

Decision-Making Framework using Interpretive Structural Modeling (Ism) and Analytic Hierarchy Process (Ahp) Methods: Millennials & Sustainable Consumption

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Abstract:

The growing population and income of consumers have led to increased consumption activities across the world. The growing consumption requires more extraction of resources and putting pressure on already strained resources. Further, human activities are harming the environment. The high extraction of resources and consumption activities require more judicious use and choices of goods. The present study attempts to identify the enablers of sustainable consumption and prioritize them using Interpretive Structural Modeling (ISM) Approach. This further established pairwise relationships among enablers. The findings of the study would help policymakers to frame strategies to encourage sustainable consumption practices among consumers.

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1. Introduction

The growing consumption of goods and services across the world has damaged natural resources and caused harm to the environment (Chen & Chai, 2010). The repercussions of this damage are reflected and are felt in the form of global warming, increased environmental pollution and decline in flora fauna (Chen & Chai, 2010). Due to the growing scarcity of natural resources and the rise in global temperatures, sustainable consumption has occupied an important role in promoting environmental awareness and reducing per capita greenhouse emissions. The growing population, income of consumers and wealth in the coming years are likely to put pressure on the resources. The change in consumers' lifestyle, diet, and reduction in energy consumption may have a significant impact on mitigating environmental degradations (IPPC, 2019). The solution to the above

problem lies in the adoption of environmentally friendly products and sustainable consumption. Sustainable consumption is the use of resources in such a way that minimizes the impact on the environment. It ensures that the need for the present generation can be satisfied without compromising the future generation's needs. The sustainable consumption calls for wisely usage of products and reduction of waste and pollution. It is about doing more using less amount of resources.

Over the past years, consumers' environmental awareness has increased considerably in the world, thus resulting in the preference of products that are greener, more suitable and environmentally friendly. According to the survey by Nielson (2015), the majority of consumers in India make decisions based on the impact of their purchase on the environment and

sustainability. People born between 1981 and 1996 are called millennials, according to pew research. They constitute more than 25% of the global population and their numbers are high in developing countries. Millennials have been at the core of all economic activities and are major consuming classes across the world. Consumers especially those who belong to millennials categories prefer to buy brands that support sustainability.

A recent report disclosed that the growth rate in certain product categories with sustainability claims was twice than of their counterparts. But despite this, few consumers' who showed a positive attitude towards green products and services buy these products. Only 26 percent of consumers buy brands that advocate sustainability despite having a positive attitude. The understanding of millennial behavior is required to enhance the promotion of sustainable consumption. Keeping this in mind, the current study green and aims at identifying the enablers of green and sustainable consumption and further prioritizing them. These enablers are modeled to study their interrelationships and prioritize them for strategizing them for the proper management plans.

1. REVIEW OF LITERATURE

1. Education

Education is the most important tool which helps us in making the right and more responsible choices in meeting our necessities and aspirations. Education can balance consumption with freedom and responsibility. It is essential to empower people and society by equipping them with appropriate information like green education, information through advertisement on sensible consumption (Carlos Rabasso, 2011). It may help people to make their choices. ESC is generally not yet considered a priority either in developing or in developed countries. The integration of education on sustainable consumption must be made an integral part of education to promote sustainable consumption among people (Meenakshi et.al, 2014). Educating people will help people to discard products that are not sustainable.

2. Values & Norms

Schwartz has conceptualized the term 'values' in literature as the concept or beliefs regarding desirable end states and behavior that surpass particular situations, escorts selection or evaluation of behavior and events and are ranked by respective importance' (Schwartz & Bilsky, 1994, Schwartz, 1994). The environmental, social and ethical values of consumers affect their behavior towards green products. It has

been empirically supported that education which is targeted at imparting an individual's belief will always confirm the scientific knowledge on sustainability and environment. The moral and cognitive aspect of sustainable behavior was focused by Chan & Bishop, 2013; Greaves, Zibarras, & Stride, 2013. Moral and personal norms have an impact on the purchase intention of consumers (Arvola et al., 2008, Gleim et al., 2013).

3. Innovation

The eco-innovation has been defined as the proves of developing fresh ideas, products, and processes that help in reducing the environmental burden or improve the ecological state of the country (Rennings, 2000). Innovative products and solutions are essential if society wants to decouple economic growth from resource consumption. Innovating products keeping in mind the sustainability factor will enable companies to develop high performing and efficient products for customers. Companies are constantly improvising their products to bring out a solution that gives consumer choices with more values and better performance while having lesser environmental footprints. One of the examples of Henkel is constantly innovating its products considering sustainability priority.

4. Collaborative Purchasing

Encouraging resource sharing is at the heart of sustainable consumption. Improvement in ecological and economic efficiency is the key to achieve the goal given by the UN. The sharing economy has the potential to make a shift in collective consumption among people. Resources sharing has a positive environmental impact by minimizing the resources required and improving resource efficiency. Transportation is one example where carpooling or resource sharing can decrease kilometer decreased.

5. Incentives

Subsidies and incentives are another way to encourage consumer's behavior towards sustainable choices. The household will make more sustainable product choices and service selection if subsidies are given to them. Subsidies may include grants in the form of money, donating goods and any fiscal incentives like tax reduction. If the government provide subsidies to households to insulate their homes, the government can reduce fuel bill, thereby, cutting the contribution of carbon emission of the nation (Raworth, 2012).

6. Taxation

Taxing unsustainable goods can be an effective way to influence consumers towards more sustainable choices. Raising the prices of unsustainable products will lower the consumption of such goods thereby improving environmental performance. Taxation can be a more effective way to shape the consumption pattern of the consumer than regulations and laws.

