier in smooth and efficient functioning of the banking sector as also leading to clean environment.

In the same manner, another study by Sobhani *et al.* (2011) for Bangladesh revealed that in the last ten years there is a significant increase in the disclosure level of sustainability issues except those of energy, human rights and natural environment. Their study also stated that prevailing differences in the organisations have reduced their practices because of similarity in practices. In another study of a world renowned sustainable bank, Cowton and Thompson (2001) presented that Triodos bank has a clear approach of lending and thus encourages the non-profit and voluntary organisations to make stronger ties among their missions and approaches to financial management. The deposits received by bank, which can be lent for other non-sustainable projects, are only used for sustainable activities.

In another study, Deka (2016) considered ethics and moral values as the most important elements and stated that the banking sector should use the concept of CSR in a more ethical and environment friendly manner. A bank should not develop itself as a normal bank but as an ethical bank which focusses more on sustainability instead of profitability. He also emphasises on the use of information technology and new environment friendly techniques for the Indian banking industry. His study also revealed that most of the account holders of different banks and even the employees do not have the proper knowledge on some of the newly launched products of the banks, so there is a need of proper awareness and guidance of both consumers and employees.

4. Sustainable banking dimensions

In total, 11 dimensions of sustainable banking are identified from available literature and expert's opinion. Out of these 11 dimensions, growing environmental concerns, business opportunities, lenders liability and borrower's ability to meet financial obligations are taken from the framework suggested by International Institute of Sustainable Development (IISD) and rest of the seven dimensions were identified from the literature. These dimensions are described in brief in the section given below.

4.1 Growing environmental concerns

From the last few years, a drastic change has been noticed in the regulations laid down for the protection of the environment. Nowadays, the general public is more concerned for the environmental quality to cover themselves from the harmful impact of pollution on their health. This concern towards the environment has made people to change their opinions about the roles of corporates for the development of a society. Some of the major banks get influenced by these trends and have started looking into their own social and environmental performance. As a result, they have started adopting the efficiency programs with regard to non-renewable energy resources in their own campuses (IISD, 2017).

4.2 Business opportunities

Traditionally, banks were working on the reactive and defensive approaches as regards to sustainability. But nowadays, several Western world banks have adopted the innovative and proactive strategies to develop themselves to grab the opportunities linked to sustainability. They are coming with newly build environment friendly products and services to succeed themselves in the area of sustainability. These banks are known by a common name as sustainable banks (IISD, 2017).

4.3 Sustainable collaboration

Sustainable collaboration is one of the main requirements for the banks to move in the direction of sustainability. Most of the renowned sustainable banks of the world are being in collaboration with some of the renowned institutes of sustainability such as United Nations Environment Programme, Global Alliance for Banking on Values, etc. These institutions are providing a better platform to the banks who aim to achieve a new height in the direction of sustainability (Author's contribution).

4.4 Legal and environmental compliance

Sustainable banking approach guides the banks to adhere to the legal framework laid by the sustainable institutes. By adopting the concept of sustainable banking, banks are supposed to follow the guidelines as laid down by the institutes with respect to legal and environmental aspects. Banks have to follow a proper mechanism for assessing the nature of projects in which they are dealing and should also take the necessary legal actions against the defaulters (Hugenschmidt *et al.*, 1999).

4.5 Green products and services

Sustainable banks are coming with innovative ideas with regard to green products and services. They are focussing more on environmental and social aspects of banking. They are proactive in nature and thus are coming with newly developed ideas that are environment friendly and help in the overall development of goods and services towards sustainability (Zimmermann and Mayer, 2001).

4.6 Sustainable reporting system

With the help of sustainable reporting system of banks, the stakeholders and other individuals are getting all the updates in the context of sustainability operations followed by the banks. They can easily identify the nature and future scope of all those environment friendly activities that are undertaken by banks and may suggest other new techniques which have positive impact on the environment and society (Bouma *et al.*, 2017).

4.7 Banking structures and sustainability

In case of sustainable banking system, banks are supposed to adhere to the principles of sustainability in designing their physical structures. The structures of sustainable banks are environment friendly as regards to their construction, maintenance and location of premises. They are more focussed on the best use of available energy and information technologies and are moving towards a socially responsible and environment friendly banking (Street and Monaghan, 2001).

