Perception Study of Project Managers of India with Reference to Environmental and Social Sustainability of Projects.

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Abstract:
The primary goal of this article is to know the perception of different experienced projectmanagers of India towards choice of most suitable parameter for environmental sustainability and for social sustainability of projects in India.Results were attained through SPSS version 26. The test of association (chi square method) conductedbetweeneach of he parametersfor social sustainability as well as parameters for environmental sustainability of projects with work experience in form of number of projects completed, shows a significant relationship.There is however, not significant relationship between work experience in form of age of project managers and choosing the right parameter for environmental sustainability and for social sustainability of projects in India. The current article suggests that transport is the parameter to be focused or preferred for environmental sustainability and relationship with vendors & suppliers to be focused or preferred for social sustainability.Additionally, through correspondence analysis, this research also identifies the specific parameters of sustainability that were of interest to different age groups of respondents.
Key-words:project manager, environmental sustainability, social sustainability, project management, workexperience.

1. INTRODUCTION

Sustainability has three pillars – environment, economic and social. Projects are unique one-time endeavours and have repercussions (positive or negative) for future generations based on impact the projects have on environment, society, and economy. So, projects that the project managers accomplish have relationship with all three pillars of sustainability. The authors shall be focussing on inter-relationship of project management with environmental sustainability and with social sustainability. For this purpose, only one of the internal stakeholders of project i.e. project managers' perception was studied. The work experience of project managers or any other manager can be defined by:

$$W= f(time, intensity, quality) \quad (1)$$

Where W = Measure of work experience
f ()= function of

In the currentresearch article, the age of project managers was considered equivalent to time variable. Intensity variable was measured by number of projects completed by project manager till the date questionnaire was administered. Quality variable was not measurable without going in detail of each project completed by project manager. So, assumption was made that quality variable does not impact or has constant impact on work experience.

Thus, the work experience measurement equation becomes:

$$W = f (time, intensity) \quad (2)$$

Various indicators can be used for impact on environmental sustainability of a project.The author has shortlisted five indicators, which aretransport, energy, water, waste and material &resources.

Similarly, various indicators can be used for impact on social sustainability of a project. The author has shortlisted five indicators, which areethical behaviour, labor practices,relationship with society &customers, relationship with vendors &suppliers and human rights.

The five indicators in each approach i.e. transport, energy, water, waste and material & resources under environmental sustainability and ethical behaviour, labor practices, relationship with society & customers, relationship with vendors & suppliers and human rightsunder social sustainability were chosen based on their popularity on search engines.

The work experience of each project manager was identified through age group and through number of projects completed.There are various perceptions about choosing the indicators of environmental and social sustainability of projects by project managers of various age groups and of different experience levels identified by number of projects completed by each till date.

1.1 Review of Literature and Research Gap

In various literature, there has often been a mention of keeping environment safe and society flourished for future generations. During the last couple of decades, there has been ahumongouseffort to increase sustainability techniques in project management.The research gap exists to find a perception of project managers of India about which parameters have relative importance in the project sustainability. The research study was done to understand the perception of project managers in identifyingparameters for improvement in environmental and social sustainability of projects in India. The existing literature

within a span of last ten yearsthat is similar to steps taken in research in this direction are briefly discussed below:

Talbot and Venkataraman(2011) produced aframework with a number of high level indicators all of which were not applicable to all projects.

A discussion on issues of environmental product development and sustainability has been reported by*Brones et. al (2014)*in which the authorsexplored the intersection between project management and eco-design.

*In operational terms, some work was doneby Sanchez (2014)*in which the author proposed points of integration between sustainability and project management.

Martens and Carvalho (2016), found a gap between the practice and perception of importanceof sustainability in project management, though firms have concern about sustainability in project management.

Thearticleby *Daneshpour and Takala (2017)*supports the logic behind sustainable competitive advantagesand the sustainable project management.According to the authors, every society gives importance to the successful management of projects. The authors give an estimate that one by three parts of worldwide Gross Domestic Product is spent on projects, so it is expected that in the future, projects will be mentioned as an important area for integrating sustainable development principles.It is expected that future of project management tasks may become more challenging due to the requirements for sustainable development from the legislations and the society. A more sustainable approach in the projects will be most sought after in future.