7. Labeling

Voluntary labeling is the process of giving information to consumers about the products. It is a tool that is most widely used to influence consumer's choices for sustainable products. Products with social and environmental claims affect consumers' perception of favorably. Eco-labeling or eco-certification intimates consumers about green consumption benefits and motivates them to shift towards consuming green products (Young et al., 2010). These environmental and social claims verified by the government and the nongovernmental organization has a positive impact on the consumers. These claims are used to communicate information to, consumers about sustainability and provide clarity which further helps consumers to make more suitable choices concerning product consumption.

8. Corporate Reporting

All companies inform consumers about its sustainability efforts. Companies apprise consumers about its social and environmental values and measures it is practicing to bring sustainability in its operation. Consumers are informed about the company's values and practices through corporate reporting. Consumers are told about under which circumstances products are made. It is a kind of disclosure by companies which gives information about all compliances that the company has followed. The topics which include reporting are corporate governance, health, and safety of employees and community contribution, etc.

9. Environmental Attitude

The changing expectations of consumers and increased awareness of environmental issues are considered an important determinant in their decision-making process (Beckford, et al,2010; Lee,2012). Attitude is defined as consumers' favorable or unfavorable liking towards something. Changes in consumer attitude and behavior are required to bring change in their choices towards product selection. Changes in consumer attitudes will make people more environmentally

conscious. Consumers can be made more sensitive towards the environment. Once they are sensitive to the environment, their choices, preferences will support sustainable products.

10. Regulation and Laws

Laws help regulate the consumption behavior of consumers. Enacting laws will help consumers to act responsibly. States shall enact effective environmental legislation. Regulation regarding consumption behavior will also aid in improving the consumption behavior of people. Law regarding energy efficiency, wastage of food, use of public transport will support sustainable consumption.

11. Changing Consumption Attitude

Consumption is seen as a status symbol in India and people indulge a lot of money on conspicuous consumption. Spending money is seen as a symbol of richness. This attitude requires change because people have to learn and understand that consuming less is also good. Change in attitude towards consumption pattern is the need of the hour. Consumers need to be educated about minimalism and how to derive satisfaction using consuming less (Carlos Rabasso, 2011).

12. Awareness

Awareness always takes consumers from ignorance to awakening. Awareness about environment and sustainability helps consumers to make the right consumption choices (Zlatan et.al,2018). Increasing consumer awareness towards their duties towards the environment will motivate them to change their behavior and will help them to reduce the negative impact of their consumption on the environment (Tarcza, 2015).

13. Self-efficacy

Self-efficacy is the ability of people to believe about their actions making an impact on the environment. It helps in determining the behavior of people (Fishbein and Capella, 2006). People believe that whatever they are doing, will have a positive impact, are important. Unilever in 2010 launched a campaign that its palm oil is all sustainably farmed. They printed a photo of a rain forest on the tagline "What you buy at the supermarket can change the world...Small actions, big difference." The company had tried to leverage the old findings that people don't take behaviors unless they have a belief that whatever they are doing will make a meaningful impact.

2. Problem Formulation

The rate at which consumption is taking place around the globe is alarming. The growing consumption of these resources by human beings is causing damage. Humans today are extracting and using 50% of more natural resources than 30 years ago. Since, we have finite resources including, materials, water, energy, and fertile land, we need to preserve them to sustain life on the planet. Therefore, this calls for more sustainable use of resources so that they can be preserved and use for a longer period.

3. SOLUTION METHODOLOGY

The above-defined problem has been solved using the given methodology that consists of four steps:

1. Extensive literature review of sustainable consumption and its enablers
2. Conduction of in-depth interviews of experts
3. The opinion of experts was taken to finalize relevant enablers
4. Use of interpretive structural modeling (ISM)

4.1 Interpretive Structural Modeling (ISM)

Interpretive structural modeling is an emphatic tool that changes mental configurations into a confident and well-designed pattern (Ahuja et al., 2009). ISM is the most popular tool to assess socioeconomic systems (Warfield, 1976). Therefore, ISM presents its users with an organized and comprehensive method for integrating group judgments in the development of "first-cut" structural models (Malone, 1975; Watson, 1978). It helps in retrieving qualitative information rather than quantifiable factors resulting from the modeling approach (Janes, 1988). This technique demonstrates the graphical presentation of output (Janes, 1988). The steps of ISM methodology are as follow:

Step 1: First different enablers of sustainable consumption are explored.

Step 2: Contextual relationships are identified among enablers in the first round.

Step 3: A Structural Self Interaction Matrix (SSIM) is created for enablers which indicates pair to pair relationship among the enablers under study.

Step 4: Transitivity lies at the core of ISM methodology. It works on the following formula where if $X=Y$, $Y=Z$, then it is deduced that $X=Z$. Transitivity is checked from the initial reachability matrix which is obtained from SSIM.

Step 5: The reachability matrix is further categorized into multiple levels.

Step 6: Directed digraph is developed and transitivity is erased. Digraph is developed based on the contextual relationship shown in the reachability matrix.

Step 7: The final output is achieved when digraphs are

transformed into the interpretive model by replacing nodes in a digraph with statements.

4.2 Analytical Hierarchy Process (AHP)

The AHP methodology is used in decision making concerning the problem taken in the research paper and it assigns weights to the criteria. The AHP methodology is preferred for its simplicity, robustness, and versatility. The steps followed in AHP about decision making are described below:

Step 1: The hierarchy of structure is formed and the main objective is to decide the enablers responsible for sustainable consumption. The various enablers responsible for encouraging sustainable consumption were analyzed in this step.

Step 2: The above analysis led to the identification of enablers affecting sustainable consumption. Thirteen enablers have been considered for the analysis based on the literature. The conceptual framework has been proposed based on the identified enablers responsible for sustainable consumption.

