Implementation and Impact Assessment of an Innovative Approach of ICT Intervention in Art and Craft Design: Case Study of Select Rural Women of Uttarakhand

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Abstract: The novelty of present approach is bringing together the rural women, their unstructured mechanism of apparel production, indigenous raw material of bamboo and ringaal, inspiration from Uttarakhand’s rich inherent art and craft culture. ICT (Information and Communication Technology) has been used to provide the missing link covering the entire approach from design conceptualization to market sale. This paper presents innovative approach of leveraging the potential of ICT to systematically develop the craft design talent amongst identified group of rural women, towards enhanced income generation opportunities, possibly opening up avenues to competitive global trade. Implementation of this approach on identified 25 beneficiaries has been presented. Using statistical techniques the overall impact of the ICT intervention using effect size has been computed.

Keywords: Information and Communication Technology, Rural Women Technology Park, Art and Craft Design Technology, Technological Empowerment, Socio-economic Development, Effect size, Impact factor.

I. INTRODUCTION

Department of Electronics & Information Technology, Govt. of India has initiated “Digital India” Programme in July 2015. The sub initiatives under Digital India Programme (Broadband Highways, Universal Access to Phones, Public Internet Access Programme, E-Governance – Reforming government through Technology, eKranti – Electronic delivery of services, Information for All Electronics Manufacturing, Electronics Manufacturing – Target NET ZERO Imports, IT for Jobs, Early Harvest Programme), emphasize on the accessibility of government services to people by improving online framework and network connectivity (GoI, 2015).

ICT plays a crucial role in facilitating access to government services. e-Services offered in different areas are notable implementation of ICT. ICT in art and craft design is an emerging area of experience for both pupils and teachers. ICT applications are widely prevalent in every sector including economic development, rural development, education, and business/IT. As an enabler ICT has transformed every sector of society contributing significantly to its progress (Cohen, Garibaldi & Scarpetta, 2004). Malaysia and Australia have successful models of ICT integration with rural development processes (Moghaddam B. Khalil and Khatoon-Abadi A., 2013). UNDP (United Nations Development Program) in India has encouraged establishment of ICT centers in rural areas, as part of its new sustainable development agenda of Sep. 2015 (UNDP, 2015). Though ICT has been greatly exploited in email, marketing, business development, etc. and in providing easy access to markets, particularly very little intervention is reported in the art & craft design sector, specifically for innovation in designs. With large number of rural population engaged in craft design related activities (officially or unofficially), it emerges out as a potential area for possible intervention. With second highest source of employment after agriculture, handicraft sector estimates seven million official artisans in India, and unofficially 200 million people are engaged in this sector (Tiwari, 2013; Crafts Council of India, 2011). In the lap of Greater Himalayas with tropical species of flora and fauna and Himalayan alpine meadows the people of state of Uttarakhand have created and nurtured various forms of art and craft since ages. Distinctive touch of nature can be seen in the art designs, made by these rural folks. Additional to its rich heritage of various art and craft, Uttarakhand also has unique raw material such as Ringaal and Rambaans (Botanical Name: Agave Sisalana). Various other forms of art & craft prevalent here are Copperwares, Wooden Craft, Aipan craft and Wax work. Out of an estimated $4 billion of global market for handicraft India is sharing below 2% (Government of Uttarakhand, 2015). The main problem identified in handicraft industry in India is market linkage on supply side.
because of no market alignment; one of the possible methods to handle this issue is to promote use of ICT (GoI. Press Information Bureau. Technology Parks for Women). Survey of literature reveals some ICT interventions undertaken in recent past, particularly concerning facilitation of market linkage. ‘e-Krishok’, a 360 degree ICT enabled extension that provides online market linkage for farmers & SMEs in Bangladesh (e-Krishok 2009). There are several online mechanisms available to source craft products from rural artisans to sell them to international and domestic buyers, few of them are MyMela.com, Anokhee, and Shopify.com etc. Some efforts are also seen in promotion of craft development, focused particularly towards rural women empowerment. Directorate of Industries, Uttarakhand has taken an initiative to empower the women entrepreneurs of Uttarakhand and launched an online portal Himani.org, where sellers can register their profile (Government of Uttarakhand, 2015). According to Dasra report (Dasra report, 2013) craft value chain includes activities to bring up a craft article from conception through production to delivery to consumers. The craft production have an added advantage of low energy demand since maximum raw material used is natural and organic contributing low carbon footprint (Emani, Sriram, 2014). It is encouraging that, planning commission, Government of India is expecting to enlarge the handicrafts production and exports between 2012 and 2017, where exports are projected to grow at the compounded annual rate of 18 per cent per year (GoI, 2012). This research work is organized as follows: next section presents background information regarding various initiatives concerning the use of ICT so far and its potential that can be leveraged in craft innovation and design. Third section presents the detail of the sponsored project under which this research work is carried out. Fourth section covers the complete approach used for implementing the research work including locale of survey, availability of raw material, government’s offerings for rural women, role of ICT in providing missing link, methodology used and implementation. Fifth section on research findings and discussion presents computation of effect size concluding the overall impact of ICT intervention, and sixth section presents replication potential and seventh last section outlines future scope and recommendation.

