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# True Value of Telecentre Contribution to Bario Community Development

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**Abstract.** Telecentres have been widely deployed worldwide particularly in the area of ICTD to bridge the gap between urban and rural development. This paper explores the value and impact of a telecentre on the community living in Bario, a small village in the highlands of Malaysia. The focus is mainly on the less studied tangible and intangible impacts of the telecentre on users and non-users. This topic is discussed based on stories collected through “Most Significant Change Technique (MSC)” providing facts from the insights of the local community. In nutshell, Bario community has greatly benefited from the use of the telecentre, whether directly or indirectly, particularly in the areas of connectedness, psychological empowerment, and financial improvement. Greater awareness and use of the telecentre shall continue to benefit this small rural community in their social and economic wellbeing.

**Keywords:** ICTD; Telecentre; ICTs, Users; Non-Users; Intangible impact; Tangible impact; Socio-Economic Impact.

## 1 Introduction

The emergence of ICTD interventions has played a crucial role in driving developing countries towards modernization particularly in the area of socio-economic development. The growing body of literature has further strengthens the impacts of ICTD interventions in measuring the tangible contributions of ICT, forgoing the intangible impact evaluation of ICTs especially on the non-user beneficiaries [27]. Thus, a question arises whether or not these unquantifiable intangible impacts such as self-esteem, sense of self-efficacy, self-confidence, enhanced capabilities, social cohesion, social capital etc. are important for community well-being and growth. Sey et al. [24] accentuate on the “impacts of public access to ICT” on users and non-users, stating that this issue needs to be put in focus to study the dynamics of public access impacts on non-users”. The assessment of public access impacts often neglects to examine non-users, although they could constitute past and potential beneficiaries [23]. Confirmation is made by studying the numerous benefits that ICT’s have given to both users and non-users beneficiaries in their respective socio-economic spheres. Grunfeld [14] claims that numerous ICT4D project appraisals frequently neglect to answer key inquiries

concerning how these ICT activities can add to empowerment, capability and sustainability. According to [4], “by fostering a sense of belonging and connectedness to community and to a larger world, public access to computers often leads to feelings of empowerment and development of social capital, two intangible factors that are critical for community development”. According to [13], “Measuring the development impacts of ICTD interventions continues to be an unresolved problem when trying to include non-traditional development measures beyond economic growth, particularly empowerment and social capital”. According to [27], evaluating, the intangible impact of ICTs remains an unresolved issue, particularly when it comes to measuring intangible impact on non-user. Although these outcomes were mostly measured quantitatively in social sciences using self-efficacy and self-esteem scales, focus was less on its ICTD perspective [26]. This strengthens that the point of ICTs impact in non-traditional and intangible contexts remain unreciprocated [11] [13] [19] to an extent that it is not enough to place emphasis only on the tangible and quantifiable benefits of ICT that is easily measurable. According to researchers, intangible impact of ICTs is hard to measure on people’s well-being [9] [11] but social impact can be measured and explained qualitatively [27]. Amartya Sen Development approach was adopted to understand the development experienced by the telecentre users and non-users. This Capability Approach (CA) sees development as “a process of expanding the real freedoms that people enjoy” and emphasizes the need for the “expansion of ‘capabilities’ of persons to lead the kinds of lives they value [22]. Empowerment is reflected in Sen’s CA whereby human development is viewed as expanding people’s capabilities and achievements. Empowerment is an important dimension of human development [15] and the capacity to make and transform choices is influenced by two factors; namely, agency and opportunity structure [2].

## **2 Methodology**

The MSC is a participatory monitoring and evaluation technique. It is used for collecting, discussing & selecting stories about the significant changes that people experience resulting from a program or initiatives [7] [28]. According to [7] [28], consider the importance of storytelling technique “as stories are one of the more participative forms of communication. Stories can deal with complexity and context; sometimes stories can carry hard messages. Stories told in casual conversation can harness another sort of information; they provide insights into how storytellers construct reality and to what they attach importance”. However, various research studies documented around the world have used various methodologies to evaluate the telecentre impacts on the rural communities, which aimed to obtain sufficient information from the community. So far, researchers have succeeded to some extent in the impact evaluation but some part of impact remains concealed. Thus, with the intention to evaluate the intangible impact of the telecentre, we considered the MSC approach more suitable than other orthodox research approaches.