Koke and Moehler (2019), found that the project control method called EVM(Earned Value Method) has been not used to track the performance of sustainability within projects. A theoretical

frameworkwas developed called 'Earned Green Value Management'to form a new project management tool to track the achievement of sustainability goals in projects.

Silviusand Schipper (2019)contributed to the integration of project stakeholder management and sustainability by incorporating practical tools and frameworks, which enable managers to identify, assess and planstakeholder engagement activities with a consideration to sustainability initiatives and development.

According to *Yu et. al* (2018),there is an intensification of balanced requirement of economic environmental and social objectives in projects. The need for integrating sustainability in projects is getting attention inpractice as well as academia. The authors further added that achievement of sustainability objectives in projectshas been done significantly for big and complex construction projects.

2. METHODS

It can be so far inferred that the goal is to find out the large differences in the perception ofproject managers with different experience levels towards parameters of environmental sustainability and of social sustainability in project management.One of the independent variable was number of projects completed by the project manager till date of survey, which was categorized as <=15 projects completedand as >15 projects completed. Another independent variable was the age group of project manager, which was categorized as less than and equal to 34 years, between 34 & 44(inclusive of 44) and more than 44 years of age. The following research questions were tried to be answered by the researcher:

Research Question 1 (RQ1): Which is perceived by project managers as the most important parameter for improving environmental sustainability of projects in India?

Research Question 2 (RQ2): Which is perceived by project managers as the most important parameter for improving social sustainability of projects in India?

Research Question 3 (RQ3): What is the result of different experience levels in form of number of projects completed by project managers on choosing the appropriate parameter for improving environment sustainability of projects in India?

Research Question 4 (RQ4): What is the result of different experience levels in form of number of projects completed by project managers on choosing the appropriate parameter for improving social sustainability of projects in India?

Research Question 5 (RQ5): What is the effect of varied experience levels in form of age group of project manager on choosing appropriate parameter for improving social sustainability of projects in India?

Research Question 6 (RQ6): What is the effect of varied experience levels in form of age group of project manager on choosing appropriate parameter for improving environmental sustainability of projects in India?

The following four Null and four Alternate hypothesis were formulated using the above research questions:

Ho11: The varied experience level in terms of number of projects completed has no effect on choosing appropriate parameter for improving environmental sustainability of projects in India?

Ha11: The varied experience level in terms of number of projects completed has effect on choosing appropriate parameter for improving environmental sustainability of projects in India?

Ho12: The varied experience level in terms of number of projects completed has no effect on choosing appropriate parameter for improving social sustainability of projects in India?

Ha12: The varied experience level in terms of number of projects completed has effect on choosing appropriate parameter for improving social sustainability of projects in India?

Ho21: The varied experience level in terms of age group of project manager has no effect on choosing appropriate parameter for improving environmental sustainability of projects in India?

Ha21: The varied experience level in terms of age group of project manager has effect on choosing appropriate parameter for improving environmental sustainability of projects in India?

Ho22: The varied experience level in terms of age group of project manager has no effect on choosing appropriate parameter for improving social sustainability of projects in India?

Ha22: The varied experience level in terms of age group of project manager has effect on choosing appropriate parameter for improving social sustainability of projects in India?

2.1 Data Collection

Thepre-structured questionnaire from project managers of India selected by judgement sampling was used to collect primary data. The examination of 500 completed questionnaires, led the way to further analysis.Articles and research studies published in some journals gave secondary data for concept formulation.