Step 3: The pairwise comparison matrix has been developed based on data provided by experts from academia and industry. The main purpose behind the pairwise comparison matrix is to found the degree of importance among the enablers. The use of a nominal scale was done for pairwise comparison. The scale with values from 1 to 9 has been used to measure different weights in AHP. AHP uses the basic assumption that if An attribute is having high importance than B, then it is rated as 9 and B must be less important than A and should be rated as '1/9'. These comparisons are made for each pair of enablers taken for the study, with ratings usually not more than 7. After this, the matrix is formed. This matrix further supports the calculation effortlessly.

Step 4: The responses of the matrix form the basis for the calculation of eigenvectors and maximum eigenvalues. The eigenvector obtained out of the comparison matrix indicates the degree of relative importance among the elements. Maximum eigenvalues are calculated at the same time. The strength of consistency is drawn taking eigenvalues as the base and becomes base for comparison and work as a reference point for shortlisting information. The MS-Excel is used to obtain weight value information after the normalization of the comparison matrix.

This value can be used to determine the strength of consistency among comparisons and as a reference index for screening information. The comparison matrix was normalized, recorded and computed in MS-EXCEL to obtain weight value information.

$$A\omega=\omega\lambda_{max} \quad (1)$$

λ_{max} is the highest values of Eigenvalue calculated based on eigenvector expression.

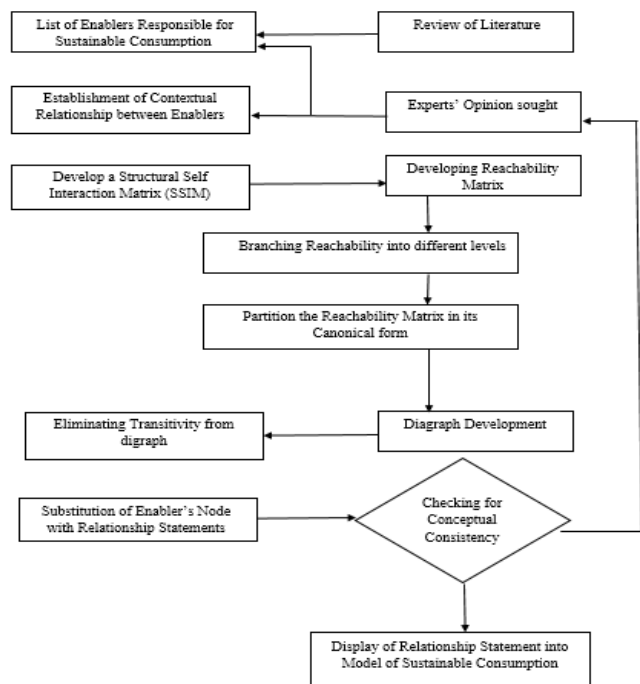


Figure1: Flow chart of ISM: Source: adapted from – Mandal A, Deshmukh S.G

Step 5: The consistency Index is calculated for pairwise comparison matrices. The responses are considered consistent if Eigenvalue is equal to its number of orders. However, it may not be the case in practical situations. That is why the difference value between these two values is used to gauge the degree of consistency.

$$CI = (\lambda_{max} - n) / (n - 1)$$

The consistency of the index greater than 0.1 is an indication of good consistency. It can be revised further if not found consistent.

5. APPLICATION OF ISM

5.1 Data Collection and Application of the Model

The proposed methodology used for decision making has been applied to optimize and prioritizes important enablers for encouraging sustainable consumption among the millennials. The data collected for AHP was taken from experts belonging to academia and industry. A total of 40 respondents were contacted for information.

For $n=13$, $CR = CI / (\text{Index Number Value})$

5.2 Structural Self -Interaction Matrix (SSIM) and Reachability Matrix

Contextual relationships were established among the enablers of sustainable consumption after taking the opinions of experts from academia and Industry. Fifty people were approached for establishing the contextual relationship. Four symbols (V, A, X, O) were used to establish the contextual relationship which further leads to the formation of the SSIM Matrix. The description of individual symbols is detailed below.

V: I helps in achieving j element

A: j helps in achieving I element

X: i and j elements both helps in achieving each

other

O: both i and j elements are not related

The four symbol relevance (V, A, X, O) are described in Table 2.

The symbol V is presented in the cell (1, 13) which means element i (1) leads to element j (13). Therefore, V is positioned in the cell where I lead j. Likewise in cell (1,7) symbol A is placed which means element j leads to element I whereas cell (1,8) denotes symbol X which implies that both enablers (i,j) leads to each other. Finally, cell (1, 10) having O shows no correlation between two elements (i, j). In the next step, SSIM is converted into a binary matrix (0,1). This matrix is also known as an initial reachability matrix (Table 3). There are few sets of rules which are practiced under the binary conversion process are as follow:

1. In SSIM Matrix cell (i, j) having V symbol has been given the binary digit '1' in the initial reachability matrix and '0' in case

of (j,i). The cell (1,13) has '1' in its binary matrix whereas '0' is allocated in the cell (13,1).

2. Again in SSIM, cell (i, j) which has A symbol will be allocated '0' in the initial reach ability matrix and (j, i) will be allotted '1' in that case. The cell (1,7) has taken '0' binary value in Table 2 and cell (7,1) has '1' in the initial reach ability matrix.

3. If (i,j) and (j,i) are depicted with symbol X then both the cells will take '1' binary digit in the initial reach ability matrix. In the case of a cell (1,3) in SSIM, both (1,8) and (8,1) are assigned with '1' in the initial reach ability matrix.

4. If the cell (i,j) is depicted by O then, it will be allocated '0' binary digit. Cell (1,10) and (10,1) show '0' binary digit in the initial reach ability matrix.