4.8 Sustainability of banks service channels

Sustainable banks are more focussed on the sustainability aspects of their service channels. They are applying the newly developed techniques in their service channels to help the customers building a sustainable society. Sustainability in service channels helps the large network of customers around the globe by giving them new technologies which are easier to use and are sustainable in nature. Some of them are use of plastic cards, financial inclusion, convenience and quality of service, personal contact, security and rights of privacy, job security, working conditions, local economic development, etc. (Street and Monaghan, 2001).

4.9 Rural sustainability

Sustainable banks are focussed towards a rural sustainability. New branches are developed by these banks especially in backward and rural areas with new technologies which are socially and environmentally viable. New automated teller machines and other machines are installed in their respective rural areas. These new technologies are environment friendly and help in strengthening the rural community (Siddiqui and Newman, 2001).

4.10 Lender's liability

The financial risk associated with the banks while granting loans to their clients is came under the purview of lender's liability. Generally, a bank or any other financial institution grants loan on the basis of financial statements of their clients. It is a duty of the borrower to show accurate figures of all the liabilities associated with them. Sometimes, it happened that borrowers are unable to assess their environmental liabilities and thus they remain undisclosed. As per new reporting guidelines, it is very clearly mentioned that the lender should develop its own mechanism to check the environmental risks associated with the project otherwise they will end up spending the money on their client's false acts (IISD, 2017).

4.11 Borrower's ability to meet financial obligations

Borrowers are supposed to utilise the loan advanced to them in such a manner that they can pay the complete amount as per the prescribed time limit. If they are unable to pay the amount with in the timeframe then it will have a negative impact on the lender and in future the lender will not help such type of companies. It becomes very necessary for the borrower to assess themselves first and then apply for any financial assistance (IISD, 2017).

5. Research methodology

5.1 The method

ISM was first propounded by J. Warfield in the year 1973. It is an effective tool used to measure complex issues. It directs the researchers to propose a roadmap about those complex relations among the elements. It is a very fundamental tool used to calculate the relationship among the complex set of factors (Sohani and Sohani, 2012).

The method of ISM is used all around the globe by some of the very renowned institutions, such as National Aeronautics and Space Administration and many more. ISM is used for proper structuring of the complex association of factors. It uses a mixture of three kinds of modelling languages to arrive at an appropriate structure. The languages which are used by ISM are words, digraphs and discrete mathematics.

Today, ISM is considered as an important tool because it is used in drawing judgements about the relationship of the elements (Janes, 1988). The procedure followed in ISM is divided into eight steps, which are as follows:

(1) To identify the elements/variables to be explored. In this study, the sustainable banking variables are identified.

(2) To examine the complex relationships among the identified variables.

(3) To make structural self-interaction matrix (SSIM) and locate all the identified variables in that matrix according to the relationship exists among them as VAXO (discussed in Table III).

(4) To make initial reachability matrix (IRM) by the responses obtained from SSIM (discussed in Table II) and to check the transitivity. The rule of transitivity is applied on the basic assumption that "if there exists a relationship among the two variables '*x*' and '*y*' and the same relationship exists among '*y*' and '*z*', then '*x*' is also related to '*z*' ".

(5) To make final reachability matrix (FRM) (Table V) by replacing "0" with "1", if there exists any transitivity. FRM (Table V) also shows the driving power and the dependence of the factors.

(6) To assign the levels for different factors on the basis of their driving power and dependency (Table VI).

(7) To draw a digraph based on the levels assigned to the factors through iteration steps (Figure 1).

(8) The last step is to do MICMAC analysis by dividing all the factors into four groups, i.e., autonomous variables, dependent variables, linkage variables and drivers based on their driving power and dependency (Eswarlal *et al.*, 2011).

5.2 Sample and data collection

The data collected for the study were qualitative in nature. It was collected from the industry experts. A structured interview was conducted to take the views of industry experts. In total, 120 experts were interviewed and the selection of experts was done randomly from different Indian states. In total, 80 of them had been selected from the banking industry, 20 were academicians and the other 20 belonged to different areas. Experts had been asked to rank the factors by using the systematic approach of ISM.

