

**NETWORK-BASED DEVELOPMENT THROUGH
A NON-GOVERNMENTAL ORGANIZATION:
A CASE STUDY OF EMPOWERING WOMEN IN RURAL INDIA**

by

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“You can tell the condition of a nation
by looking at the status of its women.”
- Jawaharlal Nehru

Abstract

This thesis seeks to address whether formal and informal networks created amongst participants in a non-governmental organization (NGO) help to increase empowerment for marginalized women in rural northern India. Empowerment is discussed in terms of changes in mobility, decision-making ability, control over resources, labor patterns, and mental well-being. The approach to answering this question is twofold. Part one involves a social network analysis to determine the nature and extent of networks at ANKURI (Agency for Non Konventional Urban Rural Initiatives). Part two involves measuring levels of empowerment in the ANKURI community. My initial hypothesis predicts that women with more active participation, as measured by network centrality, will have an increased empowerment index, independent of age, education, or time spent at ANKURI. My findings suggest that ANKURI creates an environment for networking within the confines of the nonprofit. Furthermore, ANKURI has increased empowerment in the areas of mental well-being and decision making ability, but less so in areas of gendered labor patterns, mobility, and control over resources. Network centrality is weakly predictive of empowerment. Further analysis and discussion focuses on the sustainability, robustness, and practicality of ANKURI's approach to empowering women.

Keywords: empowerment, social capital, social network theory, centrality measures

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Introduction

At the 2000 United Nations Summit, twenty-three international organizations committed to achieving eight Millennium Development Goals (Klugman, 2010). The third goal, to promote gender equality and empower women, sought drastic change by 2015, with specific milestones from 2005 until now. This included actively seeking to uphold of The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), written and adopted by the UN General Assembly in 1979. This serves as an international bill of rights for women. Yet, it was not until the UN's push for gender equality in 2005 that this document became endorsed by an increased number of countries ("CEDAW," 2007). The milestone year of 2015 has come and gone, and many countries have indeed made great strides in empowering women, recognizing that closing the gender disparity gap is a key component of an economically prosperous country (Sharma, 2005). Countries such as Nicaragua, South Africa, and Bangladesh tend to be the ones that have united the organizational potential of their respective governments, relevant UNESCO programs, and community-run organizations in order to uphold CEDAW and promote the empowerment of women (Zacarro, 2006).

Due to UN support of community organizations that seek to provide microloans to marginalized groups, women have created savings accounts and have obtained authority in family financial decisions (Mazumdar-Shaw 2012; Shah, 2010). Constitutional amendments made to abide by CEDAW at the government level have encouraged positive changes, such as a reduced number of countries prohibiting women from voting—Saudi Arabia, the United Arab Emirates, and Lebanon are a few remaining offenders (Zacarro, 2006). In addition, an increasing number of women are obtaining seats in parliament with help from empowering community

organizations and governmental programs. The progress in the last fifteen years is illustrated in the fact that in several African countries, there are now more women in parliament than in some western countries and, in Nicaragua, it is now required that one half of the seats be reserved for women (Zaccaro, 2006).

While great strides have since been made towards gender equality worldwide, some countries have experienced less improvement, despite their endeavors to endorse CEDAW and other positive UN initiatives. India, compared to many UN countries, is far behind its 2015 goal of promoting gender equality. This is underscored by the 2011 report from the United Nations Development Programme (Klugman, 2012, p. 72-80):

India missed the 2005 deadline of eliminating gender disparity in primary and secondary education. However, the country has hastened progress and the Gender Parity Index (GPI) for Gross Enrollment Ratios (GER) in primary and secondary education has risen. Given current trends, India is moderately or almost nearly on track. However, as the Government of India MDG Report 2009 notes, “participation of women in employment and decision-making remains far less than that of men, and the disparity is not likely to be eliminated by 2015.” Achieving GPI in tertiary education also remains a challenge. In addition, the labor market openness to women in industry and services has only marginally increased from 13 to 18 percent between 1990-91 and 2004-05.

This report captures recent sentiments and concerns for women in India. It is noteworthy that, despite increases in education for women, participation in decision-making and employment remains low, and this is attributed in part to slowly changing cultural expectations of women in India (Sharma, 2005). It is notable that India has the second largest population in the world and has attempted to close the gender gap via an underperforming administration, battling centuries of well-established traditions in which women are limited in their social standing.

In an effort to improve the economic prospects of women, a number of scholars (e.g. Sharma 2005; Narasimhan 1999), nonprofit organizations (e.g. AWARE and Mahila Samakhya), and development agencies (e.g. International Fund for Agricultural Development) have turned to the theory of social capital for inspiration. This theory argues that individuals

embedded in a society can improve their situation by creating useful relationships with people and organizations in their network (Helliwell and Putnam, 1999; Freeman, 1979; Borgatti, 2005). In this way, individuals are able to obtain resources and respect from their community, and make informed decisions to improve their lives. This theory lies in stark contrast to the idea of top-down empowerment from government aid, which has been implemented in India over the past sixty years (Narisimhan, 1999). In search for an affective alternative to top-down aid, many nonprofit and governmental organizations in India have begun to harness ideas from social capital theory to design better programs to enhance women's economic and social development.

This thesis focuses on how the creation of network ties via grassroots organizations, such as nonprofits and non-governmental organizations (NGOs), offers an alternative way to narrow the gender gap in India. I argue that, when grassroots organizations enable the creation of useful networks for women, they effectively empower women beyond the limited economic and political empowerment that top-down aid has historically provided. This process also has the additional effects of mentally empowering women and setting the foundation for social change.