The final reachability matrix is derived after ensuring transitivity in the initial reachability matrix. The final reachability matrix is presented in Table 4.

Table 2: Structural Self Interaction Matrix (SSIM)

| Variables | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|-----------|----|----|----|----|---|---|---|---|---|---|---|---|---|
| 1 | V | V | V | O | V | X | A | O | A | V | V | A | |
| 2 | V | V | O | O | V | O | O | O | O | V | O | | |
| 3 | O | A | O | A | A | O | O | O | A | A | | | |
| 4 | A | A | A | A | A | O | O | A | A | | | | |
| 5 | O | V | V | A | V | O | O | O | | | | | |
| 6 | O | A | V | A | V | O | V | | | | | | |
| 7 | V | X | V | A | O | O | | | | | | | |
| 8 | V | V | V | A | A | | | | | | | | |
| 9 | X | A | X | A | | | | | | | | | |
| 10 | V | V | V | | | | | | | | | | |
| 11 | V | A | | | | | | | | | | | |
| 12 | V | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | |

Table 3: Initial Reachability Matrix

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-----------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 |
| 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 6 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 7 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| 9 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 10 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 11 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 12 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 13 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |

The final reachability matrix guides to the attainment of the reachability set and antecedent set (Warfield,1974). The intersection is attained with the help of elements of both sets. When the intersection of the reachability set and antecedents are matched together, the ISM hierarchy is obtained. Variable having reachability and intersection set common is assigned the highest priority in the ISM hierarchy.

Table 4: Final Reachability Matrix

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Driving Variable |
|-----------|----|---|----|----|---|----|----|----|----|----|----|----|----|------------------|
| 1 | 1 | 0 | 1 | 1 | 0 | 1* | 1* | 1 | 1 | 1* | 1 | 1 | 1 | 11 |
| 2 | 1 | 1 | 1* | 1 | 0 | 0 | 0 | 1* | 1 | 1* | 1* | 1 | 1 | 10 |
| 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 5 | 1 | 0 | 1 | 1 | 1 | 1* | 1* | 1* | 1 | 1* | 1 | 1 | 1* | 12 |
| 6 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1* | 1* | 7 |
| 7 | 1 | 0 | 1* | 1* | 0 | 1* | 1 | 1* | 1* | 1 | 1 | 1 | 1 | 11 |
| 8 | 1 | 0 | 1* | 1* | 0 | 0 | 0 | 1 | 1* | 1 | 1 | 1 | 1 | 9 |
| 9 | 1* | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 7 |
| 10 | 1* | 0 | 1 | 1 | 1 | 1* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| 11 | 0 | 0 | 1* | 1 | 0 | 0 | 0 | 1* | 1 | 0 | 1 | 0 | 1 | 5 |
| 12 | 1* | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1* | 1 | 1 | 1 | 11 |
| 13 | 0 | 0 | 1* | 1 | 0 | 0 | 0 | 1* | 1 | 0 | 1* | 0 | 1 | 6 |
| Dependent | 8 | 1 | 12 | 12 | 3 | 6 | 6 | 9 | 11 | 7 | 11 | 8 | 11 | |

5.3 Formation of ISM Based Model

The final reachability matrix leads to the formation of a structural model known as a digraph. Once transitivity links are removed and nodes are replaced with the statement, the ISM model is formed (figure 1). The model implies that enablers are the most relevant for sustainable consumption as it comes to the lowest place in the ISM hierarchy. Environmental attitude (9), Change in consumption attitude (11) and Self efficacy have been at the top of the ISM model

indicating that they are least important.

5.3 LevelPartitions

The final reachability matrix is derived based on reachability and antecedents set for each enabler (Warfield,1974). Enablers for whom reachability and antecedents are the same achieve the top position in the ISM hierarchy. The enablers occupying top positions would not further lead to any other enablers in the ISM hierarchy. Once top-level enablers are identified, it is removed from the other enablers. This process is continued until the last level is achieved. Eleven iterations have been carried out to set levels for these enablers.

Table 5: Partitioning of Enablers

| S.NO | Reachability Set | Antecedents | Intersection | Level |
|------|-----------------------------|-----------------------------|----------------|-------|
| 1 | 1,3,4,6,7,8,9,10,11,12,13 | 1,2,5,7,8,9,10,12 | 1,7,8,9,10,12 | VI |
| 2 | 1,2,3,4,8,9,10,11,12,13 | 2 | 2 | X |
| 3 | 3 | 1,2,3,4,5,7,8,9,10,11,12,13 | 3 | I |
| 4 | 3,4 | 1,2,4,5,6,7,8,9,10,11,12,13 | 4 | II |
| 5 | 1,3,4,5,6,7,8,9,10,11,12,13 | 5,10,12 | 5,10,12 | XI |
| 6 | 4,6,7,9,11,12,13 | 1,5,6,7,10,12 | 6,7,12 | V |
| 7 | 1,3,4,6,7,8,9,10,11,12,13 | 1,5,6,7,10,12 | 1,6,7,10,12 | X |
| 8 | 1,3,4,8,9,10,11,12,13 | 1,2,5,7,8,9,10,11,13 | 1,8,9,10,11,13 | IX |
| 9 | 1,3,4,8,9,11,13 | 1,2,5,6,7,8,9,10,11,12,13 | 1,8,9,11,13 | IV |
| 10 | 1,3,4,5,6,7,8,9,10,11,12,13 | 1,2,5,7,8,10,12 | 1,5,7,8,10,12 | VII |
| 11 | 3,4,8,9,11,13 | 1,2,5,6,7,8,9,10,11,12,13 | 8,9,11,13 | III |
| 12 | 1,3,4,5,6,7,9,10,11,12,13 | 1,2,5,6,7,8,10,12 | 1,5,6,10,12 | VIII |
| 13 | 3,4,8,9,11,13 | 1,2,5,6,7,8,9,10,11,12,13 | 8,9,11,13 | III |