## 2.1 Four Steps & Procedures Used in the Main Study Data Collection Process (Interviews)

This study has adopted 4 out of 10 steps of MSC method [7] for the main empirical study: Step 1 identify “domains of change” by gathering relevant stories from users and non-users of the telecentre with the aim to evaluate direct and indirect impacts resulting in tangible and intangible benefits. ‘Domains of change’ are used to categorize changes reported through the monitoring system [17]. Step 2 collect stories in an informal way by keeping participants relaxed and interview questions were kept simple. A total of 22 “tape-recorded” interviews were collected and transcribed from audio to text into two pages with formatted layout. Step 3 involves reviewing and representing process of selection & validation for identifying and selecting the MSC stories within the set of collected stories. Step 4 involves the analysis of the stories. The first method uses “content analysis” data into valid categories through inductive inferences via tentative constant comparable examination [21]. The purpose is to identify the domains and sub-domains of change in collected stories, extracting the MSC to illustrate covering the variables of respondents’ life experiences [16]. Second method uses “Leximancer 4.5” semantic [31] technology to study the participants’ linguistic research Douglas [8] converting textual documents into visually conceptualized mapping-context-extracted information. Leximancer functionalities employ two stages of information extraction: semantic and relational data, by calculating frequencies of each word for each stage using non-linear dynamics and machine learning algorithm. Results are displayed as hierarchical concept maps where relationship between individual concepts/themes can be explored [25].

## 3 Data Analysis

Data Analysis was categorized into three parts using three methods:

**Method 1:** Using Microsoft Excel to analyze charts/diagrams to interpret the demographic profile of respondents in the form of percentage of number people that obtained benefits from the telecentre.

**Method 2:** Involved two techniques, the first “Content Analysis” analyzes the collected stories and categorizing each significant stories (reviewed transcript) into information/themes, further ascertain for information validity and relevancy. The second technique used Leximancer 4.5 to provide results for the textual documents.

**Method 3:** In order to measure the extent of indirect intangible impact, percentages calculated method was adopted as it determines “the percentage of people experiencing a particular impact in a particular area, noting whether it was tangible, intangible, direct, indirect, positive or negative, or non-existent” [24].

### 3.1 Key Findings

Results are segregated into relevant parts: The first part illustrates the demographic profile of usage pattern. The second part describes the Content Analysis of the stories (see Table 1) and Leximancer analysis results. The demographic Profile illustrates that a total 22 participants of the semi-structured interview sessions were divided according to gender specification consisting 6 females and 16 males (refer Figure 1). Respondents (users & non-users) age varied from 19yrs to 50+yrs (refer Figure 2).

Interviewees were from all occupations representing male, female, young, old, users, and non-users (Refer Figure 3: Figure 4). Internet usage pattern for 11 users varied from “Twice a week” to “Twice a year” and “Proxy help”. Among 11 non-user respondents, only 3 obtained proxy help, whereas 6 benefited through friends and family help, and the remaining 2 have never experienced the telecentre facilities due to living outside. (Refer Figure 5).