6. Results, analysis and discussions

6.1 Structural self-interaction matrix

SSIM is prepared once the study identified factors or elements related to the problem. The identified factors for the study that are associated with sustainable banking in India are growing

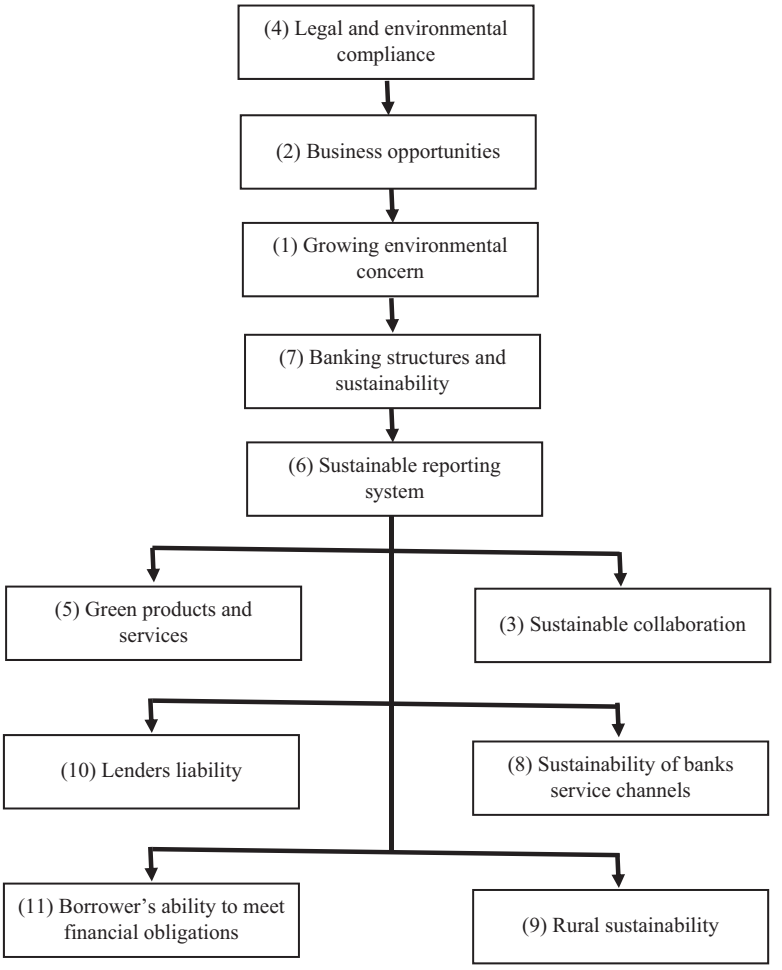

Figure 1.
ISM for sustainable banking in India

environmental concern; business opportunities; sustainable collaboration; legal and environmental compliance; green products and services; sustainable reporting system; banking structures and sustainability; sustainability of banks service channels; rural sustainability; lender's liability; and borrower's ability to meet financial obligation. The experts from the banking sector were enquired about the existence of relationship among the factors. There are four possibilities of relationship among the factors which are coded in Table I.

The SSIM for the element is shown in Table II. The table is prepared by entering the responses of experts on the basis of interaction of pairs among the elements.

Relationship	Symbol used
If element "*i*" is leading to element "*j*"	V
If element "*j*" is leading to element "*i*"	A
If both the elements "*i*" and "*j*" leading to each other	X
If there is no relationship between the elements "*i*" and "*j*"	O

Table I.
Relationship table

Table II.
Structural self-interaction matrix (SSIM)

S.no.	Sustainability banking factors	11	10	9	8	7	6	5	4	3	2	1
1	Growing environmental concern	O	V	V	V	V	X	V	X	V	A	
2	Business opportunities	A	X	A	A	V	O	A	A	X		
3	Sustainable collaboration	X	X	V	V	A	A	X	A			
4	Legal and environmental compliance	X	V	V	V	V	V	V				
5	Green products and services	O	V	V	V	A	O					
6	Sustainable reporting system	V	V	V	O	A						
7	Banking structures and sustainability	V	V	V	X							
8	Sustainability of banks service channels	O	O	V								
9	Rural sustainability	O	A									
10	Lender's liability	X										
11	Borrower's ability to meet financial obligations											

6.2 Initial reachability matrix

The SSIM is then transformed into the reachability matrix (called as IRM) which translates the coded responses (VAXO) of SSIM as 1s and 0s in the reachability matrix. The IRM for the study is shown in Table IV.

The probable situations are shown in Table III.

The IRM for the elements is prepared on the basis of above discussed rules Table IV.