2.2 Data Analysis Techniques

Test of association (chi square method) between the categorical variable of three age groups and categorical variable of five parameters of environmental sustainability of projects was used to analyse data. Another test of association (chi square method) between the categorical variable of three age groups and categorical variable offive parameters of social sustainability of projects was done. Similar test of association (chi square method) was carried out between thecategorical variable of five parameters of environmental sustainability of projects and categorical variable of two groups of number of projects completed by project manager Another similar test of association (chi square method) was carried out between the categorical variable of five parameters of social sustainability of projects and categorical variable of two groups of number of projects completed by project manager

Later, the correspondence analysis as dimension reduction technique was applied on same data with three age groups as one variable and five parameters of environmental sustainability as another variable. Another correspondence analysis was carried on three age groups as one variable and five parameters of environmental sustainability as another variable.

All these tests were carried out by using SPSS software version 26.

3. RESULTS AND DISCUSSION

3.1   Full Form of acronyms of variables used in this section are below:

Abbreviation of variable	Full form of variable
nof_p	Number of projects done by project manager (either <= 15 or >15)

s_f	Parameter of social sustainability of project
e_f	Parameter of environmental sustainability of project
a_g	Age group of respondents
LT_15	<= 15 projects completed
GT_15	>15 projects completed
LT_34	Less than or equal to 34 age
BW_34&44	Between 34 and 44(inclusive) age
GT_44	Greater than 44 age
L_P*	Labour Practices
H_R*	Human Rights
R_S&C*	Relationship with Society and Customers
E_B*	Ethical Behaviour
R_V&S*	Relationship with Vendors and Suppliers
Tra[#]	Transport
Ene[#]	Energy
Wat[#]	Water
Was[#]	Waste
M&R[#]	Materials and Resources
*five parameters of social sustainability of projects #five parameters of environmental sustainability of projects	

3.2 *Chi square between number of projects andparameters of social sustainability*.

The p-value as depicted in table 1 below for chi-square between two groups of number of projects completed and five parameters of social sustainability of projects is 0.031, which is less than significance level of 0.05.Thus, we can say that p-value is statistically significant and reject the Null Hypothesis H012. We can say that the varied experience level in form of number of projects completed has an effect on choosing appropriate parameter for improving social sustainability of projects in India i.e. alternate hypothesis Ha12 is to be accepted. This part of analysis answers the research question RQ4.

phi value and Cramer's V value are statistically significant with p-value as 0.031 in each test (table 1).

phi and Cramer's V(see table 1) give the strength of association between the nominal variables of nof_p and s_f. The value of 14.6 % shows that the strength of association is on lower side.

Since, the maximum number of project managers choose relationship with vendors and suppliers as the parameter that effects social sustainability of projects in India, we can answer the research question RQ2 i.e. relationship with vendors and suppliers is perceived by project managers as the most important parameter for improving social sustainability of projects in India. This result is also depicted in bar chart in Figure 1.

Table1: Results of chi-square tests and symmetric measures between number of projects and parameters of social sustainability

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	10.630	4	0.031
Likelihood Ratio	10.450	4	0.033
Linear by Linear	0.611	1	0.435

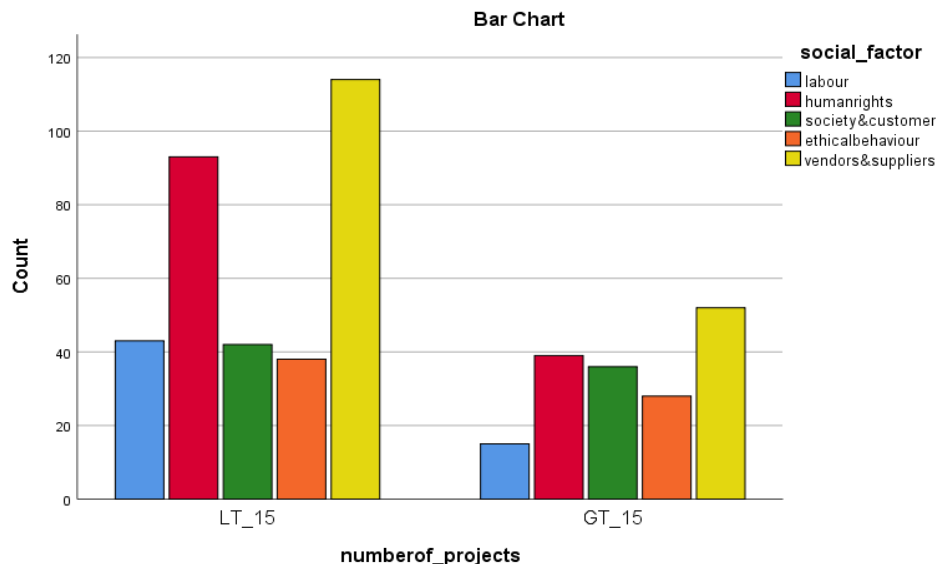| Association			
Nominal by Nominal Phi	0.146		Approximate Significance is 0.031
Nominal by Nominal Cramer's V	0.146		Approximate Significance is 0.031
N of valid cases	500		
The min. expected cell count is 19.72			

