

Technological Changes impact over Small-Scale industries promotion in India; An Empirical analysis among the perceptions of small-scale entrepreneurs

¹Mr.D.Sudhir Babu, Asst.Professor,
Vignans Foundation for Science Technology and Research,
Guntur, Andhra Pradesh, sudhir_dalavai@yahoo.com,

²Dr.B.K.Surya Prakasha Rao, Professor,
Department of Management Sciences,
R.V.R. & J.C. College of Engineering,
Chowdavaram, Guntur, Andhra Pradesh

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Abstract

The implementation and usage of technology attains a competitive advantage in the business firms received a great attention in the recent years. The studies of Niederman, Brancheau and Wetherbe revealed that the topic of change of technology and the problems related to the technological changes in the small-scale industry. The increasing number of small-scale firms which are intended to adopt the new technology and upgrade themselves is another reason which provokes to think of the small-scale industry and its adoptability levels. The technological changes can bring the competitive advantage and forms the better relations with all its stake holders of business. Technically compatible firms only can attain the competitive advantage and survive in the excessive competition. Many of the firms started adopting the technological changes in their firms, this phenomenon

is quite good in the large and medium scale sector but in the small-scale sector the momentum is low. Further the adoption of technology and their impact over the different dimensions of the firms have been empirically proved by many researchers.

Key Words: Small-scale industry, Technology development, Effective Production, promotion of SSIs.

Introduction

In the recent years, many policies and procedures have been framed for the sake of technology diffusion in many developed and emerging economy countries too. The actual diffusion of technology has been related with various aspects in the small-scale sector such as, industrial competitiveness, effective productivity, growth of economy, business development, enhanced flexibility in the business process, quality enhancement and to attain the all-round development. In this connection, the small-scale sector units are focusing on adoption of technology to their units and taking such measures as they are not relying only on making the policies but strictly adhere to the implementation to attain the effective results. Enough care has been provided by the entrepreneurs to procure the infrastructure facilities to adopt technology successfully.

The following subsections explain the various aspects such as, the nature and meaning of technology diffusion and the broad categories of technology diffusion measures. Thereafter, the policies to be framed for the effective implementation in small-scale industries are presented. The review of technology diffusion practices of small-scale industries in the different countries is presented in the scholarly manner.

Research Problem:

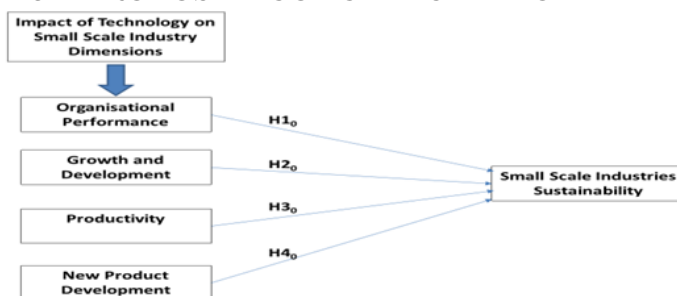
There is an abundant literature on the effectiveness of technological changes in the large-scale industries, the studies of Leonard-Barton and Sinha (1993) revealed that the technological adoption process is high in the large-scale industries as they done their research work on 34 software companies. The technological changes adoptability in the high machinery industry is analysed by taking in to the consideration of the research carried out in Ford Motors, Chapparral Steel and Hewlett Packard (Leonard-Barton, 1992).

The recent past literature stated that, little empirical evidences were found on the aspects of how to procure the organisational

learning which is required for the small-scale industry and to adopt (Weterbe, 1990). The lack of general theoretical or the ineffective organisational framework for the process of adopting the technological changes leads to create a milieu and caused for the mixed and inconclusive research results in this area (Moore and Benbasat, 1991).

The research in the domain of the small-scale industries in India is very scant. There are abundant studies on the various practices of the large-scale industries in India. Many other studies also revealed about the impact of technology on the effectiveness of large-scale industries. There is no a focused study on the small-scale industry, specifically to understand its problems in adopting the technology in both the manufacturing and service sectors small-scale industries. Hence, it is required to understand the technological aspects adoptability in the domain of small-scale industries in the Indian context.