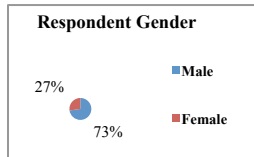


Figure 1

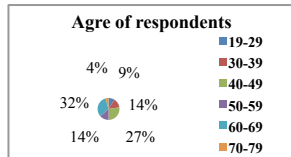


Figure 2

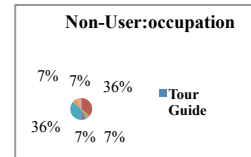


Figure 3

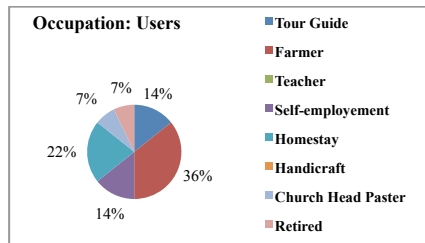


Figure 4

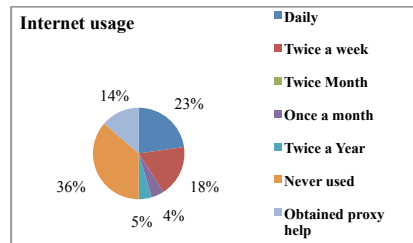


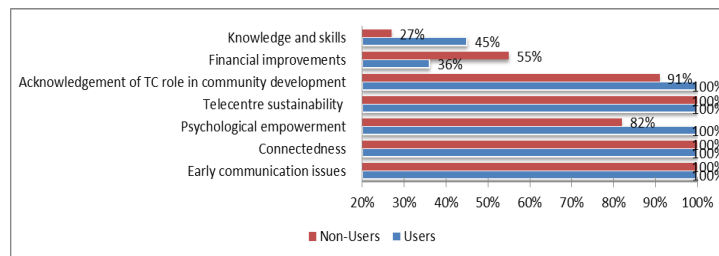
Figure 5

### 3.2 Content Analysis: Table 1. Domains and sub-domains of change based on 11 Users & 11 Non Users

Domain of Change	Sub-domain of Change	Sub-domain of Change	Sub-domain of Change	Sub-domain of Change	Sub-domain of Change
Connectedness	Feelings of belongingness: being part of a stronger community of national or international	Ease of better communication and information access: Telecentre facilitates a faster communication and easy access to information	Communication via Proxy help	Strengthen social ties b/w Friends & Families (F&F)	Mobile: Basic call & WhatsApp
Psychological empowerment	Self-efficacy: the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations [20]	Self-Esteem: Self-esteem refers to the totality of the individual's thoughts and feeling including a positive or negative attitude toward the self [3]			
Telecentre sustainability	Internet connection e.g. poor internet connectivity	Demand for services: (Request to reopen Telecentre premises, ICT literacy Trainings, Staff member)			
Acknowledgement of Telecentre (TC) role in community development	Business opportunities: Telecentre provides various opportunities in the form of business solutions i.e. homestay and tour guides, handicrafts.	Associated developments: e.g. road, farming mechanization, new clinic, festival, road, tourism	Community Exposure: Experiencing the outside world	Boosterism: the enthusiastic promotion of a person, organization, or cause[30]	Financial & Time savings
Financial improvements	Tourism: e.g. Homestay, tour guide, handicrafts income	Agriculture: e.g. Farming			
Knowledge and skills	Knowledge transformation: knowledge sharing means an expertise, information, & skills are transferred from benefactor to beneficiaries	Knowledge gained through Internet: Learned new things: e.g. cooking recipes, dance, designing,	Staying updated on news: Keep updating oneself on local & global news		
Early communication issues	Communication via Postal Service & Radio Call				

### 3.2.1 Content Analysis: Domains and sub domains of change

Figure 6 reflects responses received from both the telecentre users and non-users. The most common domains of change annotated by the respondents in the telecentre impact areas were early communication issues, connectedness, and the telecentre sustainability with a total percentage of 100%. This was followed by acknowledgement of TC role in community development (users: 100% & non-users:91%), psychological empowerment (users: 100% & non-users:82), financial improvements (users: 55% & non-users:36%), and Knowledge and skills (users:45% & non-users:27%). The findings indicate that all domains of change in the telecentre impact area showed greater improvements in the perception of both users and non-users about the telecentre role in community development.