II. BACKGROUND

The small scale industries (SSI) in Uttarakhand have grown by 29% between FY (Financial Year) 2002 – FY 2007 (PHD Research Bureau, 2011). Economic policy of Uttarakhandis focused on handicrafts and handloom sectors for enhancing skill levels and employability with development of SSI (PHD Research Bureau, 2011). ICT (Information and Communication Technology) is emerging as a potential tool for sustainable development, technological empowerment, socio-economic development and skill enrichment in rural areas worldwide (ITU, 2007; ITU, 2015; Moosa, 2010; Phiri, Foko and Mahwai, 2014). According to 2011 census (GoI, 2011) out of total of 1.01 crore 69.77% population living in the villages of rural areas of Uttarakhand, the literacy rate is 76.37%. In context of women population, out of the total women population of 49.48 lakhs, 71.09% women live in the rural areas and the literacy rate is 66.16%, highlighting promising potential for technology intervention. Reasonably good literacy rate in the women population of rural Uttarakhand provides an encouraging environment to pursue various skill development initiatives. Additionally, there are hordes of applicable science and technology policies from public sector, which on sufficient promotion, can be harnessed by the rural women.

ICT blurs the gap between traditional art design forms and innovative aesthetically appealing apparels providing opportunities to express ideas in many different and creative ways. Uttarakhand has had a reasonably long history of nurturing various forms of art & craft. There are a significantly large numbers of rural women who are talented in artistic work, but the processes followed are unstructured and outdated. The potential of ICT has been exploited to a significant extent in the current Government funded Women Technology Park (WTP) project. The novelty of the project is value addition through ICT intervention in the entire range of activities ranging from conceiving of a product to its design, development, market and sale.

Rural WTP: The Rationale behind It

With a focus on holistic empowerment of women, SEED (Science for Equity, Empowerment and Development) division of DST (Department of Science and Technology) New Delhi is implementing a scheme WTP envisaged to act as a resource centre where all necessary support is made available to women from a single platform, in different geographic locations of India. With its scheme, ‘Science and Technology for Women’, DST is focused to reduce drudgery, providing income generation opportunities through skill development training and socio-economic development. With the endeavor that, S&T could provide sustainable development through integrated approach, a large number of technologies have been developed and DST has identified two regions – Coastal and Mountain region to establish technology parks for women (GoI. Press Information Bureau. Technology Parks for Women). This scheme is intended to aid number of under privileged women to achieve better quality of life. Funded under this scheme, women technology project has been established at University of Petroleum and Energy Studies (UPES), Dehradun. Leveraging the potential of ICT for inspiring visual thinking, product design innovation, market research, linkage, facilitation of marketing and sale for sustainable development is the key theme of rural WTP commissioned at UPES.
The overall objective of the work is being elaborated under three specific objectives that are providing of technology for sustainable natural resource utilization for livelihood generation, promoting development of individual and group entrepreneurship, and facilitation of creation of women groups for income generation.