Figure 1: Bar chart of parameters of social sustainability and count of number of projects

3.3 Chi square between number of projectsand parameters of environmental sustainability

The p-value for chi-square as depicted in table 2between two groups of number of projects completed and five parameters of environmental sustainability of projects is 0.043, which is less than 0.05.

Thus, we can say that p-value is statistically significant and reject the Null Hypothesis H011. We can say that the varied experience level in form of number of projects completed has an effect on choosing appropriate parameter for improving environmental sustainability of projects in India i.e. alternate hypothesis Ha11 is to be accepted. This part of analysis answers the research question RQ3.

Phi value and Cramer's V value as shown in table 2are statistically significant with p-value as 0.043 in each test.Phi and Cramer's V (see table 2) give the strength of association between two nominal variables of nof_p and e_f.The value of 14.1 % shows that the strength of association is on lower side.

Since, the maximum number of project managers choose transport as the parameter that effects environmental sustainability of projects in India (see chart in figure 2), we can answer the research question RQ1, which meanstransport is perceived by project managers as the most important parameter for improving environmental sustainability of projects in India.

Table 2: Results of chi-square tests and symmetric measures between number of projects and parameters of environmental sustainability

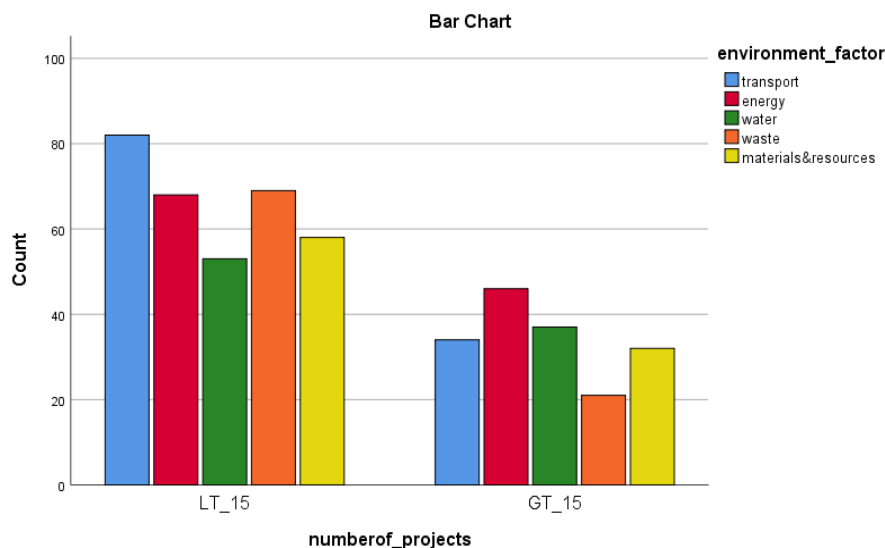|	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.874	4	0.043
Likelihood Ratio	10.089	4	0.039
Linear by Linear Association	0.044	1	0.834
Nominal by Nominal Phi	0.141		Approximate Significance is 0.043
Nominal by Nominal Cramer's V	0.141		Approximate Significance is 0.043
N of valid cases	500		
The min. expected cell count is 30.60			

Figure 2: Bar chart of parameters of environmental sustainability and count of number of projects

3.4 Chi square between age group of project manager and parameters of social sustainability

The p-value for chi-square between three age groups of project managers and five parameters of social sustainability of projects is 0.069 (see table3) which is greater than 0.05.