3.1 PROPOSED CONCEPTUAL MODEL



Research Methodology

Research Questions

Based on the available past research findings the researcher framed the conceptual frame work and derived some research questions as mentioned below:

1. What are the critical factors affecting by the technological changes in the small and medium organisations?
2. Do the changes bring by technology in organisational performance effect the small-scale industries sustainability?
3. Do the changes bring by technology in growth and development effect the small-scale industries sustainability?

4. Do the changes bring by technology in productivity effect the small-scale industries sustainability?

5. Do the changes bring by technology in new product development effect the small-scale industries sustainability?

Hypotheses of the Study

The critical factors of this concerned study is explored form the past research this study is considered as an exploratory study. Hence the hypotheses are framed in null form and they are as follows:

H10: Technology changes in the organisational performance will not have significant effect on sustainability.

H20: Technology changes in the growth and development will not have significant effect on sustainability.

H30: Technology changes in the productivity will not have significant effect on sustainability.

H40: Technology changes in the new product development will not have significant effect on sustainability.

Research Design

The researcher adopted both qualitative and quantitative research approaches to identify the critical factors related to this study and then to examine the impact of technological changes in organisational performance, growth and development, productivity and new product development on small and medium scale industry sustainability. An exploratory study was conducted in the qualitative research approach. A semi-structured questionnaire was used to conduct the personal interviews with the small-scale industry entrepreneurs. The researcher interacted with ten small-scale industry entrepreneurs in their free time and try to attain the appropriate information about the critical factors which can be implemented by technological changes in the concerned sector and their impact over the sustainability of the business units.

Data Analysis and Results

Respondents Socio-economic and Demographic Characteristics
The small-scale entrepreneurs data was analysed and it revealed that, there are 171 (68.1 percent) respondents are male and 79 (31.5 percent) are female. The major chunk of the respondents 99 (39.4 percent) are in the age band of 35-45 years and 67 (26.7 percent) are in the band of 25-35 years. This is clearly indicating that young population are coming forward to establish the small-

scale business units in this area. 61 (24.3 percent) respondents had the age of 45-55 years and merely 23 (9.2 percent) of the respondents are more than 55 years of age. Majority of the participants in the study 227 (90.4 percent) are married and very few 23 (9.2 percent) are unmarried entrepreneurs, which indicates that majority of the married population only showing interest to establish and ready to take the risk to establish the small-scale units in India. More of the respondents 147(58.8 percent) are in the manufacturing sector, 85 (34 percent) are in the service sector and a negligible portion 18 (7.2 percent) are in the other type of business units.

Among the respondents 148 (59.2 percent) are graduates, 90 (36 percent) of the respondents had SSC as their minimum qualification. 12 (4.8 percent) of the respondents are post graduates. Hence, we can conclude that degree holders are much interested towards the establishment of own business firms in India.

Out of all the respondents, 83 (33.1 percent) are earning Rs 20,000 30,000 in a month and 84 (33.5 percent) of the respondents are earning between Rs 30,000 40,000 in a month, 60 (23.9 percent) of the participants of this survey are earning Rs 40,000 50,000 per month and 23 (9.2 percent) of them are earning more than Rs 50,000 per month.

The size of the family of the respondents also analysed in the demographic segmentation and the statistics revealed that, 132 (52.6 percent) of the respondents had 3-4 members in their family, 62 (24.7 percent) of the respondents had 4-5 members in their family, 31 (12.4 percent) had 2-3 members in their family, 18 (7.2 percent) had more than five members in their family and merely 7 (2.8 percent) of the respondents had 1-2 members in their family. Regarding the business experience, 93 (37.1 percent) of the respondents had 0-2 years of experience, 91 (36.3 percent) had 2-5 years of experience, 31 (12.4 percent) had 5-10 years of experience and 35 (13.9 percent) had more than 10 years of experience. The demographic and socio-economic data analysis results i.e the questions from 1-8 of the questionnaire are presented in Table 5.1 and the graphical representation also shown in Table - 1.