III. METHODOLOGY

It has been a challenge to join the dots and provide a workable, sustainable solution facilitating capability enhancement and income generation for rural women (O. Olufunso and O. Tony). The dots being referred to here are unstructured rural art and craft women workers, abundant availability of raw material isan identified geographic area (like; bamboo, ringaal), ineffective utilization of government supported schemes, for rural women, and finally bringing forward ICT to provide support beyond e-mail & marketing etc. in penetrating into the domain of improvised designs, innovation, value add and appeal to apparels. This section presents methodology for the same under organized subheading.

IV. APPROACH: INNOVATION, DESIGN OF ROAD-MAP AND IMPLEMENTATION

Locale of Survey and Intervention

Uttarakhand located between 28° 43’ N to 31° 27’ N longitude and 77° 34’ E to 81° 02’ E latitude has a total area of 53483 Sq. Km. of which 34651 Sq. Km. is forest (Government of Uttarakhand, 2013). Uttarakhand has mainly two parts, Kedarkhand (Garhwal) and Kurmaanchal (Kumaon). Out of 13 districts of the state three are plain and the remaining 10 are hill districts. For the present work, Sahaspur block in Dehradun district has been identified. Dehradun is located at an altitude of 640 meters (2100 ft) above sea level in the northern part of India. Located in the foothills of Shivalik range, Dehradun lies between 29° 58’ and 31° 23’ north latitudes and 77° 34’ 45” and 78° 18’ 30” east longitudes. At present, district Dehradun comprises six Community development blocks Chakrata, Kalsi, Vikasnagar, Sahaspur, Raipur and Doiwala. Selection of villages for ICT intervention has been based on preliminary survey studies conducted at Sahaspur block. The survey instrument was a structured questionnaire. The total number of rural women currently carrying out unstructured art & craft work has been taken as criteria for identification of village. As part of background study, population statistics from census (2011) were analyzed. Figure 1 [Annexure-1, a] presents the area of activity of WTP project implementation.

Figure 1 [Result and Discussion] Population Statistics of WTP area of activity includes three sections. Population statistics of Dehradun district and Sahaspur block are presented in Figure 1 and 2 [Result and Discussion] separately. Figure 3 [Result and Discussion] presents the statistics of villages identified under WTP project. Computing the data from section 3, it is found that 47.41% of total population is female, with the literacy rate of 67.47%.

Analyzing further, it is revealed that out of the total female population in each of the villages under WTP project, female literacy is more than 50%. Despite a reasonably good female literacy rate 63.03%, the percentage of workers is 13.23% which is very less. The criteria for choice of villages in Sahaspur block, has primarily been, lack of proportionate number of women workers in active workforce despite of literacy. It indicates that there are a significant numbers of female literates, who are not engaged in working. Over several meetings, as part of the project it was ascertained that the groups are interested to work and provided certain vocational trainings and skills are given, they would be able to use their talent productively and join the workforce. Under Rural and small scale industries, total 42340 small scale industries are established till 2012-13 and under ‘SwarnJayanti Gram SwarojgarYojna’ as on 31-03-2013, total 42396 SHGs are formed (Government of Uttarakhand, 2013). After completion of training the initial batch of beneficiaries under this project registered as Self Help Groups (SHGs), is associated with cooperative societies and state Bamboo & Fiber Development Board for sustainable development. It was noticed at the time of survey that maximum number of women are interested to take the art & craft as their career prospect because, the people of Uttarakhand have a rich heritage of culture & tradition in art forms. Currently, most of them have been carrying out these activities in an unstructured manner.

Availability of Indigenous Materials

In an elevation gradient Uttarakhand forms part of the Central Himalaya with three distinct physiographic regions, the Himalaya, the Siwalik and the plains ranging from 300 to 3500 m and the bamboo forests are dominated in lower elevations (Manjusundriyal, Rakesh Chandra Sundriyal, 2011) particularly in Siwalik Hills (WTP area of activity). In rural areas of Uttarakhand few communities totally depend on natural fiber and bamboo for household purpose. As per the record of Uttarakhand Bamboo & Fiber Development Board, Uttarakhand has 460 villages depending on Bamboo and Ringaal as their major livelihood. Bamboo in Uttarakhand is categorized into; bamboo and Ringaal. Bamboo is thick long and slender while Ringaal is thin spineless plant.

