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## Factors affecting acceptance of biogas stove by rural women

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### Abstract

A study was conducted in Samastipur district of Bihar to identify the factors affecting acceptance of biogas stove by rural women. The result indicated that there was positive and significant correlation of communication variables and psychological variables with the acceptance. It was also found that constraints were mainly inhibiting its acceptance. Technical constraint was most important variable affecting directly. Organisational, operational and socio-cultural constraints were other important variables inhibiting acceptance of biogas stove.

**Keywords:** Acceptance, Biogas stove, Rural Women, Constraints, Path analysis

### Introduction

Biogas technology is a boon for women in rural India. It saves the consumption of kerosene, charcoal and wood, which are depleting very fastly. It avoids the need to collect firewood and twigs and thus saves the labour of women in rural areas who normally spend considerable time and energy to cover long distances daily to collect fuel. Besides these biogas is a cheap, smokeless, hygienic fuel which reduces health hazards. Though, biogas technology is having many advantages, the response of the people towards this, so far have been poor and the progress achieved is not encouraging. As the success or failure of any technology would mainly depend upon its acceptance by the intended group, the present study was undertaken with the objective to identify the factors affecting the acceptance of biogas stove by the rural women.

### Methodology

The study was conducted in Samastipur district of Bihar. Selection of district, blocks and villages included those where work on biogas was done. Proportionate random sample of 120 rural women were selected for the study. The statistical tests employed were correlation and path analysis.

### Two sets of crucial factors were taken as independent variables as below:

1. The variables such as age, family education, socio-economic status (Caste, occupation, education, social participation, land holding, family type, family size, herd size, income, material possession), farm experience, communicational variable (information source, mass media exposure and extension contact) and psychological variable (innovation proneness, risk orientation and economic motivation).
2. The constraints that affect the acceptance of biogas stove included technical, operational, socio-cultural, economic, situational and organisational. For the purpose of seeing the effect, the aggregate of weighted scores obtained by each respondent was taken for all the categories of constraints as well as for total constraints.

### Results and Discussion

Correlation analysis (Table 1) revealed that there was positive and significant correlation of communication variable and psychological variable with the acceptance of biogas stove. As scores on communication variables and psychological variable increase, rural women become

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more aware of the advantage and positive effect of biogas plant. Their knowledge about this technology increases and misconceptions are removed. Their attitude changes from negative to positive and thus these all contribute to higher acceptance of biogas technology. Singh (1983) [5] also found positive correlation with respect to communicational variables. Chahal (1995) [1] supported that overall psychological variables were associated with perceived acceptability index of biogas technology.

**Table 1:** Correlation of crucial factors with acceptance of Biogas stove

Crucial factors		Correlation co efficient
Age	(X <sub>1</sub> )	-0.1146
Family education	(X <sub>2</sub> )	0.0341
SES	(X <sub>3</sub> )	0.0925
Farm experience	(X <sub>4</sub> )	-0.0773
Communicational variable	(X <sub>5</sub> )	0.6240*
Psychological Variable	(X <sub>6</sub> )	0.5815*

r, tabulated value = 0.1799 at 5% level of significance for 118 d.f.

Table 2 indicated that with respect to constraints, there was negative and significant correlation of all the constraints with the acceptance of biogas stove except situational constraint where there was also negative correlation but not significant. It means that there is significant increase in acceptance of biogas stove with a decrease in all the constraints. It is evident that these are mainly the constraints which are inhibiting the acceptance of biogas technology by rural households. If these constraints are removed then the acceptance of biogas technology will automatically increase. It is supported by the

findings of Rao and Ramana (1984) [4], Nag *et al.* (1986) [3], Tawde and Ranmare (1990) [6], Kute (1993) and Chahal (1995) [1].

**Table 2:** Correlation of constraints with acceptance of Biogas stove

Constraints		Correlation co efficient
Educational & communicational	(X <sub>7</sub> )	-0.6840*
Technical	(X <sub>8</sub> )	-0.7082*
Operational	(X <sub>9</sub> )	-0.6409*
Socio-cultural	(X <sub>10</sub> )	-0.6740*
Economic	(X <sub>11</sub> )	-0.6588*
Situational	(X <sub>12</sub> )	-0.0434*
Organisational	(X <sub>13</sub> )	-0.6566*
Total Constraints	(X <sub>14</sub> )	-0.6943*

r, tabulated value = 0.1799 at 5% level of significance for 118 d.f.

The result of path analysis (Table 3) indicated that the highest direct effect on acceptance of biogas stove was exerted by technical constraint (-0.39) followed by educational & communicational constraints (-0.281).