5.5 MICMAC Analysis

MICMAC analysis is an abbreviation for Matrice d'Impacts cross-multiplication applique' a classmate (Cross-impact matrix multiplication applied to classification). Driving power and dependence power is the base of MICMAC analysis. Table 4 presents the driving and dependence power of the enablers. Based on two important parameter enablers are categorized in four-quadrant namely: Autonomous, Dependent, and Linkage and Independent according to their driving and dependence power.

| | | | | | | | | | | | | | | |
|---------------|----|----|---|---|---|---|---|----|----|-------------|----|----|----|----|
| | 13 | | | | | | | | | | | | | |
| | 12 | | | 5 | | | | 10 | 1 | | | | | |
| | 11 | | | | | | | 12 | | Linkage III | | | | |
| | 10 | 2 | | | | | | | | | | | | |
| | 9 | | | | | | | | 8 | | | | | |
| | | | | | | | | | | | | | | |
| Driving Power | 8 | | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | |
| | 6 | 13 | | | | | | | | | | | 9 | |
| | 5 | | | | | | | | 11 | | | | | |
| | 4 | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | | 4 |
| | 1 | | | | | | | | | | | | | 3 |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | | | | | | | | | | | | | | |

Figure 2 : Driving Power and Dependence

5. APPLICATION RESULTS USING AHP

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Table 6: Pairwise Comparison Matrix

| Factors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1 | 5 | 1/4 | 3 | 2 | 5.00 | 1/5 | 3 | 7 | 6 | 4 | 6 | 4 |
| 2 | 1/4 | 1 | 1/3 | 3 | 2 | 5 | 5 | 7 | 6 | 4 | 1/5 | 1/6 | 1/4 |
| 3 | 4 | 3 | 1 | 4 | 2 | 5 | 1/3 | 4 | 5 | 4 | 1/4 | 4 | 4 |
| 4 | 1/3 | 1/3 | 1/4 | 1 | 5 | 4 | 1/3 | 5 | 1/5 | 1/4 | 1/7 | 1/5 | 1/5 |
| 5 | 1/2 | 1/2 | 1/2 | 1/5 | 1 | 4 | 7 | 1/5 | 1/7 | 1/5 | 1/7 | 1/7 | 1/5 |
| 6 | 1/5 | 1/5 | 1/5 | 1/4 | 4 | 1 | 1/5 | 1/6 | 1/5 | 1/4 | 1/7 | 1/7 | 1/5 |
| 7 | 5 | 1/5 | 1/3 | 3 | 1/7 | 5 | 1 | 6 | 5 | 4 | 1/7 | 1/6 | 5 |
| 8 | 1/3 | 1/7 | 1/4 | 1/5 | 5 | 6 | 1/6 | 1 | 5 | 4 | 1/6 | 1/4 | 6 |
| 9 | 1/7 | 1/6 | 1/5 | 5 | 7 | 5 | 1/5 | 1/4 | 1 | 5 | 1/6 | 1/5 | 7 |
| 10 | 1/6 | 1/4 | 1/4 | 5 | 4 | 4 | 1/4 | 1/4 | 1/5 | 1 | 1/5 | 1/5 | 4 |
| 11 | 1/4 | 5 | 4 | 4 | 7 | 7 | 7 | 6 | 6 | 5 | 1 | 7 | 5 |
| 12 | 1/6 | 6 | 1/4 | 7 | 7 | 7 | 6 | 4 | 5 | 5 | 1/5 | 1 | 5 |
| 13 | 1/4 | 4 | 1/4 | 5 | 5 | 5 | 1/5 | 1/6 | 1/7 | 1/4 | 1/7 | 1/5 | 1 |

Table 8: Normalized Matrix

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------------------------------|------|-------|------|------|------|------|------|------|------|------|------|------|------|
| Education | 0.08 | 0.19 | 0.03 | 0.07 | 0.04 | 0.08 | 0.01 | 0.08 | 0.17 | 0.15 | 0.58 | 0.3 | 0.1 |
| Values & Norms | 0.02 | 0.04 | 0.04 | 0.07 | 0.04 | 0.08 | 0.18 | 0.19 | 0.15 | 0.1 | 0.03 | 0.01 | 0.01 |
| Innovation | 0.32 | 0.12 | 0.12 | 0.1 | 0.04 | 0.08 | 0.01 | 0.11 | 0.12 | 0.1 | 0.04 | 0.2 | 0.1 |
| Collaborative Purchasing | 0.03 | 0.01 | 0.03 | 0.02 | 0.1 | 0.06 | 0.01 | 0.14 | 0 | 0.01 | 0.02 | 0.01 | 0 |
| Incentive | 0.04 | 0.02 | 0.06 | 0 | 0.02 | 0.06 | 0.25 | 0.01 | 0 | 0.01 | 0.02 | 0.01 | 0 |
| Taxation | 0.02 | 0.01 | 0.02 | 0.01 | 0.08 | 0.02 | 0.01 | 0 | 0 | 0.01 | 0.02 | 0.01 | 0 |
| Labeling | 0.4 | 0.01 | 0.04 | 0.07 | 0 | 0.08 | 0.04 | 0.16 | 0.12 | 0.1 | 0.02 | 0.01 | 0.12 |
| Corporate Reporting | 0.03 | 0.01 | 0.03 | 0 | 0.1 | 0.1 | 0.01 | 0.03 | 0.12 | 0.1 | 0.02 | 0.01 | 0.14 |
| Environmental Attitude | 0.01 | 0.01 | 0.02 | 0.12 | 0.14 | 0.08 | 0.01 | 0.01 | 0.02 | 0.13 | 0.02 | 0.01 | 0.17 |
| Regulation | 0.01 | 0.01 | 0.03 | 0.1 | 0.08 | 0.06 | 0.01 | 0.01 | 0 | 0.03 | 0.03 | 0.01 | 0.1 |
| Changing Consumption Attitude | 0.02 | 0.19 | 0.5 | 0.17 | 0.14 | 0.11 | 0.25 | 0.16 | 0.15 | 0.13 | 0.14 | 0.36 | 0.12 |
| Awareness | 0.01 | 0.23 | 0.03 | 0.12 | 0.14 | 0.11 | 0.22 | 0.11 | 0.12 | 0.13 | 0.03 | 0.05 | 0.12 |
| Self-Efficacy | 0.01 | 0.845 | 0.03 | 0.12 | 0.1 | 0.08 | 0.01 | 0 | 0 | 0.01 | 0.02 | 0.01 | 0.02 |
| Sum | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Table 7: Normalized Matrix