To this end, I sought to embed myself in an Indian non-governmental organization (NGO) with the mission of empowering the women in its community. An opportunity arose to travel to an NGO in Bisht Gaon, called the Agency for Non Konventional Urban Rural Initiatives (ANKURI). This organization is located in the northern Uttarakhand region, near the city of Dehradun. ANKURI's goal is to empower women both economically and socially by teaching women knitting skills, paying for knitted products, and connecting women to knitting circles ("ANKURI, Many Women, One Dream," 2015). Based on this mission statement, the villages involved in the ANKURI program seemed an exemplary place to analyze one application of networking.

My hypothesis is that women with more active participation at ANKURI, measured by network centrality, will have an increased empowerment in the categories of mobility, decision-

making ability, control over resources, labor patterns, and mental well-being. This expectation is independent of age, education, or time spent at ANKURI. This main hypothesis includes two additional parts that must be tested: (1) whether ANKURI indeed facilitates an environment for networking and (2) whether ANKURI has indeed increased empowerment in its community of women. This case study provides insights into the organizational potential of the nonprofit/NGO sector in India. If organizations such as ANKURI can offer a platform for networking amongst individuals and other organizations, they will help minority groups overcome barriers to resources in a way that the Indian government failed to do in the past sixty years. Such organizations help communities overcome oppressive both traditions that limit women's position in society and poor distribution of resources by governmental initiatives.

I begin this thesis first by providing historical evidence of India's struggle to become an developed nation and then introduce the necessity for social change, in addition to the mix of tactics for development that already exist. Second, I define and develop the concepts of empowerment, social networks, and social capital, which are key to this thesis. Third, I explain in detail the methods I use for collecting original data from twenty-nine women at the non-governmental organization, ANKURI, which I worked at in the summer of 2015. Fifth, I explore the networks created at ANKURI, to find out (1) if this NGO facilitates the creation of networks, (2) what the structure to these networks are, (3) what type of information becomes available in each network, and (4) what limitations may exist due to these networks. Sixth, I compute an empowerment index for each survey participant and analyze average empowerment in five categories. Seventh, I perform a linear regression analysis, to see whether network centrality is predictive of empowerment. I conclude with a discussion findings, broader implications, and possible future research.

India After 1947: The Struggle for Development

India only began implementing a community networking strategy to increase empowerment in the late 90s. From 1947 until the 1990s, India has instead favored a centralized, top-down strategy, focusing on the economic and political aspects of empowerment. It follows that the success of such government programs is gauged by measuring economic and political advancements for women: How many assets do women possess? How many women have jobs? How many seats do women hold on regional government boards? Such measurements are no doubt useful, but despite reports of rising jobs, assets, or government positions for women in India, the large population of poor women in rural settings has not received many of these benefits (Sharma, 2005). The continuous failure of India's approach can be best illustrated in an overview of India's history of development after gaining independence from Britain. This will include an overarching discussion of the socioeconomic growing pains that India has undergone in the last 60 years, multiple Five-Year Plans that have attempted to implement programs for the direct benefit of women, and policymaking attempts that have been made to improve the status of women with a top-down approach.

The Republic of India was founded in 1950, after becoming an independent nation within the British Common Wealth in 1947. The transition of power from the British administration to the Indian administrators-in-training was decidedly short: on February 20, Prime Minister Attlee announced that the British would pull out by June 30 of that same year (James, 1997). This was because Britain's resources and manpower had been reallocated to Europe, instead of India, during WWII, and also due to Gandhi's effective activism throughout WWII, which incited many Indians to push for independence earlier than the British had planned (James 1997; Cannadine, 2001). This short transition time was headed by the newly appointed Count Viceroy Mountbatten, who spent his limited time and resources lobbying for support for Plan Balkin,

which would have divided India into three separate dominions: Pakistan, the Princely States, and the rest of British India (James, 1997). As time was running out, Mountbatten panicked and fabricated a second plan that did not involve a partition. This plan grudgingly met approval by Britain—after all, a poorly designed plan was better than no plan at all. The application of the plan was haphazard, inefficient, and rife with military conflicts between communities of Sikhs, Muslims, and Hindus (James 1997).

The Indian Civil Service (ICS), which had previously been the foundation of government administration under the British rule, had lost much its power in the 5 years leading up to the British/Indian transition of power. Consequentially, the ICS was unequipped to handle Count Mountbatten's new plan. In the words of Indian historian Lawrence James (1997):

The ICS once known as the 'steel frame' which held India together, had been reduced to a few 'struts,' and in many areas real power rested in the hands of the administrators to whom their country looked as a source of patronage (p. 617).

Following 1950, India's economy experienced little growth at first, held back by multiple wars with Pakistan, corruption on every level of administration, and poorly organized governmental offices throughout India. It has taken decades recuperate administrative control lost during the transition from British to Indian power. Today India remains heavily centralized, with poor relations between local and federal administration. India recognizes this problem, and has made great efforts to rework its ungainly infrastructure and adopt socialist-inspired policies. It was not until 1991 that India had recovered enough to implement large-scale economic reforms.