Table 1: Respondents Demographic Profiles.

Demographic Description		Frequency	Percentage
Gender	Male	171	68.1
	Female	79	31.5
Age	25 - 35 Yrs	67	26.7
	35 - 45 Yrs	99	39.4
	45 - 55 Yrs	61	24.3
	above 55 yrs	23	9.2
Marital Status	Married	227	90.4
	UnMarried	23	9.2
Type of Business	Manufacturing	147	58.8
	Service Sector	85	34
	Others	18	7.2
Qualification	SSC/Diploma	90	36
	Degree/B.Tech	148	59.2
	P.G	12	4.8
Monthly Income	Rs 20000 - 30000	83	33.1
	Rs 30000 - 40000	84	33.5
	Rs 40000 - 50000	60	23.9
	above Rs 50000	23	9.2
Family Size	1-2 Members	7	2.8
	2-3 Members	31	12.4
	3-4 Members	132	52.6
	4-5 Members	62	24.7
	5 and above	18	7.2
Experience	0to2 years	93	37.1
	2to5 years	91	36.3
	5to10 years	31	12.4
	above 10 years	35	13.9

Source: Primary data

Inferential Statistics

H_{10} : Organisational Performance will not have significant effect on SSIs sustainability

The proposed hypothesized association between the organisational performance to the technological change and its impact over small-scale industries sustainability is tested with using simple linear regression analysis (SLRA). The SLRA results are tabulated in table no - 2 and disclosed that the predictor variables contribute significantly and had moderate impact on sustainability ($R^2 = 0.368$). The corresponding ANOVA value ($F = 139.429$, $p=0.000$) for the regression models had indicated the validation with sustainability.

Table 2 Regression Model Summaries for the Organisational Performance on Sustainability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Results			
					F-Value	df1	df2	Sig.
1	0.607 ^a	0.368	0.366	0.41935	139.429	1	239	0.000

a. Predictors: (Constant), Organisational Performance

The coefficient summary shown in Table 3 revealed that beta values of organisational performance ($\beta=0.485$, $t=11.808$, $p=0.000$) was significant predictor of sustainability. The results were implicit that predictor variable was related with dependent variable. Hence, null hypothesis was disproved and alternate hypothesis ($H1_a$) was accepted as their p-values were less than 0.05.

Here is the following simple linear regression model:

$$\text{Sustainability (Y)} = 2.227 + 0.485 (\text{Organisational Performance}) X$$

Table 3: Predictor effects and Beta Estimates (Unstandardized) for Sustainability associated with Organisational Performance

Model	Variable	Unstandardized Coefficients		Standardized Coefficients Beta	t-Value	Sig.
		B	Std. Error			
1	(Constant)	2.227	0.159	--	14.012	0.000
	Organisational Performance	0.485	0.041	0.607	11.808	0.000

a. Dependent Variable: Sustainability

$H2_0$: Growth and Development will not have significant effect on SSIs sustainability

The proposed hypothesized association between the growth and development to the technological change and its impact over small-scale industries sustainability is tested with using simple linear regression analysis (SLRA). The SLRA results are tabulated in table no - 4 and disclosed that the predictor variables contribute significantly and had moderate impact on sustainability ($R^2 = 0.199$).

The corresponding ANOVA value ($F = 59.475$, $p = 0.000$) for the regression models had indicated the validation with sustainability.

Table 4 Regression Model Summaries for the Growth and Development on Sustainability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Results			
					F-Value	df1	df2	Sig.
1	0.446 ^a	0.199	0.196	0.47219	59.475	1	239	0.00
a. Predictors: (Constant), Growth and Development								

The coefficient summary shown in Table - 5 revealed that beta values of growth and development ($\beta = 0.253$, $t = 7.712$, $p = 0.000$) was significant predictor of sustainability. The results were implicit that predictor variable was related with dependent variable. Hence, null hypothesis was disproved and alternate hypothesis (H2a) was accepted as their p-values were less than 0.05.