The variable total constraint exerted highest total indirect effect (-0.882) followed by organisational constraint (-0.86) and operational constraint (-0.594) respectively. The first largest indirect effects were of variables namely total constraint, operational constraint, socio-cultural constraint and organisational constraint in order of sequence. It was also interesting to note that majority of the substantial indirect effect were channelized through technical constraint while technical constraint itself was passed through "educational and communicational" constraint.

**Table 3:** Path coefficients showing the effects of crucial factors on acceptance of Biogas stove

Sl. No.	Crucial factors		r-value	Direct effect	Total indirect effect	Substantial indirect effect
1	Age	(X <sub>1</sub> )	-0.115	-0.003	-0.112	-0.063 X <sub>8</sub> -0.035 X <sub>7</sub> 0.026 X <sub>14</sub>
2	Family Education	(X <sub>2</sub> )	0.034	-0.071	0.105	0.058 X <sub>8</sub> 0.047 X <sub>7</sub> -0.038 X <sub>13</sub>
3	SES	(X <sub>3</sub> )	0.092	-0.067	-0.026	-0.029 X <sub>2</sub> -0.024 X <sub>8</sub> 0.011 X <sub>5</sub>
4	Farm Experience	(X <sub>4</sub> )	0.077	0.010	0.066	-0.058 X <sub>8</sub> -0.026 X <sub>7</sub> 0.020 X <sub>14</sub>
5	Communication Variable	(X <sub>5</sub> )	0.624*	0.103	0.521	0.304 X <sub>8</sub> 0.230 X <sub>7</sub> -0.169 X <sub>13</sub>
6	Psychological Variable	(X <sub>6</sub> )	0.582*	0.086	0.496	0.281 X <sub>8</sub> 0.219 X <sub>7</sub> -0.156 X <sub>13</sub>
7	Educational & Communicational constraints	(X <sub>7</sub> )	-0.684*	-0.281	-0.403	-0.334 X <sub>8</sub> 0.186 X <sub>13</sub> 0.176 X <sub>14</sub>
8	Technical constraints	(X <sub>8</sub> )	-0.708*	-0.391	-0.317	-0.240 X <sub>7</sub> 0.176 X <sub>13</sub> 0.173 X <sub>14</sub>
9	Operational constraints	(X <sub>9</sub> )	-0.641*	-0.047	-0.594	-0.343 X <sub>8</sub> -0.232 X <sub>7</sub> 0.176 X <sub>13</sub>
10	Socio-cultural constraints	(X <sub>10</sub> )	-0.674*	-0.164	-0.51	-0.342 X <sub>8</sub> -0.255 X <sub>7</sub> 0.192 X <sub>13</sub>
11	Economic constraints	(X <sub>11</sub> )	-0.658*	-0.141	-0.517	-0.329 X <sub>8</sub> -0.249 X <sub>7</sub> 0.189 X <sub>13</sub>

12	Situational constraints	(X <sub>12</sub> )	-0.043	0.086	-0.129	0.059 X <sub>7</sub>
						0.056 X <sub>14</sub>
						0.054 X <sub>8</sub>
13	Organisational constraints	(X <sub>13</sub> )	-0.657*	0.203	-0.86	-0.339 X <sub>8</sub>
						-0.258 X <sub>7</sub>
						0.181 X <sub>14</sub>
14	Total Constraints	(X <sub>14</sub> )	-0.694*	0.188	-0.882	-0.361 X <sub>8</sub>
						-0.265 X <sub>7</sub>
						-0.197 X <sub>13</sub>

Residual effect = 0.447571

On the basis of above, it can be confirmed that technical constraint was most important variable affecting directly the acceptance. It had also provided a way for most of the variables in exerting their substantial indirect effect. It was also observed that organisational, operational and socio-cultural constraints exerted higher total indirect effect and also larger substantial indirect effects in negative direction. Therefore, these constraints were also important.

It can be seen that these are the constraints which are mainly influencing the acceptance of biogas technology by rural women both individually and collectively. Although contributory factors are there like communicational variable and psychological variable which are affecting acceptance positively, but the effect of these contributory factors are suppressed by all the constraints. The government and agencies concerned with energy, must observe this point. In place of increasing the coverage, they should provide facilities for quick requiring of old and sick plants already installed earlier so that these can create positive impact on the attitude of surrounding inhabitants and act as a source of motivation for other to accept and adopt the technology. Similarly, constraints must be taken care of unless the solution to these problems is given, the propagation of biogas technology will have serious set back.

There is also an urgent need to train the rural women the skill to use, understand and maintain the biogas technology through a massive multimedia information campaign and extensive educational programme to overcome the barriers toward using biogas as a fuel aimed at reducing their drudgery and upgrading standard of living in rural areas.

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