Thus, we can say that p-value is not statistically significant. So, we don't reject the Null Hypothesis H022. We can infer thatthe varied experience level in form of age of projectmanagers has no effect on choosing appropriate parameter for improving social sustainability of projects in India i.e. NULL hypothesis Ha22 is to be rejected. This part of analysis answers the research question RQ5.

Phi value and Cramer's V value are also not statistically significant with p-value as 0.069 in each test (see table 3)

Table 3: Results of chi-square tests and symmetric measures between age groups and parameters of social sustainability

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.542	8	0.069
Likelihood Ratio	14.099	8	0.079
Linear by Linear Association	1.459	1	0.227
Nominal by Nominal Phi	0.171		Approximate Significance is 0.069
Nominal by Nominal Cramer's V	0.121		Approximate Significance is 0.069
N of valid cases	500		
The min. expected cell count is 8.70			

3.5 Chi squarebetween age group of respondents (project managers) and parameters of environmental sustainability

The p-value for chi-square between three age groups of respondents (project managers)and five parameters of environmental sustainability of projects is significantly less than 0.05.

Thus, we can say that p-value is statistically significant and reject the Null Hypothesis H021. We can say that the varied experience level in form of age of project manager has an effect on choosing appropriate parameter for improving environmental sustainability of projects in India i.e. alternate hypothesis Ha21 is to be accepted. This part of analysis answers the research question RQ6.

The Phi value and Cramer's V value are statistically significant with p-value less than 0.05 in each test. The strength of relationship is although only 25.9 % and 18.3 % respectively by Phi and Cramer's V test.

Table 4: Results of chi-square tests and symmetric measures between age groups and parameters of environmental sustainability

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.456	8	0.000
Likelihood Ratio	33.496	8	0.000
Linear by Linear Association	7.324	1	0.007
Nominal by Nominal Phi	0.259		Approximate significance is 0.000
Nominal by Nominal Cramer's V	0.183		Approximate Significance is 0.000
N of valid cases	500		
The min. expected cell count is 13.50			

3.6 Correspondence analysis between age groups of project managers and parameters of environmental sustainability for data reduction.

As can be seen in the biplot(figure 3) obtained after running correspondence analysis in SPSS, the observations are that less than 34 age group of project managers

prefer to focus on parameters of water as well as materials & resources for environmental sustainability of projects in India. The project managers further give more preference to water than materials & resources because in biplot, distance between point of LT_34 variable and point of water variable is less than the distance between point of LT_34 variable and point of Materials&Resources variable.

Further from same biplot, on similar reasoning, we can state that between 34 and 44 age group respondents (project managers) prefer parameter waste and those greater than 44 age group respondents prefer parameter energy for environmental sustainability of project in India.The parameter transport is, however, preferred almost equally by all respondents because in biplot, the point of transport variable is almost equidistant from each point of age group variable.
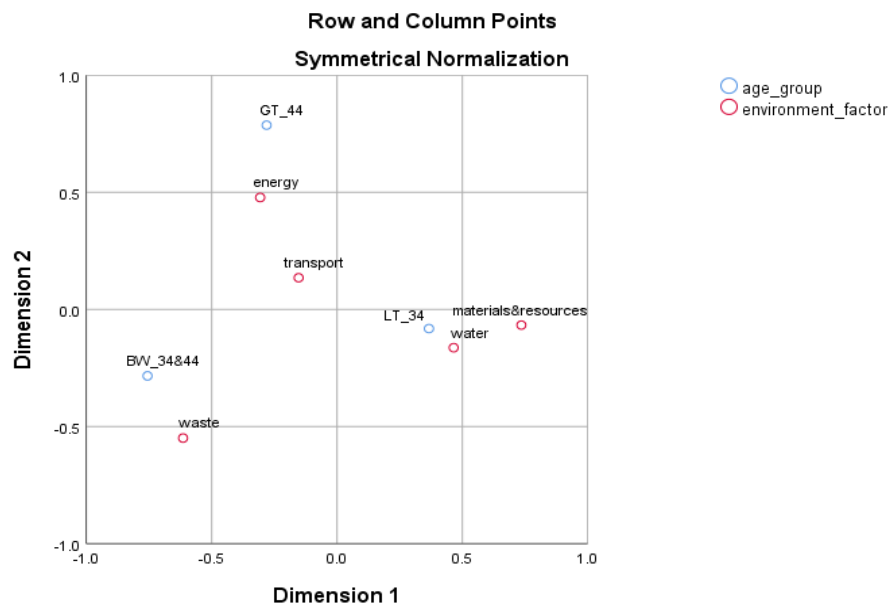