Bamboo valuable in rural livelihood is available worldwide with its 1250 species, known as “Green Gold” because of fast growing nature. Bamboo practically forms the best suitable understory in tropical sub-tropical and temperate region, with the rainfall range of 1200-4000 mm having temperature range of 16°C to 38°C.
C (CEDAR 2011). WTP area of activity falls under 640 – 850 meter above sea level, which is the best suitable condition for occurrence of bamboo (GoI. Ministry of women & child development/National mission for empowerment of women). India with 136 species comes after china having 300 species in bamboo production worldwide (GoI. Ministry of agriculture and farmers welfare/National Bamboo Mission). Diverse rainfall zones in India (Mukesh Chandra et al., 2014; Mukesh Kestwal et al., 2015) play an important role in growth of different bamboo species, because bamboo prefers regions of high rainfall and it is the only reason, two-third of the growing stock of bamboo in country is available in north-east states with 58 species (GoI. Ministry of women & child development/National mission for empowerment of women; GoI. Press Information Bureau. Technology Parks for Women; Moghaddam B. Khalili, Khatoon-Abadi A., 2013; Naithani, H.B., 1993).

In Uttarakhand, bamboo & ringaal fall under revenue forest, reserve forest and village forest. At low hills, bamboo is collected and auctioned by forest department. Bamboo & ringaal artisans are live at mid and high hill areas. For the domestic needs, at most of the places villagers collect Ringaal from village forest free of cost and for additional needs it is available by paying nominal fee to forest department (Manjusundriyal, Rakesh Chandra Sundriyal, 2011). Figure 2 [ Annexure-1, b] presents the number of artisan villages per district. Out of 13 districts, Uttarkashi has maximum bamboo production followed by Rudraprayag, Haridwar and Namital. Bageshwar, Chamoli, Pithoragarh, Tehri and Uttarkashi have Ringal species only, while Uddham Singh Nagar, Haridwar, Champawat districts are comprised of bamboo species only. Rest of the other districts has both bamboo & ringaal (Manjusundriyal, Rakesh Chandra Sundriyal, 2011). With the financial assistance of Uttarakhand Bamboo and Fiber Development Board (UBFDB) Centre for Ecology Development and Research (CEDAR) is working on evaluating the growth, survival and productivity of Bamboo plantation in different zones of Uttarakhand (GoI. Ministry of women & child development/National mission for empowerment of women).

Interest of Government in promoting the natives especially rural women

In its 12th five year plan (2012-2017) govt. of India aims to reduce poverty on a sustainable basis to achieve faster, more inclusive growth (GoI, 2012). Under it’s one of the major objectives, National Bamboo Mission under Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India is promoting marketing of bamboo and bamboo based handicrafts (GoI. Press Information Bureau. Technology Parks for Women). Ministry of Women & Child Development, Govt. of India offers support under its following schemes (GoI. Ministry of women & child development/National mission for empowerment of women):

- Financial assistance for preparing young professionals in rural areas.
- Raw material assistance scheme.
- Technology development & utilization Programme for women.
- STEP (Support for Training and Employment Programme for women).
- Marketing & Export promotion scheme.
- Management Training Programme.

To promote Entrepreneurship, MSME Uttarakhand declares “Self-Employment & Entrepreneurship Day” on last Friday of every month (Government of Uttarakhand, MSME UTTARAKHAND, Industrial Policy, 2003). Directorate of Industries, Uttarakhand has launched online portal Himani.org (Aangan se Aasmantak) for women entrepreneurs of Uttarakhand (Government of Uttarakhand, 2015). Industries Department, Uttarakhand also offers the following schemes as per the Industrial Policy 2003, Government of Uttarakhand, Dehradun:

- Promotion of small scale village industries with assistance of Modernization and Technological upgradation, necessary common facilities, backward and forward linkages, product design and marketing support to make them globally competitive and remunerative.
- Under the State Interest Incentive Scheme, remote areas will be given enhanced interest @5% with maximum of Rs. 3 Lakh/annum. (Admissible only if the unit remains in operation for a minimum of 3 years from the date of disbursement of last installment).
- Marketing assistance to the small scale enterprises through facilitating participation in Trade fairs.
- Traditional craft like Ringaal craft shall be encouraged through training by master craftsmen in “Shilp Grams”.
- Promotion of souvenir craft products in tourist and commercial Centers within and outside the state.
- Support for development of Urban Haat (at Dehradun) and Rural Handicraft Centres (Gramin Shilp Kendras) for the display and marketing of products

Role of ICT in providing missing link

A group of 25 beneficiaries identified from selected villages is being provided training under this project. The training program comprises of a basic ICT training, design training and a hands-on practice of craft making (carried out in workshop mode) under professional artisan mentorship. With an aim to use indigenous raw material, the current focus has been on bamboo. ICT intervention can help these budding artisans in understanding market handling and tackling the business risk (Bansal 2014) and in finding their customers.