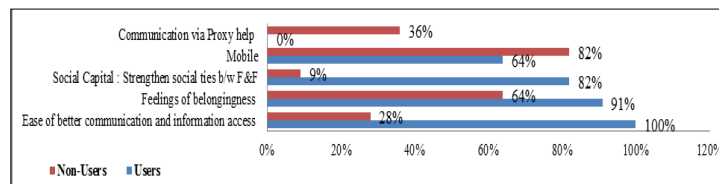
**Figure 6:** Domains of change (Reported by Users & Non-users)

A closer look at key findings shows both users and non-users perceived positive tangible and intangible impact of telecentre. Unlike non-users, users benefited at large. However, most surprisingly, the percentage ratio of non-users in the area of intangible impact was phenomenal such as connectedness at 100%, and psychological empowerment at 82%. It is interesting to note that unlike users, non-users lack the ICT skills. But through indirect assistance those non-users who had alternative access to Internet exhibit feelings of connectedness and positive psychological empowerment. The study found that they have positive attitude towards themselves and the changes they have experienced both in tangible and intangible impacts. As illustrated, both respondent groups indicated communication as the major issue they faced earlier for the community inhabitants to be connected with their loved ones as well as keeping updated with the global & local events. But with the presence of the telecentre as a hub of easy internet access, the communication barrier is bridged and social ties with friends and families is strengthened. The business opportunities brought about by the telecentre have benefited both users and non-users. Baron, Gomez [4] stated, “This sense of connectedness is strengthened by the speed and ease with which people can now access multiple sources of information, and it results in a sense of empowerment and confidence building on the part of users of ICT”.

Thus, these results indicate that the social connectedness and access to all variety of information without limit further led to sense of empowerment and confidence-building, stronger self-esteem of the respondents. User and non-user respondents stated that their ability to cope with new challenges have improved along with their decision-making power. These insights reaffirmed the presence of intangible impacts of the telecentre within the community.

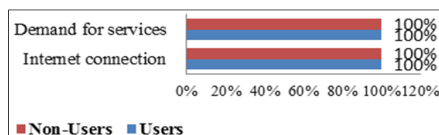
### 3.2.2 Content Analysis of Stories by Sub-Domains (Users and Non-Users)

Figure 7 below illustrates the elements that make up the domain “Connectedness” in accordance to the given percentages per elements. It is worth noting that non-users who are not able to access the telecentre services by themselves acquired proxy help while other non-users who gained access to information through external sources received benefits indirectly. Communication has been the main issue that was always in the limelight agenda of users and non-users through their collective stories. The telecentre brought positive changes encompassing “ease of better communication and information access”, “access to the world at large” to a “sense of belongingness”. This strengthens social bond among friends and family members living outside of the community. Putting further into focus is the use of mobile communications (smart phones, ordinary mobile phone) in particular the use of “WhatsApp” for digital interaction.

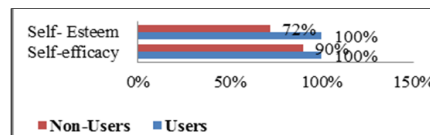


**Figure7.** Sub-domains of change within Connectedness Domains

Figure 8 illustrates the elements that make up the domain of ‘the telecentre sustainability’, which indicate that all respondents reflect their need for telecentre. Figure 9 illustrates the elements that make up the domain “Psychological Empowerment”, which show the presence of the positive “Psychological Empowerment” pattern among users and non-users. Figure 10 illustrates the elements that make up the domain “Financial Improvements”, which provides stronger evidence of the business opportunities brought by the telecentre for the tourism livelihood increase the household income of the community. Figure 11 illustrates the elements that make up the domain “Knowledge and skills” revealed the positive impacts of the telecentre towards the community addressed by users and non-users in terms of improved viability of information and communication providing a catalyst for the community to enrich their knowledge about the outside world. Figure 12 below illustrates the elements that make up the domain “Acknowledgement of TC role in community development”, revealed the telecentre’s positive attributes that contributes to positive opportunities such as in Eco-Tourism and other sectors of developments etc., resulting in financial improvements amongst users and non-users lifestyle.