6.3 Final reachability matrix

The IRM so obtained is checked for transitivity and FRM (Table V) is prepared. Transitivity stands for a triangulated relationship between three factors, namely "*i*", "*j*" and "*k*". Mathematically transitivity states that when "*i*" drives "*j*" and "*j*" drives "*k*" then it results as "*i*" drives "*k*". Where the transitivity rule is found to be satisfied, for example, it is marked as

Table III.
Probable situations

SSIM (*i*, *j*) entry	IRM (*i*, *j*) entry	IRM (*j*, *i*) entry
V	1	0
A	0	1
X	1	1
O	0	0
For cells, where $i = j$	1	

Table IV.
Initial reachability matrix (IRM)

S.no.	Sustainability banking factors	1	2	3	4	5	6	7	8	9	10	11
1	Growing environmental concern	1	0	1	1	1	1	1	1	1	1	0
2	Business opportunities	1	1	1	0	1	0	0	1	1	1	1
3	Sustainable collaboration	0	1	1	0	1	0	0	1	1	1	1
4	Legal and environmental compliance	1	1	1	1	1	1	1	1	1	1	1
5	Green products and services	0	1	1	0	1	0	0	1	1	1	0
6	Sustainable reporting system	1	0	1	0	0	1	0	0	1	1	1
7	Banking structures and sustainability	0	0	1	0	1	1	1	1	1	1	1
8	Sustainability of banks service channels	0	1	0	0	0	0	1	1	1	0	0
9	Rural sustainability	0	1	0	0	0	0	0	0	1	0	0
10	Lender's liability	0	1	1	0	0	0	0	0	1	1	1
11	Borrower's ability to meet financial obligations	0	1	1	1	0	0	0	0	0	1	1

S.no.	Sustainability banking Factors	1	2	3	4	5	6	7	8	9	10	11	Driving power
1	Growing environmental concern	1	0	1	1	1	1	1	1	1	1	***1****	10
2	Business opportunities	1	1	1	0	1	0	0	1	1	1	1	8
3	Sustainable collaboration	0	1	1	0	1	0	0	1	1	1	1	7
4	Legal and environmental compliance	1	1	1	1	1	1	1	1	1	1	1	11
5	Green products and services	0	1	1	0	1	0	0	1	1	1	***1****	7
6	Sustainable reporting system	1	0	1	0	0	1	0	0	1	1	1	6
7	Banking structures and sustainability	0	0	1	0	1	1	1	1	1	1	1	8
8	Sustainability of banks service channels	0	1	0	0	0	0	1	1	1	0	0	4
9	Rural Sustainability	0	1	0	0	0	0	0	0	1	0	0	2
10	Lenders Liability	0	1	1	0	0	0	0	0	1	1	1	5
11	Borrower's ability to meet financial obligations	0	1	1	1	0	0	0	0	0	1	1	5
	Dependence	4	8	9	3	6	4	4	7	10	9	9	

Note: ***1**** means the presence of transitivity

Table V.
Final reachability matrix (FRM)

"1^{*}" in bold and italicised (Cell number R1C11 and R5C11 in this case). Then FRM is prepared by replacing the "0" with "1".

The rule of transitivity in case of R1C11 indicates a strong dependence between growing environmental concerns and borrower's ability to meet financial obligations, which is quite evident with the fact that borrower's should realise the importance of growing environmental concerns and should, therefore, utilise the funds available to them in environment friendly projects and activities. Similarly, the rule of transitivity in case of R5C11 indicates a strong dependence between green products and services and borrower's ability to meet financial obligations. It makes an investor more responsible in fulfilling their commitments by investing in ventures related to green products and services.

The FRM (Table V) also shows the "driving power" and the "dependence power" of sustainability factors for banks. The driving power of a variable represents the total number of variables including the variable itself that the variable can facilitate to accomplish. The dependence of a variable represents the total number of variables including the variable itself, which helps in accomplishing it. For example, element 1 (growing environmental concern) with the driving power of "10" can assist the accomplishment of elements 3 (sustainable collaboration), 4 (legal and environmental compliance), 5 (green products and services), 6 (sustainable reporting system), 7 (banking structure and sustainability), 8 (sustainability of banks service channels), 9 (rural sustainability), 10 (lender's liability) and 11 (borrower's ability to meet financial obligations, respectively) including itself. In the same way, the element "1" (growing environmental concern) with the dependence of "4" can be assisted for accomplishment by elements 2 (business opportunities), 4 (legal and environmental compliance) and 6 (sustainable reporting system) including itself. Similar connotation can be drawn for other elements according to their driving power and dependence.