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Demand of traditional craft has increased in last couple of years. NSDC (National skills development corporation) reported that handicraft sector is amongst 20 high growth sectors in India, where skill gap need to be bridged, and on the other hand skilled crafts persons are leaving their profession due to lack of income generation opportunities. Here ICT comes with the solution, i.e. connecting budding rural women artisans with domestic & global market. ICT intervention forming the missing link, provides better communication between sellers & buyers. Live example of ICT approach towards providing marketing linkage is “The Boutique Model” proposed by Sriram Emani (GoI. Press Information Bureau, Technology Parks for Women). This model suggests boutique commissions to artisans based on market price of their product and take risk of marketing. Following are the potential outcomes of positive ICT intervention.

- Moving from market awareness to sale
- Achieving befitting cost to labour
- Increased income opportunities
- Promoting the financial independence, empowerment, self-esteem, status in society for the rural women
- Spreading awareness on govt. offerings & schemes that can be appropriately utilized by rural women.

Road Map

This section describes the detailed methodology undertaken in a step-wise manner for implementation of the present project work, explained in Figure 3 [Annexure-1, c]. At the onset, relevant statistics of the census 2011, particularly for the identified villages under the Sahaspur block (Dunga, Misras, Patti, Bharapur, Bakarna, Nuniyas) were extracted and analyzed for gathering the data regarding the numbers of women working for livelihood. Subsequent to this analysis, a series of preliminary surveys were done, involving visits to households. One to one meeting, in villages, data collection through questionnaires resulting in development of a database, which was ultimately used for identification of a batch of beneficiaries, was done. These participants are particularly the women in age group 18-38 described in Figure 4 [Annexure-1, d], who belong to either of the two categories, viz, already working to develop craft, but in an unstructured manner or keenly interested to take up skill to enhance livelihood and income generation options. Before initiation of the training, following pre-work was accomplished; Infrastructure facility development including an ICT laboratory and a craft studio. Development of the courseware exclusively designed as per the education level of the participants (primarily middle school passed-outs), a workshop catalogue holding a picture collection (inclusive of craft making procedures) of craft products. The detailed methodology undertaken as part of the project is presented in Figure 2 with the various steps undertaken in course of training of the batch. Figure 5 [Annexure-1, e] presents a sequence plan to indicate the different modules of training imparted to the identified beneficiary group and details of specific modules covered under each of the training stages. In order to facilitate them to attend to their household work as well, a convenient time of three hours has been selected. With pattern of three classes per week the 75 hour course was delivered.

Actionable Deliverable: Implementation

Talented rural women have been working in an unstructured manner in developing new product designs as there is a lack of specific know-how, innovation, aesthetics and integration with changing culture. The inherent abilities nurtured through a systematic approach by using computerized technology can potentially contribute to learning, training, product innovation and improved market opportunities. This has been the main focus of implementation. The ICT laboratory developed under this project is aimed at providing computing learning including simple basics (aimed at increasing the levels of familiarity), getting comfortable with the use of MS office packages, learning to use art and craft design software for innovation in product designs, experimenting with colors, art forms, gaining awareness of use of internet and social media for understanding market, government schemes including thereby making oneself better prepared to harness upcoming opportunities. An essential aspect of the training is the studio work comprising of hands-on practice of apparel making, carried out under mentorship of expert artisans. The overall aim of the training is to produce products with distinct aesthetics identity and enriched market appeal. Current focus is on bamboo and ringaal with design inspired by traditional prototypes. The user friendly training module invokes ‘visual thinking’ and focuses on practical approach. For market linkages, WTP has associated the group of beneficiaries with Uttarakhand Bamboo & Fiber Development Board for exhibition and sale of products.