**Figure 8:** Percentage of stories addressing sub domains of change within the telecentre Sustainability



**Figure 9** Percentage of stories addressing sub domains of change within Psychological empowerment

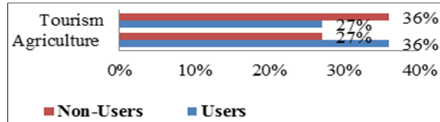


Figure 10 Percentage of stories addressing sub domains of change within Domain of Financial Improvements

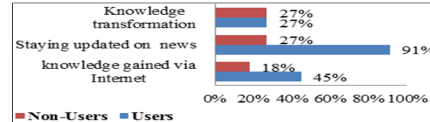


Figure 11 Percentage of stories addressing sub domains of change within Domain of Knowledge and skills

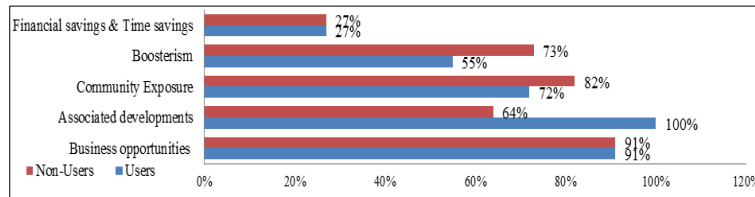


Figure 12: Sub-domains of change within Acknowledgement of TC role in community development

### 3.3 Analysis of Collected Stories from Users and Non-Users with Leximancer 4.5

At this stage, Leximancer 4.5 assisted in the analytical review by calculating, extracting and displaying the collected stories, providing visual interpretation of the actual data uploaded from the MS Word database aligned by two sentences per block prose threshold of 1. The results are shown in (Users: Table 2 and Figure 13; Non-Users Table 4 and Figure 14), which depict concepts/themes along with its connectivity measurement extracted from analysis of results in the form of visual concepts to present interactive connectivity. The map entails conceptual clusters as colored circles to summarize semantic point connection of particular groups of concepts (colored circles for themes and small grey dots for annotated concepts). Relational value between concepts is dependent upon range between concepts, which represents top-level classification of noted stories, the larger the circle the richer the content impact factor of concept/themes.

### 3.4 Users Theme Map and Concept Nodes within Themes

These 7 themes highlight the users' perception of the telecentre's positive influence on beneficiaries, positive socio-economic change at individual level, and collective level. Dominant themes fall into the categories of "Internet", followed closely by "People", "Use", "Time", "Satisfied", and "Radio". Themes overlay depicts users' (individual and collective level) experience level in using the telecentre internet access to improve socio-economic status since these themes materialized larger conceptual semantic relationship, which exists within the threshold rate of 100%. Closer examination on these 7 major themes indicated the potential of expanding the telecentre's role towards improving rural development in terms of "Better Communication", "Information Access", connectivity to the outside world and financial improvement to further strengthen the sense of connectedness. Respondents were satisfied with their wellbeing and the changes that came into their livelihood through either direct or indirect approach provided by the telecentre as stated below:

*User1: If the telecentre did not exist, we will have struggling to get access to the outside world; of course, it is a challenge to get something and a way to improve our life. User2: Telecentre improved my motivation for living better life. The telecentre did motivate me because with the telecentre I can communicate with the outside world.*



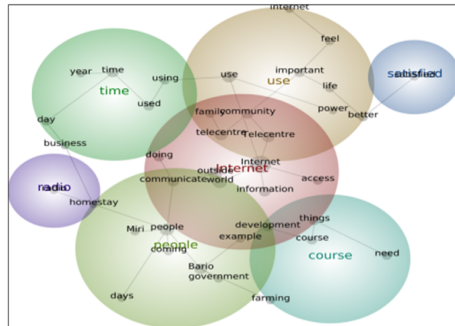


Figure 13 Users Theme Map and Concept

Table 2: Theme & Concept Coding Classifications and explanation

Theme	Concepts	Hits
Internet	Internet, outside, world, telecentre, telecentre, information, communicate, things, doing, development, access	268
people	people, Bario, example, Miri, coming, government, days, homestay	182
use	use, community, important, feel, better, life, family, internet, power	166
time	time, used, using, day, year, business	132
course	course, need, farming	81
satisfied	satisfied	23
radio	radio	13

Table 3 indicates a summary of 10 high level concepts discovered in the collected stories represented as groups of parallel point connected text that is aligned to represent weighted themes/terms weighted, to present frequencies of influence that each text to determine the frequency of co-occurrence between concepts [41]. The percentage of relevance indicates relationship/linkage between frequently occurring concepts, represented in highly ranked concepts associated to indicate the path of travel of between texts [21].