Figure 3: Biplot of age group of project manager and parameters of social factors from correspondence analysis

3.7 Correspondence analysis between age groups of project managers and parameters of social sustainability

The biplot (Figure 4), obtained after running correspondence analysis in SPSS, the observations are that less than 34 age group of project managers prefer to focus on parameters of relationship with society & customers and with vendors & suppliers for social sustainability of projects in India. The project managers further give more preference to relation with society & customers because in biplot (figure 4), distance between point of LT_34 variable and point of relationship with society&customer variable is less than the distance between point of LT_34 variable and point of relationship with vendors&suppliers variable.

Further from same biplot, on similar reasoning, we can state between 34 and 44 age group respondents (project managers) prefer parameter ethical behaviour and those greater than 44 age group respondents do not have any particular preference. Parameter human rights is preferred almost equally by all age groups. Parameter labour is preferred almost equally by GT_44 and LT_34 age group variables. And parameter labour is preferred least by BW_34&44 age group variable.
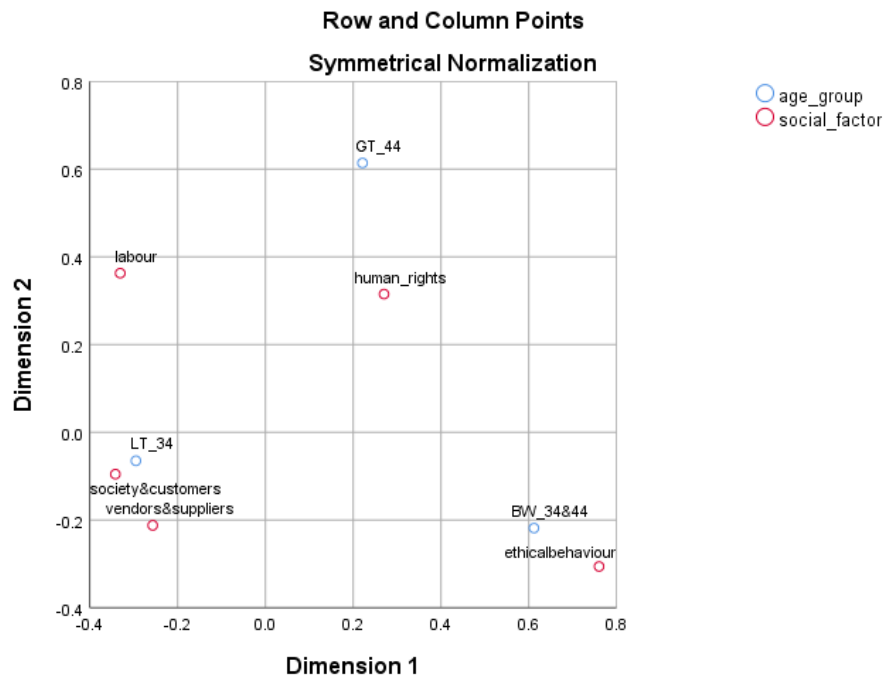
Figure 4: Biplot of age group of project manager and parameters of social factors from correspondence analysis

4. CONCLUSION

The work experience being considered a function of time, intensity and quality of work can, through medium of this research, be considered a function of only intensity in the form of number of projects completed if quality remains constant.

The respondents i.e. project managers, who have different work experience as measured by number of projects completed by them so far in their career had also different age groups.