The last sixty years of India's history can be seen as a series of large reforms and movements. Reforms in Hindu women's rights, legislation against caste discrimination, a reorganization of the states, and military conflicts occurred in heavy succession from 1952 to 1964 during Nehru's administration (Cannadine, 2001). The 1970s ushered in the Emergency, a state of emergency declared by Prime Minister Indira Gandhi. This is perhaps the most a highly controversial period of independent India's history, but it did notably conclude with increased

constitutional rights for women (Narasimhan, 1999). Expensive safety standard reforms occurred in the 1980s in the wake of the Union Carbide disaster, which killed thousands of Bhopal residents in a large gas leak (Lepowski, 1998). In the 1990s, India experienced both drastic economic reforms and a sharp increase in Hindu-Muslim conflicts under Prime Minister Narasimha Rao (Narasimhan, 1999). In the early 2000's, India made a move towards decentralization by the privatization of corporations and services, including the post, coal and aluminum industries. The 2000s also brought economic expansion due to increased higher education and mobilization towards new technology avenues (Mazumdar-Shaw, 2012). Today, India is experiencing a period of economic growth, decreased unemployment, and a growing middle class. India has faced a huge battle to build a sustainable infrastructure that meets the needs of the second most numerous and diverse population any nation has ever seen.

India has seen significant progress on the economic and industrial fronts, but this progress has been inequitable, meaning that disparities continue to rise between the urban and rural sectors, between castes, and between genders. Women have failed to share proportionately in the fruits of progress, and whatever betterment they have attained has been temporary and has not addressed socio-cultural handicaps that persist (Narasimhan, 1999, p. 198). This inequitable distribution of resources is undeniably a problem; the World Economic Forum of India states that if the societal value of women is not recognized and their marginalization continues, India will never reach economic superpower status on the global stage, and its growing population will cause resources to be spread increasingly thinner (Mazumdar-Shaw, 2012).

The organizational and structural issues that accompanied India's independence were an obvious barrier to equably sharing resources to marginalized groups throughout India, but since then the government has begun to recover. It has even been stated that India now possesses "an administrative machinery unmatched by any other agent" as well as great authoritative power to enact policies throughout India (Narasimhan, 1999, p. 35). The Indian government has allocated

a large amount of money, resources, and programs to the social problem of marginalized women—but has made very little progress. Let us explore specific state plans over the last 60 years in relation to empowering women.

Economic and Legislative Empowerment Initiatives

Economic Empowerment

During the first twenty-five years after the formation of the Republic of India, the Indian state took a generalized, top-down approach to issues of poverty, illiteracy, unemployment, and uneducated minorities (Narasimhan, 1999). It was assumed that by giving government handouts, empowerment would be received by all marginalized groups, including women. This would stimulate the economy and decrease dependency on government handouts (Planning Commission, 1950-71). However, assessment after assessment of the State's Five-Year Plans showed a common trend in which only men were the direct beneficiaries of handouts and small initiatives. In those twenty-five years, India additionally grew into a much larger, relatively poorer population—with the top twenty to thirty percent of the population appropriating most of the fruits of economic development (Narasimhan, 1999, p. 35-37).

It was not until 1971 that India appointed a Commission on the State of Women in India, after a total of four Five-Year-long Plans failed to stimulate significant economic growth. In a report, *Towards Equality*, this commission argued for women as critical actors of development (Guha et al., 1974). They conclude that women and men alike are crucial actors in the development of a healthy economy and the government's treatment of women as patients needing aid is propagating the very problems they are trying to fix (Guha et al., 1974). Despite this advancement in appointing the Commission on the State of Women in India, the Fifth Plan still did not manage to *directly* address the needs of women. Instead, the Fifth Plan targeted households as beneficiaries—a moot point, since the majority of Indian households were and still

are run under a patriarchal format, with little financial decision-making by the wife. The Fifth Plan ran its course, helping the economy temporarily and offering little direct benefit to Indian women. Benefits to other minority groups, such as the Scheduled Castes and Scheduled Tribes (SC/ST), came in a similar form of "ad hoc subsidiaries, grants, and tokenism" and were equally short term in their success (Narisimhan, 1999, p. 35). Without having established any permanent solutions, India's government drafted yet another Five-Year Plan.

The Sixth Plan's opening statements included a discussion of the weakest areas of India: the SC/ST, women, and the rural poor (Planning Commission, 1980-85). For the first time, this plan included a chapter on women and development, written under the assumption that there was a simple solution: economic empowerment was the way to improve the status of India's rural, impoverished women. Thus the Plan called for poverty alleviation programs that would create employment opportunities and generate income specifically for women.

The Sixth Plan began to focus on economic development for rural women, with countless poverty alleviation programs, including 41 programs relating to employment generation for women alone (Planning Commission, 1980-85). However, after 5 years, investigation into the success of these programs returned dismal results (Narisimhan, 1999).

The failure of these programs is attributed to three primary flaws (Narisimhan, 1999): (1) Similar to previous attempts, help did not reach the target audience—either men remained the beneficiaries or a lack of literacy and transportation remained a barrier to reaching the targeted rural women. (2) Economic help was not long term. In many cases, women found themselves in emergency situations and had to sell whatever equipment they had attained through a government loan, such as sewing machines and livestock. Additionally, livestock such as buffalo were expensive to maintain and could die suddenly. (3) Finally, many rural women learned skills, such as sewing or knitting, but found there was no market for such crafts in their rural area, and traveling was not a feasible option.

All three of these flaws relate to a larger issue: the state's continued consideration of women as subjects or targets needing treatment, with all decision-making remaining in the hands of government officials. Therefore, many of these programs succeeded only in spending excessive amounts of government money and in helping women for a few short years.