Table 7: Pairwise Comparison Matrix

| Factors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|
| 1 | 1 | 5 | 1/4 | 3 | 2 | 5.00 | 1/5 | 3 | 7 | 6 | 4 | 6 | 4 |
| 2 | 1/4 | 1 | 1/3 | 3 | 2 | 5 | 5 | 7 | 6 | 4 | 1/5 | 1/6 | 1/4 |
| 3 | 4 | 3 | 1 | 4 | 2 | 5 | 1/3 | 4 | 5 | 4 | 1/4 | 4 | 4 |
| 4 | 1/3 | 1/3 | 1/4 | 1 | 5 | 4 | 1/3 | 5 | 1/5 | 1/4 | 1/7 | 1/5 | 1/5 |
| 5 | 1/2 | 1/2 | 1/2 | 1/5 | 1 | 4 | 7 | 1/5 | 1/7 | 1/5 | 1/7 | 1/7 | 1/5 |
| 6 | 1/5 | 1/5 | 1/5 | 1/4 | 4 | 1 | 1/5 | 1/6 | 1/5 | 1/4 | 1/7 | 1/7 | 1/5 |
| 7 | 5 | 1/5 | 1/3 | 3 | 1/7 | 5 | 1 | 6 | 5 | 4 | 1/7 | 1/6 | 5 |
| 8 | 1/3 | 1/7 | 1/4 | 1/5 | 5 | 6 | 1/6 | 1 | 5 | 4 | 1/6 | 1/4 | 6 |
| 9 | 1/7 | 1/6 | 1/5 | 5 | 7 | 5 | 1/5 | 1/4 | 1 | 5 | 1/6 | 1/5 | 7 |
| 10 | 1/6 | 1/4 | 1/4 | 5 | 4 | 4 | 1/4 | 1/4 | 1/5 | 1 | 1/5 | 1/5 | 4 |
| 11 | 1/4 | 5 | 4 | 4 | 7 | 7 | 7 | 6 | 6 | 5 | 1 | 7 | 5 |
| 12 | 1/6 | 6 | 1/4 | 7 | 7 | 7 | 6 | 4 | 5 | 5 | 1/5 | 1 | 5 |
| 13 | 1/4 | 4 | 1/4 | 5 | 5 | 5 | 1/5 | 1/6 | 1/7 | 1/4 | 1/7 | 1/5 | 1 |

Table 9: Critical Enabler Weightage

| S.No | Factors | Weight | Ranking |
|------|-------------------------------|--------|---------|
| 1 | Education | 1.89 | 3 |
| 2 | Values & Norms | 0.95 | 7 |
| 3 | Innovation | 1.46 | 4 |
| 4 | Collaborative Purchasing | 0.45 | 12 |
| 5 | Incentive | 0.51 | 10 |
| 6 | Taxation | 0.20 | 13 |
| 7 | Labeling | 1.18 | 6 |
| 8 | Corporate Reporting | 0.70 | 9 |
| 9 | Environmental Attitude | 0.75 | 8 |
| 10 | Regulation | 0.48 | 11 |
| 11 | Changing Consumption Attitude | 2.44 | 1 |
| 12 | Awareness | 1.42 | 5 |
| 13 | Self-Efficacy | 1.90 | 2 |