The next step is to divide the matrix into different levels. The reachability and antecedent sets for each element are to write in different columns followed by a column named as intersection set. The reachability set includes elements counted for driving power, whereas the antecedent set includes elements counted for dependence. The reachability and antecedent set are extracted from FRM (Table V). Reachability set comprises of factors which obtained value 1 counted horizontally with respect to the driving power, whereas antecedents are those which obtained value 1 counted vertically with respect to dependence. The intersection of reachability and antecedent sets is determined for all elements. When the reachability and intersection sets are the same, it is allocated as the first-level element in the ISM hierarchy. The element so identified as first-level element of the hierarchy is parted out from lists of reachability and antecedent sets. Following the same procedure, the levels of

other elements are determined. Detailed description for each iteration is presented in Table AI. With the help of levels identified by the procedure, the final digraph is prepared. The summary of iterations is shown in Table VI.

It is clear from Table VI that the factors 9 (rural sustainability) and 11 (borrower's ability to meet financial obligations) placed at the first level and the factors 8 (Sustainability of bank's service channels) and 10 (lender's liability) obtained the second level (these elements are dependent elements as per the MICMAC analysis). Therefore, these factors are placed at the top of the ISM hierarchy. The factors 3 (sustainable collaboration) and 5 (green products and services) obtained the third level and factor 2 (business opportunities) placed at the seventh level (these factors are linkage factors as per MICMAC analysis). The factors 6 (sustainable reporting system), 7 (banking structures and sustainability), 1 (growing environmental concerns) and 4 (legal and environmental compliance) placed at the fourth, fifth, sixth and eighth levels, respectively (these factors are independent factors as per MICMAC analysis). The final structural model is shown in Figure 1.

The structural model obtained from the FRM and iteration steps followed is shown above (Figure 1). The association among the parameters "*i*" and "*j*" are presented by an arrow which points from "*i*" to "*j*". This is a directed graph. Then, the transitivity is removed to obtain the final ISM for sustainable banking. In the Figure 1, element "4" namely "legal and environmental compliance" has come out to be a key variable in the model which is at the top of the model. In other words, legal and environmental compliance can work as driver for other elements to achieve. The legal and environmental compliance come out to be an independent variable and has the power to drive other variables studied. India is a growing economy and has witnessed a rapid industrialisation and automation in recent years. Though, such a rapid development has added positive impacts to a domestic production, the environmental issues invited attentions and interventions of the judiciary system. In *Narmada Bachao Andolan v. Union of India*, 2008, 10 SCC 664 case, the Supreme Court implemented the doctrine of sustainability and explained the meaning of sustainable development as the type or extent of development that be sustained by the nature. Such actions can be of benefit for banks as well. It is clear by the decision of the Indian court that environment has different facets, and care of the environment is an on-going process (Gupta and Pant, 2014). Further, India has recently recognised the need for such sustainability for its banking sector; however, no such regulations have been spelled out by any regulatory body. The elements 9 (rural sustainability) and 11 (borrower's ability to meet financial obligations) that are at the bottom of the model are dependent variables and do not have any driving power.

6.4 MICMAC analysis

MICMAC (Figure 2) analysis is a cross-impact matrix multiplication which is used for classification. In the words of Sharma and Gupta (1995), the concept of MICMAC is based on

Table VI. Summary of iteration steps

Iteration	Factors	Reachability set	Antecedent set	Intersection set	Level
1	9	2, 9	1, 2, 3, 4, 5, 6 ,7, 8, 9, 10	2, 9	I
1	11	2, 3, 4, 10, 11	1, 2, 3, 4, 5, 6, 7, 10, 11	2, 3, 4, 10, 11	I
2	8	2, 7, 8	1, 2, 3, 4, 5, 7, 8	2, 7, 8	II
2	10	2, 3, 10	1, 2, 3, 4, 5, 6, 7, 10	2, 3, 10	II
3	3	2, 3, 5	1, 2, 3, 4, 5, 6, 7	2, 3, 5	III
3	5	2, 3, 5	1, 2, 3, 4, 5, 7	2, 3, 5	III
4	6	1, 6	1, 4, 6, 7	1, 6	IV
5	7	7	1, 4, 7	7	V
6	1	1, 4	1, 2, 4	1, 4	VI
7	2	2	2, 4	2	VII
8	4	4	4	4	VIII