According to assessments by the planners themselves, none of their projects achieved expected results in bettering communities of women (Narisimhan, 1999, p. 40). Recognizing these failed attempts at granting employment and aid to individual women, the Sixth Plan pivoted to create women's self-help groups, monetarily supported by the central and state government, as well as by UNICEF (Planning Commission, 1980-85). Assessments showed that this plan was working well: networking amongst women created a level of autonomy that had previously not existed and, in the case of emergencies, self-help groups provided a safety-net for the women. However, UNICEF's financial support in the project came to a scheduled close in 1996, and the Indian government's ability to support these projects folded—immediate repayments of loans were required from many of the blossoming women self-help groups. The level of autonomy that had been fostered amongst rural women reverted to instability and heavy dependence on the government. Since then, both the Indian government and grassroots organizations have attempted variations of women's self-help groups created during the Sixth-Plan, but on a smaller scale (Narisimhan, 1999, p. 35).

In summary, each Five-Year Plan has attempted a different method to economically stimulate India and support its underprivileged groups. It is crucial to notice that the core of these welfare interventions focused on *economic* empowerment. Until the 1990s, it is apparent that the Indian State had yet to realize that a single mode approach is ineffective; such an approach fails to give women decision-making power or to change the basic social expectations families and communities have of women.

It is common for any government to attempt to solve complex problems such as poverty, gender disparity, caste disparity, poor education, racism, or segregation through economic means. After all, it is much easier to measure money spent in government handouts or prospective jobs created than it is to measure improved decision-making, gender expectations, mental well-being, or political power for minorities in society. As we demonstrated in the previous section, though, this approach has had little success in India.

India's second method of enacting large-scale social transformation has included legislative changes, designed to give women rights and power. However, we will soon see that such changes appear good only on paper, as the Indian government has historically lacked the infrastructure to enforce their own policies.

Legislative Changes

During Indira Gandhi's service as Prime Minister from 1966-1977, women's rights to equality, dignity, and freedom from discrimination became secured in the Constitution of India. Specifically, the Constitution of India guarantees to all Indian women equality (Article 14), no discrimination by the State (Article 15(1)), equality of opportunity (Article 16), and equal pay for equal work (Article 39(d)). In addition, it allows special provisions to be made by the State in favor of women and children (Article 15(3)), renounces practices derogatory to the dignity of women (Article 51(A) (e)), and also allows for provisions to be made by the State for securing just and humane conditions of work and for maternity relief (Article 42). Despite this, the rights of women are not enforced at a social and community level. Without this foundational reinforcement, discrimination continues in an economic, political, and social sense. Education, land ownership rights, and workforce participation are often withheld from women by members of the community, regardless of women's rights stated in the constitution (Shah, 2010). This does not mean that men are the only ones withholding rights from women; female community members also participate in propagating social oppression because it seems "normal" and

"traditional." To expect anything different would be seen as socially abnormal. More extreme crimes, such as domestic violence, sexual harassment, and trafficking, oppose tradition and elicit greater objection when women try and fail to receive compensation for crimes committed against them ("Crimes Against Women," 2005). In the case of these serious crimes, women seeking to claim their constitutional rights are disappointed by the lack of community support and malpractice in administrative action. Despite Indira Gandhi's constitutional changes in the 1970s, it remained difficult to overcome the traditional ideals of gender roles in society due to a lack of government reinforcement of women's constitutional rights.

Women's constitutional rights continued to receive a low level of reinforcement until the late 1980s, when new plan was finally drawn up in 1988 to take up specific women's rights issues in Parliament. The hope was that with attention to women's rights, the status of women might improve with a top-down approach. However, proposed amendments were often pushed aside with the excuse that they were not a priority (Narisimhan, 1999, p. 44; Shah, 2010). In 1994, six years later, an amendment was passed requiring that one third of the seats at a local government level be reserved for women. This top-down approach has thus far seen little success: studies found that women holding these local seats were often "mere puppets in the panchayats"¹—blindly signing resolutions as instructed by the male representatives (Narisimhan, 1999, p. 13, 45). These women remained passive observers to a process in which they should have been key participants. In interviews conducted for a study in the Uttar Kannada district of Karnataka, women representatives reported that they did not know their own authoritative rights (Narisimhan, 1999). Without first understanding their positional authority, it is impossible for these women to obtain any form of power: the ability to enact changes when they were contrary to the desires of others. Additionally, surveys and interviews showed that the community itself did not perceive the women leaders as having any real authority or power.

¹ The *Panchayat Raj* system, enacted in 1992, is a multi-tiered system that allows villages to govern themselves

On both a legislative and economic level it is apparent that (1) these women are not aware of their own empowerment when given political authority and (2) their communities do not recognize their authority. (Narisimhan, 1999, p. 46) Therefore, strategies for empowering women must focus beyond economic and legislative restructuring to restructuring the social relations and perceptions that constrain women. (Narisimhan, 1999, p. 47)

The Third Ingredient: Social Change

Empowerment cannot be reduced to economic and political factors: other social factors such as decision-making ability and mental well-being are vital, too. An alternative to a top-down approach is the use of a community network strategy, which utilizes the power of a grassroots movement amongst individual communities, supported by the help of nonprofits and non-governmental organizations (NGOs). This approach seeks to put the information and resources in the hands of its participants through the creation of networks in and amongst communities. Social restructuring would include a deviation in a long Indian history in which men traditionally carry lineage, inheritance, identity, status, and economic security. These traditions overlook class and caste lines in its discrimination against girls and women, whose traditional role involves remaining in the private confines of their household (Karam, 2016).