The respondent's age groups could not give a statistically significant result when choosing the right parameter for environmental and social sustainability. Although, statistically significant result was obtained in case of parameters of environmental sustainability versus age groups, there was statistically not significant result in case of social sustainability parameters and age groups. So, we infer that work experience when measured in terms of age groups does not give significant relationship with choosing the right parameters for sustainability of projects.

The respondent's intensity of work experience measured in terms of number of projects completed was able to give statistically significant relationship with the choice of parameters for sustainability of projects.

Thus, the authors conclude that work experience of project managers is a function of number of projects done by them and is not a function of time spent on projects or gaining experience with age provided the assumption that quality of projects is constant for all projects stands true.

We can further specifically conclude that in India, the parameter to be given most importance for social sustainability of project will be relationship with vendors and suppliers. Similarly, the parameter that is to be given most importance for environmental sustainability will be transport.

The correspondence analysis further gives specific preferences for different age groups of project managers towards the choice of parameters for sustainability of project in India. It can be concluded that

less than 34 years of age respondents prefer parameter water for environmental sustainability and parameter relationship with society & customers for social sustainability whereas greater than 44 years of age respondents prefer parameter energy for environmental sustainability and no specific preference for parameter of social sustainability. Further the author states that the project managers between 34 and 44 years of age prefer waste for environmental sustainability and parameter ethical behaviour for social sustainability of projects in India.

5. FUTURE SCOPE

This research was done in context of Indian project managers and may be reproduced with different context in different countries, which may then be furtheraggregated to give a generalized result.

6. REFERENCES

1. Brones, F.,Monteiro de,M. C., & Zancul, E. de, S.(2014). Eco-design in project management: A missing link for the integration of sustainability in product development. *Journal of Cleaner Production*, 1-36.https://doi.org/10.1016/j.jclepro.2014.05.088
2. Daneshpour, H.,& Takala, J. (2017). Decision making towards integration of sustainability into project management: a multilevel theory building approach. *Management and Production Engineering Review* (8)3, 13–21. https://doi.org/10.1515/mper-2017-0024
3. Koke, B., &Moehler, R. C. (2019). Earned Green Value management for project management: A systematic review.*Journal of Cleaner Production*, 230, 180-197. https://doi.org/10.1016/j.jclepro.2019.05.079
4. Martens, M.L., &Carvalho, M.M. (*2016)*. The Challenge of Introducing Sustainability into Project Management Function: Multiple-Case Studies. *Journal of Cleaner Production*, 12-39. https://doi.org/10.1016/j.jclepro.2015.12.039
5. Sánchez, M. A. (2014). Integrating sustainability issues into project management.*Journal of Cleaner Production*, 1 -12. https://doi.org/10.1016/j.jclepro.2013.12.087
6. Silvius, G., & Schipper, R.(2019).Planning Project Stakeholder Engagement from a Sustainable Development Perspective.*Administrative Sciences(9)*, 46. https://doi.org/10.3390/admsci9020046
7. Talbot, J.,&Venkataraman, R., (2011).Integration of Sustainability Principles into Project Baselines Using A Comprehensive Indicator Set.*International Business & Economics Research Journal*, *10*(9), 29-40. https://doi.org/10.19030/iber.v10i9.5624
8. Yu,M., Zhu, F., Xiaotian, Y., Wang, L., &Sun, X. (2018).Integrating Sustainability into Construction Engineering Projects: Perspective of Sustainable Project Planning.*Sustainability* (*10*), 784. https://doi.org/10.3390/su10030784

ADDITIONAL READINGS

9. Bassham, Anna (2019, January 13). How should you measure work experience? Guru. https://www.guru.com/blog/measure-work-experience/
10. Madan, M., &Sahai, A. (2019). Introduction of environment management knowledge area in PMBOK (Project Management Body of Knowledge): A preliminary study. *Balkans Journal of Emerging Trends in Social Sciences, 2, 124-133.* *https://doi.org/10.31410.Balkans.JETSS.2019.2.2.124-133*