Table 3: Count Related concepts and Relevance of the top identified concepts:

Ranked Concept List		
Name-Like	Count	Relevance
Internet	151	100%
Bario	64	42%
Telecentre	50	33%
Miri	22	15%
Word-Like	Count	Relevance
people	79	52%
use	67	44%
time	56	37%
outside	53	35%
world	50	33%
telecentre	50	33%

### 3.3.2 Analysis of Non-User Stories with Leximancer 4.5.

Figure 14 depicts themes/concepts map from Leximancer analysis. Eight depicted themes represent non-users' evaluation of the telecentre. Closely interrelated concepts representing top-level classification of stories (gray dots) linked by solid lines, suggest how non-users perceived indirect benefits provided by the telecentre, improving their socio-economic status with proxy help. They also expressed satisfaction, which is another fact, that some non-users, even though lacking in IT skills benefit from the acts of others to help them use the telecentre facilities. According to non-users, Internet gave them seamless access to knowledge and social connectivity to, for example, exchange ideas to the outside world and improving farming techniques for sustainable livelihood. Telecentre contributed largely in domains such as "connectedness", "financial improvements" and "psychological empowerment" and enhanced technical skills. Following are the words of interviewees: *Non-User1: The presence of telecentre encouraged me and motivated to explore new opportunities homestays, hand phone.*

*Non-User2: I did not use it but I know the advantages of this telecentre because it is easy to get information. It has motivated me to live a better life. I am satisfied and proud what I have but I want to improve.*

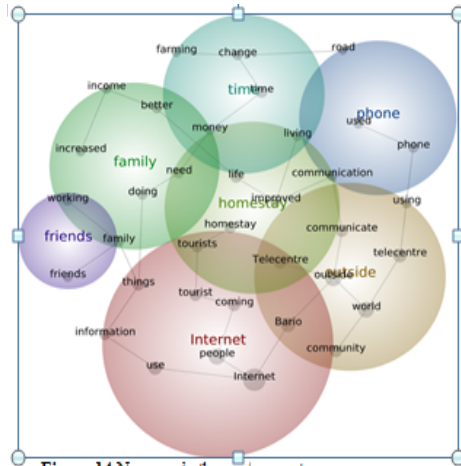


Figure 14 Non user's themes/concepts map

Table 4. : Presents a summary of 8 Higher-Level Themes.

Themes	Concept	Hits
Internet	Internet, people, Barrio, use, coming, things, tourist, information	205
outside	outside, world, telecentre, communicate, community, using	135
homestay	homestay, improved, tourists, life, communication	96
family	family, doing, need, better, income, increased	90
time	time, change, living, money, farming	70
phone	phone, used, road	47
friends	friends, working	35

Table 5: Count Related concepts and Relevance of the top identified concepts

Ranked Concept List		
Name-Like	Count	Relevance
Internet	115	100%
Barrio	48	42%
Telecentre	29	25%
Word-Like	Count	Relevance
people	62	54%
outside	49	43%
use	49	43%
world	47	41%
telecentre	43	37%
communicate	30	26%

### 3.5 Discussion

#### 3.5.1 Succinct reflection on Tangible Impact of Telecentre from users and non-users' perspectives

The findings indicate that a domain of change addressed by participants in the area of the telecentre tangible impact was financial improvements at Users: 36%, Non-users: 55%. The percentages of non-users stories in the area of financial impact that addressed the domains of change were considerably higher even though they lack in ICT skills. This suggests that improvements experienced by non-users in this area involved indirect assistance from friends & family, proxy and those who had access to other Internet sources. The sub-domains of change indicate improvements in "Tourism" recorded at Users: 27% & Non-users:36%: "Agriculture" at users: 36%, non-user:27%. This indicates that users with ICT skills obtained considerable higher impact in "Agriculture" whereas non-users obtained in Tourism. Moreover, financial savings users & non-users reported at 27%, business opportunities users & non-users at 91%. The results further indicate that community have experienced the modern way

of farming which resulted in saving their time, labor cost, while some community people still practices the traditional farming method. But, due to the unavailability of required labor force, the modern way of farming takes its role in the agriculture society of the community. In contrast, non-user farmers benefitted from knowledge shared by tourists resulted in improving vegetables and fruits yields, which led to increase in their income. Both respondent groups indicated that Tour guides always receive clients directly from their associated homestays owners that resulted in their household income improvements. Both respondents' groups revealed that internet has a huge role in promoting community to the outside world, which resulted in tourists' influx, which further led to financial improvements in the business of homestays, tour guides and farming.