The Relationship Between Empowerment, Social Networks, & Social Capital

Empowerment

Empowerment is a concept that is central to this thesis. However, there exist many possible definitions of empowerment, which tend to include ambiguous words such as "choice, autonomy, and freedom" (Pettit, 2012, p. 6). Empowerment has alternatively been defined as the "opening of avenues and possibilities" (Pettit, 2012) but with such an open-ended definition, measurements for empowerment can be cherry picked to fit the needs of a study. One of the

more professional definitions of empowerment includes changes in social, economic, political, and legal power. This multidimensional definition begins to address the complexity of empowerment. It also includes the concept that empowerment is a change over time and can be measured relative to the empowerment of others. After researching best definitions of empowerment, I have chosen to use IFAD's² definition, as this appears to be the most accepted in UN-related initiatives across the world (IFAD, 2000). Since the 1990s, this UN organization has been conducting research on social and economic factors that contribute to empowerment and, after a decade of research, IFAD has defined four of the main *processes* that relate to empowerment of women, which encompass social, political, economic, and legal changes within each category:

- Changes in women's mobility and social interaction
- Changes in women's labor patterns, including altering gender norms
- Changes in women's access to and control over resources
- Changes in women's control over decision-making

Each of these categories can be broken down into further subcategories. For example, the first category includes the ability to travel to distant places, interact with government officials, or open and access a bank account. I will not include an exhaustive list of these subcategories, but they are reflected in part two of the survey found in Appendix A1. The only common critique of IFAD's definition is the lack of a fifth category: changes in women's mental well-being (e.g. Sharma, 2005; Narasimhan, 1997). Narasimhan (1997), a researcher in the field of empowering Indian women through alternative strategies, states that increased mental well-being can change a women's perception of her status in society, allowing her to overcome the pressure of gender stereotyping traditions and also allowing her to more creatively use existing resources. Therefore, the complete definition used for empowerment in this thesis is as follows:

- Changes in women's mobility and social interaction
- Changes in women's labor patterns, including breaking traditional gender norms.

² International Fund for Agricultural Development

- Changes in women's access to and control over resources
- Changes in women's control over decision-making
- Changes in women's mental well-being

Social Networks and Network Theory

I hypothesize that the success of a community action approach to empowering women is reliant on networking between individuals and organizations. This thesis therefore utilizes social network theory to analyze network structures that are created with this grassroots strategy. Social networking theory is the study of how people and organizations interact with others inside their network. A social network consists of relationships (edges or ties) that connect the actors in the community (nodes). Networks can be broken down from large components to small components to explore the many aspects network theory. The largest component is the network structure—the overall shape of the network. A network can be complete, in which all actors are connected, or it can be sparse, in which there are few redundant connections. Network structure can influence the flow and diversity of information (Burt, 1995). Examples of smaller network components include cliques, factions, and network centrality. Centrality is important because it indicates who occupies critical or influential positions in the network (Freeman, 1979 p. 227; Valente, 2008). Different centrality measures, such as degree, betweenness, closeness, and power are all related, but measure a different process through which key actors may influence the flow of information and resources in a social network (Valente, 2008). Friend groups, university departments, and even interest group politics can be analyzed using formal network studies. In this thesis, social network theory will be applied to the case study of ANKURI, an NGO that empowers women in northern India. Using network analysis, we can extract information about both individual actors and about the greater community.

A network analysis is advantageous when approaching complex issues, such as how societies and communities function, because it is both empirical and ethnographic: network

analysis combines data-driven graphs and measurements with the contextual information necessary to provide useful feedback and advice, just as any experienced consultant would do for a client. The data driven graphs can give measures of centrality, multiplex relationships, coalitions, and more. This data takes on a more complicated meaning when the stories of actors are associated with the network. This can be done through interviews or by linking attributes to individual nodes, such as age, gender, and occupation.

Social Capital

According to Robert Putnam, a social scientist who has contributed to the discussion of social capital over the past thirty years, social capital refers to the networks that prove useful in advancing one's life and career (Helliwell and Putnam, 1999); social capital—like human capital or financial capital—is spoken of in terms of *positive* outcomes, such as how many useful business connections one has. It does not provide a measurement of the negative possibilities of being embedded in a network, such as when an individual becomes unable to disentangle themselves from a harmful relationship, is in a situation of subservience, cannot obtain the resources they need, or does not realize that their own network is limited in resources. In short, social capital does not include costs, tradeoffs, and risks in its definition, often because it is hard to distinguish which ties are useful and which are not when measuring social capital (Gargiulo and Benassi, 1999, pp. 298-322).

Discussions on social capital are often linked to the concept of network centrality. It is important to make a clear distinction between network centrality and social capital, lest the two ideas become synonymous in the eyes of the casual reader. When measuring network centrality, a high centrality score for a specific node does not necessarily imply high social capital for that individual—further investigation would be needed to ascertain whether the high centrality has indeed created social capital, which is often to perform because social capital is a term that has

been under constant revision since the 1980s. There exists neither a rigorous definition, nor an exact procedure to measure social capital.

It is, however, possible to measure empowerment through the use of a longitudinal study. Because empowerment is defined as a relative change over a period of time, it can have either a positive or negative measurement—unlike social capital. If a positive change in empowerment exists in a community supported by a non-governmental organization and if placement in a network can be correlated to this empowerment, then it can be argued that social capital (network ties that prove useful) has indeed been created as a positive response to networking in communities, which would be convincing argument for the usefulness of grassroots organizations in India that seek to empower women.

The Role of Women-focused NGOs in India

An estimated 2 Million NGOs existed in India as of 2012, many of which are devoted to empowering women (Klugman, 2012). With so many NGOs, there is wide variation in their structure, resources, and goals. Such wide variation makes it necessary to create categorizations for the NGO sector, to facilitate a more narrowed discussion about ANKURI. One of the most important categorization of the NGO sector that of location: whether an NGO is located in a rural or urban environment will affect its structure, resources, and mission statement.