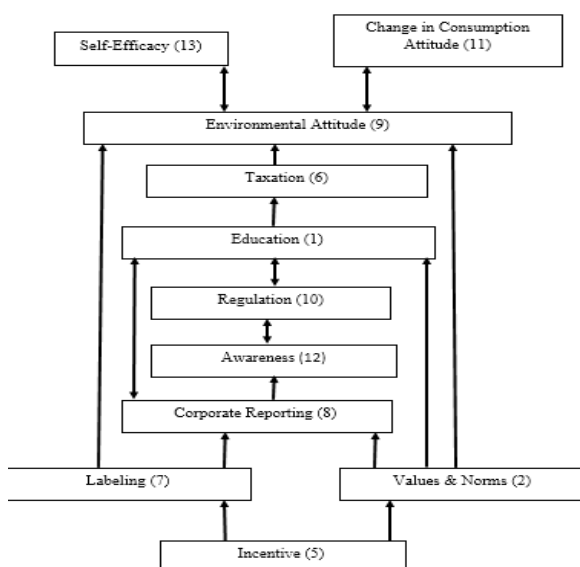


Figure 3: ISM Model for Sustainable Consumption

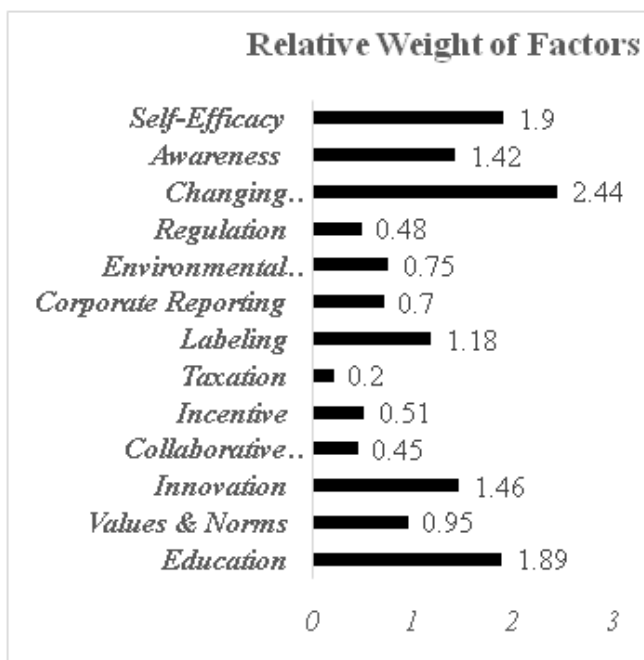


Figure 4: Graphical Representation of Criteria Weightage

6. RESULTS & DISCUSSIONS

The burgeoning human consumption is the main cause behind the unprecedented changes in the environment that we are witnessing in the form of an increased rise in the demand for land, energy, and water, etc. Ecological footprint which is known as consumption indicator provides us a complete state of consumption. The product that we consume and the supply chain behind them, the material used and how they have been extracted have a huge impact on the world around us. The current study aims to identify the enablers of sustainable consumption. The identification of these enablers will help consumers shift towards sustainable consumption.

According to the ISM model, the incentives are driving labeling and values and norms which comes on the second in the ISM hierarchy level. It implies that incentives are helpful in the labeling of products. The government should promote the labeling of goods to promote good consumption practices among consumers. Goods carrying certification of environmental, social and labor compliance are preferred by consumers. Labels are ways to communicate credential product information to consumers. Consumers have a positive attitude towards eco-label (Lucyna Witek, 2017). The labels induce confidence about the quality of goods being purchased by consumers. Labels are very helpful in educating people about transparency and providing

information related to sustainable production and consumption.

The incentives in the form of subsidies will only work when consumers perceive the difference in the price of sustainable goods significant. If the incentives do not make significant sense to consumers, they would not be lured by incentives (OECD, 2008). Many countries have introduced fiscal incentives to improve home energy efficiency like china, Canada, France, Denmark, etc. Further, consumers may be offered a scheme to earn green points when they use public transport or buy locally made products or buy fair trade goods. These points can further be reduced instead of buying sustainable goods.

Corporate reporting which drives awareness is driven by labeling and values and norms. It is a general practice of companies nowadays to put their sustainability efforts among the public domain so that consumers may be apprised of companies' sustainability efforts. This practice further seems to create awareness among consumers about sustainability practices. Further, awareness leads to regulations which further drives education among consumers. The education on sustainability equips people to change the way they behave and think about the sustainable future. Educating on sustainability is about knowledge, values, and skills which helps them to make goods choices. Education must be integrated with the curriculum, research, and service. People must be educated on recycling, climate change, biodiversity, and renewable energy so that they can contribute towards sustainability and the United Nations sustainable development goal. Education helps in the attainment of taxation which further shapes the environmental attitude of consumers. Taxing goods that cause environmental damage and are not sustainable is a way to reduce the consumption of unsustainable goods. Self-efficacy and change in consumption attitude are the least important enablers as they are at the top in the ISM hierarchy. These two enablers have the least driving power among all thirteen enablers.

7. THEORETICAL CONTRIBUTION

The literature on Sustainable consumption is extant as sustainable consumption is the new and progressing field of research. Very few studies have used interpretive structural modeling to prioritize enablers of sustainable consumption. This study uses an interpretive structural modeling approach to prioritize enablers responsible for sustainable consumption. The formation of links among enablers is an important

contribution to this domain. Further, the links among enablers have been shown using dependence and driving power. The hierarchy in ISM shows the importance of each enabler as a driver. Enablers at the same level indicate the same importance.

8. IMPLICATIONS

The consumption pattern of consumers is problematic because we have only one planet and have limited resources. If the consumption continues to happen at the same pace, then all resources on the planet would exhaust and deplete. The findings of the current study would help policymakers to frame strategies concerning sustainable consumption. It would contribute to encouraging sustainable consumption, thereby, leading to saving of resources, reduction of waste and pollution, fewer emissions, improving environment, improved biocapacity and reducing unsustainable consumption.

9. DIRECTION FOR FUTURE RESEARCH

The current study has only identified thirteen enablers of sustainable consumption based on literature. The future studies may explore more such enablers and try to prioritize them based on Interpretive modeling (ISM). Further, these contextual among enablers relationship may be tested statistically using Structural equation modeling. Since the study has been carried out in India, so the enablers may vary across countries.

10. CONCLUSION

Unfortunately, all the human activity comes at a cost to the planet, be it aimed at meeting needs or fulfilling wants. This research contributes to the form of highlighting the relationship among enablers of sustainable consumption using the ISM Approach. The current study provides useful information about the relative significance and interaction among these enablers. The finding of the study would help in saving precious resources. The findings would also help to attain the goal given by the United Nations.