Here is the following simple linear regression model:

$$\text{Sustainability (Y)} = 3.190 + 0.253 (\text{Growth and Development}) X$$

Table 6: Predictor effects and Beta Estimates (Unstandardized) for Sustainability associated with Growth and Development

Model	Variable	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.190	0.119	--	26.828	0.000
	Growth and Development	0.253	0.033	0.446	7.712	0.000
a. Dependent Variable: Sustainability						

H_{3_0} : Productivity will not have significant effect on SSIs sustainability

The proposed hypothesized association between the productivity of the organisation to the technological change and its impact over small-scale industries sustainability is tested with using simple linear regression analysis (SLRA). The SLRA results are tabulated in table no - 7 and disclosed that the predictor variables contribute significantly and had moderate impact on sustainability ($R^2 = 0.160$). The corresponding ANOVA value ($F = 15.236$, $p = 0.000$) for the regression models had indicated the validation with sustainability.

Table 8 Regression Model Summaries for the Productivity on Sustainability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Results			
					F-Value	df1	df2	Sig.
1	0.245 ^a	0.160	0.156	0.51163	15.236	1	239	0.00

a. Predictors: (Constant), Productivity

The coefficient summary shown in Table 9 revealed that beta values of productivity ($\beta = 0.228$, $t = 3.903$, $p = 0.000$) was significant predictor of sustainability. The results were implicit that predictor variable was related with dependent variable. Hence, null hypothesis was disproved and alternate hypothesis ($H3a$) was accepted as their p-values were less than 0.05.

Here is the following simple linear regression model
Sustainability (Y) = 3.109 + 0.228 (Productivity) X

Table 10: Predictor effects and Beta Estimates (Unstandardized) for Sustainability associated with the Productivity

Model	Variable	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.109	0.250	--	12.438	0.000
	Productivity	0.228	0.058	0.245	3.903	0.000

a. Dependent Variable: Sustainability

$H4_0$: New Product Development will not have significant effect on SSIs sustainability

The proposed hypothesized association between the new product development of the organisation to the technological change and its impact over small-scale industries sustainability is tested with using simple linear regression analysis (SLRA). The SLRA results are tabulated in table no - 11 and disclosed that the predictor variables contribute significantly and had moderate impact on sustainability ($R^2 = 0.223$). The corresponding ANOVA value ($F = 68.527$, $p=0.000$) for the regression models had indicated the validation with sustainability.

Table 12 Regression Model Summaries for the New Product Development on Sustainability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Results			
					F-Value	df1	df2	Sig.
1	0.472 ^a	0.223	0.220	0.46519	68.527	1	239	0.00

a. Predictors: (Constant), Productivity

The coefficient summary shown in Table 13 revealed that beta values of new product development ($\beta=0.382$, $t=8.278$, $p=0.000$) was significant predictor of sustainability. The results were implicit that predictor variable was related with dependent variable. Hence, null hypothesis was disproved and alternate hypothesis (H4a) was accepted as their p-values were less than 0.05.

Here is the following simple linear regression model

$$\text{Sustainability (Y)} = 2.547 + 0.228 (\text{New Product Development}) X$$

Table 14: Predictor effects and Beta Estimates (Unstandardized) for Sustainability associated with the New Product Development

Model	Variable	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.547	0.187	--	13.609	0.000
	New Product Development	0.382	0.046	0.472	8.278	0.000

a. Dependent Variable: Sustainability

Conclusions of the Study

The present study has demonstrated that organisational performance, growth and development, productivity and new product development are the factors which can effect drastically by the change in the technology which can be adopted by the small-scale industries. The sustainability of the small-scale industry is considered as the dependent variable of the study. The impact of technology on small-scale industry dimensions are considered as organisational performance, growth and development, productivity and new product development. The affect of technology on small-scale industry dimensions of organisational performance, growth and development, productivity and new product development were test on small-scale industries sustainability. The results elicit that, all the attributes are significant predictors, but the effect of productivity, organisational performance and new product development process have more impact over small-scale industries sustainability and the factor of growth and development had moderate impact.

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