Rural and Urban NGOs

The structure of a rural NGO often relies on the participation of volunteers and local community members. Oftentimes, such NGOs will enable broad participation by selecting "a few basic activities that can be performed by the majority of their members" (Ristic, 2005, p. 4). Common examples include hand crafting products (knitting, sewing, weaving) or milk production. Rural NGOs also tend to have general mission statements and guiding principles.

Examples might include female empowerment, poverty reduction, and child education. The decision to have a broad mission allows these NGOs to gather more resources and approval from a larger pool of community supporters; a narrow mission statement can have the effect of offending excluded groups or put social pressure on the participants to choose between ideals of the NGO or the greater community (Ristic, 2005, p. 4). It is also common that the staff of these NGOs consists of volunteers. As a result, NGOs have to deal with temporary help and quick, informal training programs.

The second category consists of NGOs from urban areas. These often have a small but professional staff working in more specialized areas such as legal reform, democratization, trafficking of women, and violence against women. These NGOs sometimes also have a large, temporary staff of volunteers, but the core group of staff working in these NGOs is more likely to consist of educated lawyers, economists, and professors (Ristic, 2005, p. 6). They are capable of implementing tightly organized projects, acquiring international donors, measuring the success rates of their NGO, and navigating corrupt bureaucracy. By virtue of being in an urban location, these NGOs receive more funding and resources than the NGOs in the first group.

Therefore, the women who work and participate in urban NGOs experience more direct financial empowerment through their NGO membership, while the women in the rural group are indirectly empowered through utilizing social capital. For example, women working in urban NGOs are often paid for their work, while women in rural NGOs are often volunteers who utilize social ties in the community to support themselves and the NGO. Additionally, when situated in a major urban area with good infrastructure and access to computers and the Internet, urban NGOs are in a better position to generate, maintain and institutionalize a more diverse pool of social capital. Meanwhile, the social capital generated in a rural environment may be of a more informal, friendship-based nature.

Categorizing ANKURI

ANKURI, falls mainly into the first category: it lies in the rural village of Bisht Gaon, half an hour drive from the city of Dehradun. The goal of ANKURI, to empower women, is very broad. Consequentially, a large percentage of women in Bisht Gaon and the surrounding villages are participants. However, ANKURI falls into the second category in that its staff consists of a few paid women. Most are informally trained or have a basic level of higher education. The NGO also subsists off of volunteers from the community and from visiting foreign volunteers, including anthropologists and university students from America. The ability to pay and train staff and obtain diverse social ties is due to the educated, well-traveled owner. In later analysis, her high network centrality will prove to be a large asset both to the NGO and the participating women.

In order to ascertain whether networks at ANKURI have indeed created or depleted social capital, I measure the amount of empowerment created and then test whether the networks at ANKURI have been instrumental in creating this empowerment. Empowerment shall be defined as a relative change in aspects of mobility, gendered labor patterns, decision-making, ability to obtain resources, and mental well-being. Because empowerment is defined as a relative change over a period of time, it can have either a positive or negative measurement—unlike social capital. If a positive change in empowerment exists and if placement in a network can be correlated to this empowerment, I argue that ANKURI does indeed create social capital for its participants and is encouraging social change in India where the government has failed to do so.

Methods

The previous sections provided a historical context on women in Indian society as well as some background on the theories I will be implementing. Next, network theories will be applied

to the context of rural northern India at a non-governmental organization, ANKURI. This is followed by an analysis of changing empowerment at ANKURI over the last fifteen years.

I used multiple methods to analyze ANKURI, including surveys, qualitative interviews, and demographic research. Both the qualitative interviews and the surveys were made possible with the help of a team of local translators, students from Princeton, and students from the University of Michigan. Historical background of the area was collected through lecture-like discussions from the owner of the NGO and online documents. All data has been anonymized in consideration of the participants of ANKURI and my study has met the approval of the University of Michigan's Internal Review Board.

Survey

With the help of several translators, I obtained twenty verbal surveys. While I would have ideally surveyed the majority of the one hundred participants in ANKURI, this is a remarkable number considering obstacles such as illiteracy, need for English/Hindi translators, and the one to two hour time-commitment for each survey participant.

The survey consists of two parts (Full survey found in Appendix A.1). Part one consists a network name generator of members of ANKURI. This section asks questions about different types of relationships, including knitting circles, friendships, and advice relationships. Using specific names given during the surveys, I constructed the networks and calculated multiple measures of centrality, including degree, betweenness, closeness, and Bonacich Power (Defined in detail on page 50). The overall structure of each network will also prove instrumental in the discussion of ANKURI's strengths and weaknesses in empowering women. While writing this survey, it underwent multiple revisions by the owner of ANKURI, in order to ensure sensitivity to the participants. This procedure also meant that the number of questions I could include was reduced (Omitted questions found in Appendix A.2). These excluded questions inhibited me

from compiling a network analysis of the various organizations and resources ANKURI participants connect to *outside* of ANKURI.

The second part of the survey includes twenty questions relating to empowerment. Due to the complicated nature of empowerment, this pool of questions ranges from topics of social and psychological changes to more concrete changes in financial situations. These questions are based on the International Fund for Agricultural Development's (IFAD) definition and methods for measuring empowerment. It is also important to know for now that each survey question asks about conditions *before* and *after* joining ANKURI and are based on a 1-5 Likert scale. This allows me to measure empowerment as a *change* in the status of women, and also eliminates some biases, such as the tendency to use of higher numbers in the Likert scale (Friedman et al., 1994, p. 792-795). Part two of the survey ends with a series of demographic questions, which are used as control variables, to see whether demographics such as age and education account for changes in empowerment more so than measures of centrality.