REFERENCES

1. Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lahteenmaki, L., & Shepherd, R. (2008). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the Theory of Planned Behavior, *Appetite*, 50(2), 443-454. <https://doi.org/10.1016/j.appet.2007.09.010>
2. Barr, S. (2003) Strategies for Sustainability: Citizens and Responsible Environmental Behavior, *Area*, 35(3), 227-240. <https://doi.org/10.1111/1475-4762.00172>
3. Beckford, C.L.; Jacobs, C.; Williams, N.; Nahdee, R. (2010). Aboriginal environmental wisdom, stewardship, and sustainability: Lessons from the Walpole Island First Nations, Ontario, Canada, *Journal of Environmental Education*, 41, 239-248. <https://doi.org/10.1080/00958961003676314>
4. Bilsky, W., & Schwartz, S. H. (1994). Values and personality, *European Journal of Personality*, 8, 163-181. <https://doi.org/10.1002/per.2410080303>
5. Chan, L., & Bishop, B. (2013). A moral basis for recycling: Extending the theory of planned behavior. *Journal of Environmental Psychology*, 36, 96-102. <https://doi.org/10.1016/j.jenvp.2013.07.010>
6. Chen, T. B., and Chai, L. T. (2010). Attitude towards the Environment and Green Products: Consumers Perspective, *Management and Science Engineering*, 4: 27-39.
7. Fishbein, M., & Cappella, J. N. (2006). The role of theory in developing effective health communications. *Journal of Communication*, 56, 1-17. <https://doi.org/10.1111/j.1460-2466.2006.00280.x>
8. Gadenne, D., Sharma, B., Kerr, D., & Smith, T. (2011). The Influence of Consumers' Environmental Beliefs and Attitudes On Energy Saving Behaviors, *Energy Policy*, 39(12), 7684-7694. <https://doi.org/10.1016/j.enpol.2011.09.002>
9. Gerber, A. S., & Rogers, T. (2009). Descriptive social norms and motivation to vote: Everybody's voting and so should you, *The Journal of Politics*, 71 (01), 178-191. <https://doi.org/10.1017/S0022381608090117>
10. Gleim, M. R., Smith, J. S., Andrews, D., Cronin Jr, J. J. (2013). Against the green: A multi-method examination of the barriers to green consumption, *Journal of Retailing*, 89(1), 44-61. <https://doi.org/10.1016/j.jretai.2012.10.001>
11. Kumar, P., Verma, H., & Dube, P. (2019). The moderating role of gender and religiosity on the relationship between Gratitude and Stress. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)* ISSN, 2278-3075.

12. Lee, S.(2012). Consumers' Value, Environmental Consciousness, and Willingness to Pay more toward Green-Apparel Products. *Journal of Global Fashion Marketing*, 2,161–169. <https://doi.org/10.1080/20932685.2011.10593094>
13. Mandal, A., & Deshmukh, S.G. (1994). Vendor selection using interpretive structural modeling (ISM), *International Journal of Operations and Production Management*, 14(6), 52-59. <https://doi.org/10.1108/01443579410062086>
14. Mizobuchi, K. and Takeuchi, K., (2013). The influences of financial and non-financial factors on energy-saving behavior: A field experiment in Japan, *Energy Policy*, 63, 775–787. <https://doi.org/10.1016/j.enpol.2013.08.064>
15. Mujkic, Z; Qorri, A & Kraslawski, A (2018). Consumer Choices and Sustainable Development of Supply Chain, *Procedia Manufacturing*,17,1097-1103. <https://doi.org/10.1016/j.promfg.2018.10.075>
16. R. Nittala (2014). Green Consumer Behavior of the Educated Segment in India, *Journal of International Consumer Marketing*, 26 (2) (2014),138-152. <https://doi.org/10.1080/08961530.2014.878205>
17. Rabassó, C. and Rabassó, J. (2011). Educating Responsible Transcultural Managers for Open Environments and Organizations, *International Journal of Employment Studies*, 19 (2), 33-61
18. Rennings, K.(2000). Redefining Innovation—Eco-Innovation, *Research and the Contribution from Ecological Economics*, 32, 319–332. [https://doi.org/10.1016/S0921-8009\(99\)00112-3](https://doi.org/10.1016/S0921-8009(99)00112-3)
19. Schwartz, S. H. (1994). Are there universal aspects in the content and structure of values? *Journal of Social Issues*, 50, 19-45. <https://doi.org/10.1111/j.1540-4560.1994.tb01196.x>
20. Sharma, M, and Rani, Leela (2014). Environmentally sustainable consumption: A review and agenda for future Research, *Global Journal of Finance and Management*, 6(4), 367-374. https://www.ripublication.com/gjfm-spl/gjfmv6n4_13.pdf
21. TARCZA, T. T. (2015). Quantitative benchmarks on the traditional food products market in Romania. *Annals of the University of Oradea, Economic Science Series*, 24(2), 605-614.
22. Warfield J.W.((1974). Developing interconnected matrices in structural modeling, *IEEE Transactions on Systems Men and Cybernetics*, 4(1), 51-81. <https://doi.org/10.1109/TSMC.1974.5408524>
23. Young, W., Hwang, K., McDonald, S., Oates, C. J. (2010). Sustainable consumption: green consumer behavior when purchasing products, *Sustainable Development*, 18(1), 20-31. <https://doi.org/10.1002/sd.394>
24. Zibarras, L.D., Port, R.L., & Woods, S.A. (2008). Innovation and the Dark Side of Personality: Dysfunctional Traits and their Relation to Self-Reported Innovative Characteristics, *Journal of Creative Behavior*, 42, 201-215. <https://doi.org/10.1002/j.2162-6057.2008.tb01295.x>
25. Zimmer, M. R., Stafford, T. F., & Stafford, M. R. (1994). Green Issues: Dimensions of Environmental Concern, *Journal of Business Research*, 30(1), 63-74. [https://doi.org/10.1016/0148-2963\(94\)90069-8](https://doi.org/10.1016/0148-2963(94)90069-8)