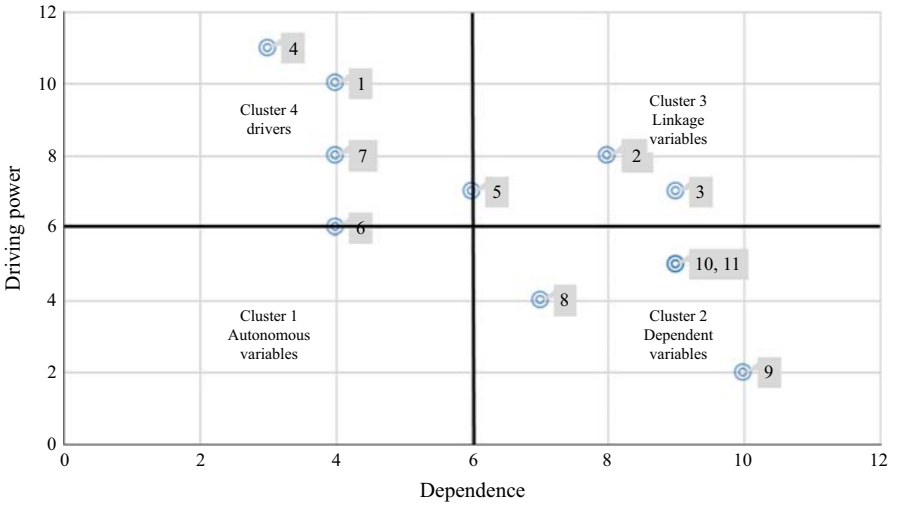

Figure 2.
MICMAC analysis

multiplication properties of matrices. In this study, MICMAC analysis is used to categorise the sustainable banking elements on the basis of their driving power and dependence power and then classified into four quadrants as follows:

(1) Autonomous variables: they have weak driving power and dependence. They are almost detached from the structure.

(2) Dependent variables: they have weak driving power but strong dependence. They do not contribute in the achievement of other elements.

(3) Linkage variables: they have both the strong dependence as well as driving power. They possess a responsive effect. They impact other variables in the system.

(4) Independent variables (drivers): the last and the fourth quadrant consists of elements with low dependence and high driving power. They are the key variables.

The driving power and dependence of the elements are shown in FRM (Table V). Plotting the values of driving power on *Y*-axis and dependence on *X*-axis for each element MICMAC graph is plotted as shown in Figure 2. For example, the element 1 (growing environmental concern) has a dependence power of four and the driving power of ten. Depending on these values, the elements 1 (growing environmental concern), 4 (legal and environmental compliance), 7 (banking structures and sustainability) and 6 (sustainable reporting system) have got place in the fourth quadrant. In the present study, the element 4 (legal and environmental compliance) has come out to be a key variable. The elements 3 (sustainable collaboration), 5 (green products and services) and 2 (business opportunities) are linkage, while elements 8 (sustainability of banks service channels), 9 (rural sustainability), 10 (lender's liability) and 11 (borrower's ability to meet financial obligations) are dependent variables.

7. Conclusion

The factor "legal and environmental compliance" has been determined as an independent factor which clearly signifies that legal and environmental compliance does not depend on any other factor for its functioning. It can also be stated that this is the most important factor among all the factors which have been selected. This is the only reason that this factor is being considered as a driver which is driving all the other available sustainability factors.

Similarly, legal and environmental compliance drives the overall business opportunity as legal compliance shall first lead to basic environmental management system, which significantly leads to pollution reduction and waste control. Therefore, the compliance standards thus established will finally increase the business opportunities. With the growth of "business opportunities", organisations will be more focussed on the environmental aspect and explore those opportunities that will facilitate in "growing environmental concern". In the same way, growing environment concerns will lead to banking structures and sustainability. Banks can initiate for modification of their structures. To sustain the sustainable practices, banks can adopt sustainable reporting system and can come forward for collaboration opportunities like for reducing paper based work, etc. With these concerns in mind, banks come up with different green products and services like green loan for environment friendly business ideas and side by side also think upon the sustainability aspects of its service channels by keeping in view the lender's liability also. Then, finally it leads to the sustainability of rural areas and thus to the borrower's ability to meet the financial obligations.