The results from the survey are used to calculate four centrality measurements as well as an empowerment score for each woman, which I average to find the overall change in empowerment at ANKURI. The ultimate goal is to perform a linear regression analysis, to see whether high centrality is predictive of positive empowerment. If there is a significant, positive correlation, then it can be said that ANKURI facilitates the creation of networks that lead to empowerment.

Qualitative Interviews

I conducted a series of thirty qualitative interviews with twenty questions throughout the villages surrounding ANKURI. Questions were verbally asked in English and translated to Hindi. Participants' responses were then verbally translated back to English. Voice recordings allowed me to more accurately translate the conversations and to clarify specific Hindi phrases

with the translators. These interviews were conducted to provide context for the data received in the surveys and were also an opportunity to express immediate needs, desires, and positive feedback for ANKURI. In many cases, the women were very conversational and shared personal stories that deviated from the original twenty questions. Several of these anonymized qualitative interviews will be discussed in conjunction with the survey results, and more can be found in Appendix B.1.

Results

Results show that ANKURI enables new network contacts amongst participating women, though some of the women who are hierarchically privileged tend to dominate the center of multiple networks. The more abstract aspects of empowerment, such as mental well-being, have seen a larger positive change over the past fifteen years than other aspects of empowerment, such as mobility and gendered labor patterns. In correlating network centrality with empowerment, it was revealed that Bonacich Power centrality was predictive of empowerment, while betweenness, closeness, and degree centrality were not. A node's Bonacich power centrality is a function of the centrality of its surrounding network contacts. Thus actors may be connected to central actors or a central clique, though they are not central themselves. In the following sections, I will reiterate my methods, discuss the results I just summarized in greater detail, and draw conclusions. These sections are broken down into following: (1) Network Study, (2) Empowerment Study, and (3) Linear Regression Analysis.

1. Network Study

Network data was drawn from a series of name generating questions in the survey, found in Appendix A.1. Based off of this data, I constructed networks and explore these network figures to find out (1) what network structures and patterns exist, (2) what type of information

becomes available in each network, (3) what limitations may exist due to these networks, and (4) if ANKURI facilitates the overall creation of networks. The following results explore the full network, invitation network, knitting network, and advice network and discuss these four topics.

The full network, depicted in *Figure 1*, combines all of the relationships within ANKURI that were surveyed, including introductions, knitting circles, friendship, and formal advice networks. This figure reveals a network structure that is completely connected, but that contains multiple cliques and peripheral nodes that bridge the gap between these cliques. When considering *Figure 1* in combination from qualitative interviews, it was revealed that women holding formally appointed positions (e.g. craft manager) are much more central to the network or acted as powerful bridges between cliques, while regular knitters remain periphery.

For example, Janki is the most central node. She is a current craft manager at ANKURI and retired village head, called a *pratap*, an important role in local village government. As craft manager, her job is to help distribute wool and teach new designs to the women in her area. Megha, Babita, Mukta, and Nirupama also have high betweenness values. These women tend to connect small cliques to the larger, central network in which Janki is central. Nirupama is a craft manager, while the other central women are advanced knitters who help lead knitting circles. The betweenness scores of these women is summarized in *Table 1* and support the idea that appointed women are more central while regular knitters are not.