### **3.5.2 Succinct reflection on Intangible Impact of the telecentre from users and non-users perspectives**

Empirical evidence from Bario rural community indicates that the telecentre's benefits were not limited to direct users but also benefited the non-users, demonstrating the intangible impact area, all users & non-users (100%) experienced "Connectedness". This finding indicates that "Connectedness" was deemed as the most important value added benefit to the community with contribution towards bridging communication barrier between community and outside world, bringing closer family value ties and business opportunities. Whereas all 11 users (100%) and 9 in 11 non-users (82%) experienced psychological empowerment. Within the "Psychological Empowerment", the focus of change was on the sub-domains of change of "self-efficacy (Users: 100% Non-users:90%) and "Self-esteem (Users: 100% Non-users:72%), it is pertinent to mention that 3 non-users had access to other sources than the telecentre. This study found strong evidence that easy access to communication and information encouraged the users and non-users to explore new opportunities provided by telecentre for living better life. Chamberlain [6], who views empowerment more in the perspective of mental health rehabilitation, refers to empowerment as a process that has a number of qualities such as decision making power, access to information and resources, and having a range of options from which to make choices. These have been defined in this study through data analysis of facts taken for respondent's feedback. Empowerment through ICT means transforming skills into actions to produce a self-determined change [1] of which non-users who have not been able to use computer and the internet directly at the telecentre but obtained benefits in terms of communication with family and friends and also dealt with business clients' registration. In this context, the results of this study show digital opportunities offered by the telecentre empowered poor marginalized community people to achieve their desired goals.

Thus, the major finding of this study is that the sense of empowerment was not worthy at an individual level among users, particularly non-users of the telecentre. The evidence showed the influential impact of Empowerment was not only apparent in users' beneficiaries group but also in non-users group such as being able to gain control over social economic conditions results in stronger sense of empowerment, and positive psychological empowerment (i.e. building confidence and efficacy level, strengthened sense of self-esteem, enhanced motivation level). From the CA perspective, respondents who were interviewed from different life style did their best to expand their capabilities and use their resources from the Eco-Tourism business, farm-

ing or knowledge/skills, which resulted in their tangible and intangible outcomes achievements. Thus, these are the most important intangible outcomes found within collected stories.

**3.5.3 Leximancer 4.5:** The comparative results obtained through Leximancer 4.5 has shown that the telecentre contributed to positive changes in community's wellbeing in terms of ease of communication and information access, promoting community to outside world which created/enhanced business opportunities. Analysis suggests the psychological empowerment experienced by users and non-users exhibit high self-esteem, self-efficacy, and positive level of confidence and motivation.

## 4 Conclusion

In conclusion, better communication with internet connectivity has enabled the community to strengthen social bonds among families, friends and business network, giving a sense of connectedness and sense of belonging, financial improvements, enhanced sense of empowerment, enhanced positive Psychological empowerment (building confidence, self-efficacy, strengthened sense of self-esteem, and motivation level). Thus, this study has shown a way to quantifying the intangible impact and shown at least as significant. The adopted theoretical lens provided a deeper understanding of how the telecentre expanded and extended the socio-economic opportunities for community people and how they utilized their abilities to achieve their desired goals. When this project was concluded in July 2016, the telecentre internet Wi-Fi facilities has ended, respondents then have started to make demand for the telecentre services to be re-operated. This study contributes a qualitative methodology approach to the analysis of collected data in the form of stories focused on the MSC within the context of the telecentre tangible/intangible impact on the users& non-users. Thus, the MSC approach was useful to chart stories based on the telecentre impact at individual and collective level.

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