To conclude, bringing legal compliance will pose a challenge for business concerns for initiating various sustainable steps. The challenge will be a motivation for generating business opportunities. For sustaining these efforts, banks are required to be aware about the environmental issues with respect to distributing loans and facilities to organisations. Also, collaborations and improving structures with service channels and lender's liability can prove to be beneficial but there is a need to consider the aspects of rural sustainability along with that of borrower's ability to meet the financial obligations.

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Further reading

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Appendix

Table AI. Detailed iteration steps

Variable	Reachability set	Antecedent set	Intersection	Level
Iteration 1				
1	1, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 2, 4, 6	1, 4, 6	
2	1, 2, 3, 5, 8, 9, 10, 11	2, 3, 4, 5, 8, 9, 10, 11	2, 3, 5, 9, 10, 11	
3	2, 3, 5, 8, 9, 10, 11	1, 2, 3, 4, 5, 6, 7, 10, 11	2, 3, 5, 10, 11	
4	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 4, 11	1, 4, 11	
5	2, 3, 5, 8, 9, 10, 11	1, 2, 3, 4, 5, 7	2, 3, 5	
6	1, 3, 6, 9, 10, 11	1, 4, 6, 7	1, 6	
7	3, 5, 6, 7, 8, 9, 10, 11	1, 4, 7, 8	7, 8	
8	2, 7, 8, 9	1, 2, 3, 4, 5, 7, 8	2, 7, 8	
9	2, 9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	2, 9	I
10	2, 3, 9, 10, 11	1, 2, 3, 4, 5, 6, 7, 10, 11	2, 3, 10, 11	
11	2, 3, 4, 10, 11	1, 2, 3, 4, 5, 6, 7, 10, 11	2, 3, 4, 10, 11	I
Iteration 2				
1	1, 3, 4, 5, 6, 7, 8, 10	1, 2, 4, 6	1, 4, 6	
2	1, 2, 3, 5, 8, 10	2, 3, 4, 5, 8, 10	2, 3, 5, 8, 10	
3	2, 3, 5, 8, 10	1, 2, 3, 4,5 ,6, 7, 10	2, 3, 5, 10	
4	1, 2, 3, 4, 5, 6, 7, 8, 10	1, 4	1, 4	
5	2, 3, 5, 8, 10	1, 2, 3, 4, 5, 7	2, 3, 5	
6	1, 3, 6, 10	1, 4, 6, 7	1, 6	
7	3, 5, 6, 7, 8, 10	1, 4, 7, 8	7, 8	
8	2, 7, 8	1, 2, 3, 4, 5, 7, 8	2, 7, 8	II
10	2, 3, 10	1, 2, 3, 4, 5, 6, 7, 10	2, 3, 10	II
Iteration 3				
1	1, 3, 4, 5, 6, 7	1, 2, 4, 6	1, 4, 6	
2	1, 2, 3, 5	2, 3, 4, 5	2, 3, 5	
3	2, 3, 5	1, 2, 3, 4, 5, 6, 7	2, 3, 5	III
4	1, 2, 3, 4, 5, 6, 7	1, 4	1, 4	
5	2, 3, 5	1, 2, 3, 4, 5, 7	2, 3, 5	III
6	1, 3, 6	1, 4, 6, 7	1, 6	
7	3, 5, 6, 7	1, 4, 7	7	
Iteration 4				
1	1, 4, 6, 7	1, 2, 4, 6	1, 4, 6	
2	1, 2	2, 4	2	
4	1, 2 ,4, 6, 7	1, 4	1, 4	
6	1, 6	1, 4, 6, 7	1, 6	IV
7	6, 7	1, 4, 7	7	
Iteration 5				
1	1, 4, 7	1, 2, 4	1, 4	
2	1, 2	2, 4	2	
4	1, 2, 4, 7	1, 4	1, 4	
7	7	1, 4, 7	7	V
Iteration 6				
1	1, 4	1, 2, 4	1, 4	VI
2	1, 2	2, 4	2	
4	1, 2, 4	1, 4	1, 4	
Iteration 7				
2	2	2, 4	2	VII
4	2, 4	4	4	
Iteration 8				
4	4	4	4	VIII

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