Subsequent to trainings the participants have been using bamboo for producing variety of articles including baskets, lampshades, flower vases, flower pots, pen stands, dustbins, trays, mobile-covers, photo frames etc. In keeping with the responsibility towards environmental concern, to promote use of eco-friendly material as office-ware, the current concentration has been on making office accessories such as dustbin, pen stands, visiting-card holders, multi-utility trays etc.

The complete ICT Cycle has the following set of deliverables:

1) Sustainable Development
   - Nurture and Enrich Skill
- Support to market linkage
- Technological Empowerment
  - Digital literacy
  - Multi-skill development (Computing, Designing, Managerial)
- Workforce towards digital India initiative
  - Efforts towards reduction of digital divide
  - Self-dependent, confident, strengthened & prepared
- Socio-economic empowerment
  - Group activities with women networking
  - Opening opportunities for income generation

V. RESULT AND DISCUSSION

The section below presents results of the work, bringing out the overall impact of the intervention using statistical analysis.

**Population Statistics of WTP Area of Activity (GoI, 2011)**

![Dehradun district statistics (Population)](image1)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Population</td>
<td>754753</td>
<td>392891</td>
<td>361862</td>
</tr>
<tr>
<td>Total Population</td>
<td>1696694</td>
<td>802199</td>
<td>804495</td>
</tr>
</tbody>
</table>

*Figure 1 Source: Census 2011*

![Sahaspur Block Statistics (Population)](image2)

<table>
<thead>
<tr>
<th></th>
<th>Total Population</th>
<th>Female Population</th>
<th>TFL (Total Female Literates)</th>
<th>TFW (Total Female Workers)</th>
<th>FHW (Female Household Workers)</th>
<th>FMW (Female Marginal Workers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>34015</td>
<td>167501</td>
<td>80682</td>
<td>54038</td>
<td>8447</td>
<td>313</td>
</tr>
<tr>
<td>Total</td>
<td>37778</td>
<td>184381</td>
<td>87574</td>
<td>58975</td>
<td>9504</td>
<td>336</td>
</tr>
</tbody>
</table>

*Figure 2 Source: Census 2011*
Above Figure 1, 2 and 3 represent population statistics of Dehradun district, population statistics of Sahaspur Block and population statistics of WTP project specific areas (such as; Misraspatti, Bakarna, Bidholi, Kanswali Kothari) respectively.

Table 1: Mean, Standard Deviation, Variation and Population Standard deviation of achievement effect size of ICT intervention

<table>
<thead>
<tr>
<th>Name of the village</th>
<th>TFMW (Total Female Main Workers)</th>
<th>ICT Beneficiary</th>
<th>Skilled female Literacy (% increase)</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misraspatti</td>
<td>11</td>
<td>6</td>
<td>54.54</td>
<td>25.370</td>
</tr>
<tr>
<td>Bakarna</td>
<td>7</td>
<td>2</td>
<td>28.57</td>
<td>21.55071</td>
</tr>
<tr>
<td>Bidholi</td>
<td>89</td>
<td>10</td>
<td>11.23</td>
<td>464.43311</td>
</tr>
<tr>
<td>Kanswali Kothari</td>
<td>98</td>
<td>7</td>
<td>7.1428</td>
<td>18.66346</td>
</tr>
</tbody>
</table>

To quantify outcomes of ICT study, the value of Cohen's (d) and the Effect Size (ES) is used. The effect size is defined as the difference between the mean of two groups divided by the standard deviation of the control group (Ting Seng Eng., 2005).

Cohen's d = \( \frac{M_1 - M_2}{\sigma_{pooled}} \) where; \( \sigma_{pooled} = \sqrt{\frac{\sigma_1^2 + \sigma_2^2}{2}} \)

Hence, through analysis and application of formula, the Effect Size in the present case has been computed as 0.6397816648.

As per the Cohen's guidelines, the computed value is mapped to ascertain the impact of given effect size;

- Effect Size of 0.5 or less = Small Effect
- Effect Size of 0.5 to 0.8 = Medium Effect
- Effect Size of 0.8 or more = Large Effect

Thus we can state that the ICT intervention has been able to effectively improve the size of skilled female literates in rural areas as the effect size found to be medium.

**Impact Analysis**

The impact of ICT intervention can be observed as ‘direct’ and ‘indirect’.

<table>
<thead>
<tr>
<th>Direct Impact</th>
<th>Indirect Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT technology enables shorter turnaround times, which quantified both in terms of cost and time.</td>
<td>ICT is a good estimate for realizable opportunity cost if tool improves efficiency.</td>
</tr>
<tr>
<td>The artisan affiliated organizations use the ICT tool</td>
<td>Quality improvement and risk management handled</td>
</tr>
</tbody>
</table>
Artisan can grow business using ICT technology or e-marketing. | Artisan can solve the problems quickly using ICT technology.

**Limitation**

Though the larger aim of this research work is to produce reasonably large quantities of finished products (bamboo and ringaal artefacts) in limited amount of time and provide market, there are certain limitations which are listed below. Bamboo being a sturdy grass is hard to handle and budding artists, face difficulty in slitting, stripping and sharpening it. This is essential preparation before art work can be done or apparels can be made. The knives and other sharp objects (tools) used for this purpose need to be handled with care and slight carelessness, may lead to injury. Further, novice artisans, take long period of time to gain skills for production of market appealing apparels, thus limiting their income generation opportunities. While they are, in their early days of training, there is a risk of lower motivation levels, leading to their dropping out of training, failing the overall objective of the project.

**Replication potential**

This pilot approach executed for identified set of rural women is proposed to be extended further for multiple sets in the other villages of the project area. Considering the fact that the prevailing condition in these areas, economically, socially and financially are very similar to those in the villages of many other developing countries, the work offer tremendous potential to be replicated, so as to contribute towards empowerment of rural women (Prof. Adewoye, Oyerinde et. al., 2014; O. Olufunso and O. Tony). This is an excellent initiative being taken ahead aligned to the digital initiative of Indian government.

Further, this pilot approach holds potential to be implemented across in different geographical areas for upliftment and empowerment of rural women.

**VI. CONCLUSION**

Systematic approach of ICT intervention in art and craft design work of identified beneficiaries has been implemented. Considering the numbers of literate rural women interested in generating livelihood through art and craft, thereby upgrading themselves to be part of the formal workforce, the statistical computations have been done for computing the impact through effect size. It reveals the over all exercise has been beneficial indicating medium impact.

**Recommendation & Future Work**

Presently, the observation period of the first batch of beneficiaries is continuing during which their progress is being monitored. While the registrations for the next batch have commenced, the focus is on incorporation of learning from the first batch. Progress monitoring is on quantitative criteria of total number of rural women able to use their skills for livelihood enhancement.

**VII. REFERENCES**

**Journal articles**


**Theses**


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Figure 2: Bamboo and Ringal Artisan villages per district

Image Source (Manjusundriyal, Rakesh Chandra Sundriyal, 2011)

Figure 3: WTP - ICT Cycle
Figure 4: WTP – ICT Batch-I Beneficiaries Age-Group

WTP - ICT Project Sequence Plan

PROJECT SEQUENCE PLAN

ICT Assisted Art & Craft Design

FIRST MODULE

SECOND MODULE

THIRD MODULE

WORKSHOP MODULE

DELIVERABLES

UNIT-I

Basic Computer Awareness

- Computer components and applications
- Start-up and Connectivity
- MS Office package
- Practical hands-on exercises

UNIT-II

ICT assisted Art & Craft design education

- ICT Basics
- Internet & Email
- Art & Craft design learning
- Practical hands-on exercises
- Creation of Aesthetic Designs & Innovative Craft Products

UNIT-III

Managerial skill development

- Managerial basics
- Entrepreneurship skills
- e-commerce and e-marketing
- Introduction to Market Linkage - DPI (Directorate Of Industries) and MSME (Micro, Small and medium enterprises)

Art & Craft training @Workshop

- Specific internal exchange between artisans and beneficiary
- Art & craft product development using raw material
- Product finishing with aesthetic appeal for market

Action outcomes of the Project

- S&T Exposure to Rural Women
- Women empowerment and income generation opportunities
- Sustainable development
- Elevating factor to Digital India Initiative