Full Network

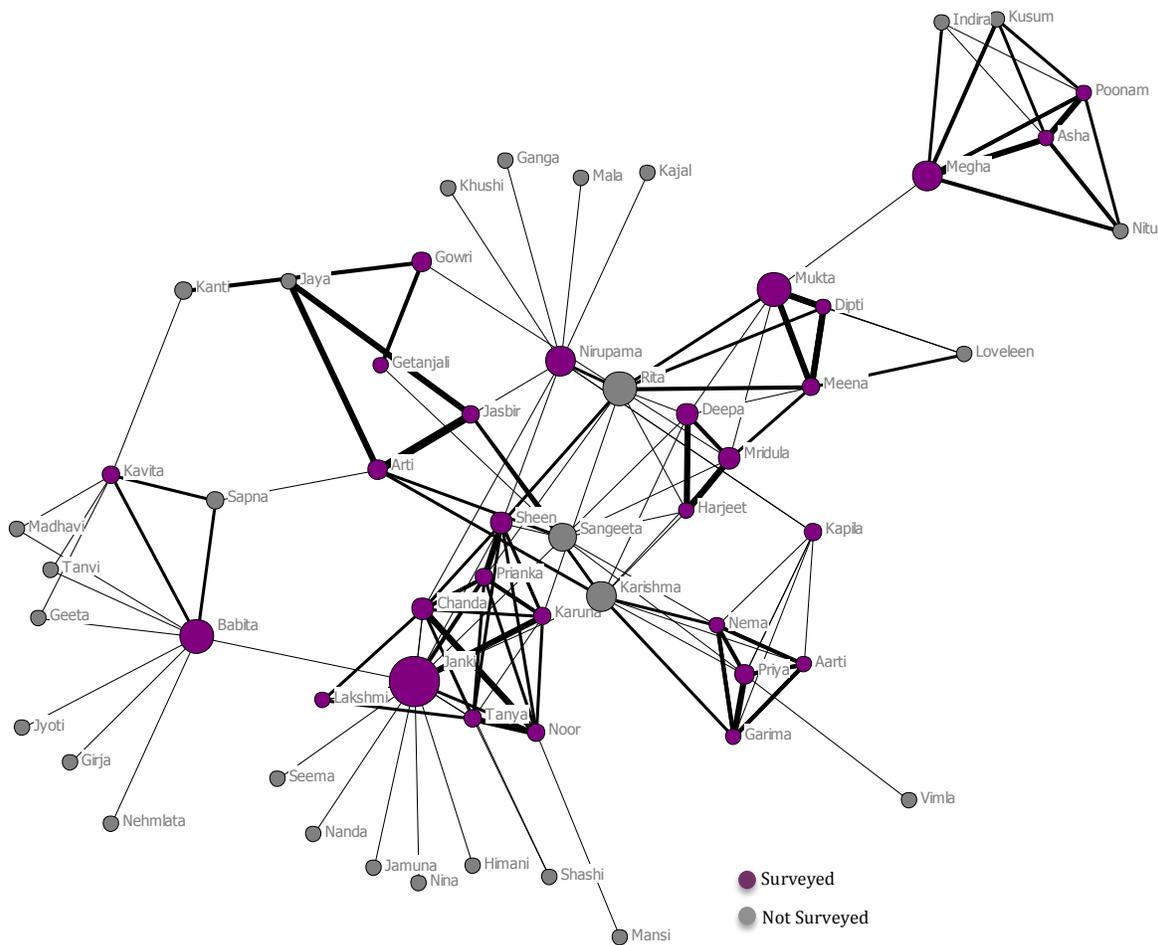


Figure 1: Full Surveyed ANKURI Network

Here all ANKURI networks that were surveyed, including invitations, knitting circles, friendship, and formal advice networks. We do not have information on the complete network of ANKURI, as we were only able to survey twenty-nine of the approximate one hundred participants. Therefore, throughout all network figures, purple nodes represent the twenty-nine women that were surveyed, while grey nodes represent other ANKURI participants who were not interviewed, but mentioned by survey-takers. Size of each node corresponds to betweenness value, a centrality measure that calculates how often a node lies on the shortest path to other nodes. Bonacich Power, an eigenvector centrality measure, was not available in the network visualization software, as it is a more recently accepted measure. Ties are weighted by the strength of a relationship between nodes. A thick, dark line means that two nodes have a multiplex relationship. All names mentioned are generated from a list of most popular northern Indian names.

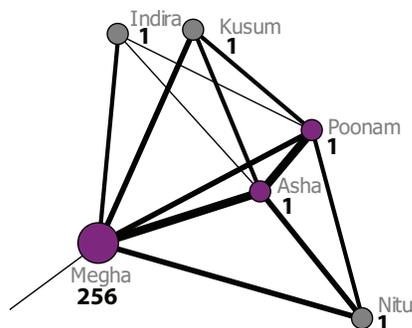


Figure 2: Full Network Close Up

This illustrates a section of the full network, inclusive of betweenness measurement. A score of (1) means that a node lies on the shortest path to another node only one time. Megha, who connects these 5 women to the rest of the network, has a high betweenness score (256).

Table 1: Betweenness Measures for the Full Network

The following data shows the top five and bottom five central figures in the full network, based on betweenness. For data on all four centrality measures, see Appendix D.1.

Top 5	Name	Betweenness Score	ANKURI Position
1	Janki	624.89	Craft Manager at Shigli
2	Babita	339.02	Advanced Knitter
3	Mukta	321.87	Advanced Knitter
4	Nirupama	271.86	Craft Manager at Galjwari
5	Megha	256.00	Advanced Knitter
Bottom 5			
25	Arti	2.71	Knitter
26	Garima	2.71	Knitter
27	Asha	1.00	Knitter
28	Poonam	1.00	Knitter
29	Lakshmi	0.00	Knitter

Three other women, Rita, Sangeeta, and Karishma, appear central to the network in *Figure 1*, though I have not included them in *Table 1* because their grey nodes indicate that they were not surveyed. This means that, without reporting their own ties, other members of the network reported having many relationships with Rita, Sangeeta, and Karishma. If these three had been surveyed, they may have appeared even more central to the network. This high centrality is explained by the fact that Rita is the owner of ANKURI, while Sangeeta and Karishma are the two young administrators of ANKURI, aged twenty and twenty-three. When Rita is busy, these two administrators fill her shoes—their contact by with the surrounding villages tend to consist of professional relationships, as they are interacting with many women who are older and socially superior in the context of their villages. Their centrality further supports the idea that hierarchy is linked to centrality at ANKURI, which is to be expected to an extent, as formally appointed participants perform tasks of teaching and distributing materials. The problem lies in the fact that centrality is limited to a few select women and is proportionally much higher than other knitters. This means that information and resources do not percolate to the periphery of the network, where the majority of ANKURI knitters currently are. This

network structure may handicap ANKURI from its mission of equally empowering all women in its community, but we can not know whether this is true until we look at the individual relationship components—and the information they may gain from such relationships.

Invitation Network

The first step to joining ANKURI involves being recommended by other knitters or talking directly to Rita, the owner. Therefore, the invitation network depicted in *Figure 3* illustrates these important initial relationships with ANKURI members and also shows how the popularity of ANKURI diffuses throughout the surrounding villages. For many survey participants, the story of being introduced to ANKURI is memorable. Some women joined under difficult financial or emotional circumstances, while others joined for their passion of knitting or desire for community action. In all cases, being connected to the right person opens a door to the opportunities, resources, and security of being an ANKURI knitter. In *Figure 3*, it appears that Rita is the most active in inviting women to join ANKURI.

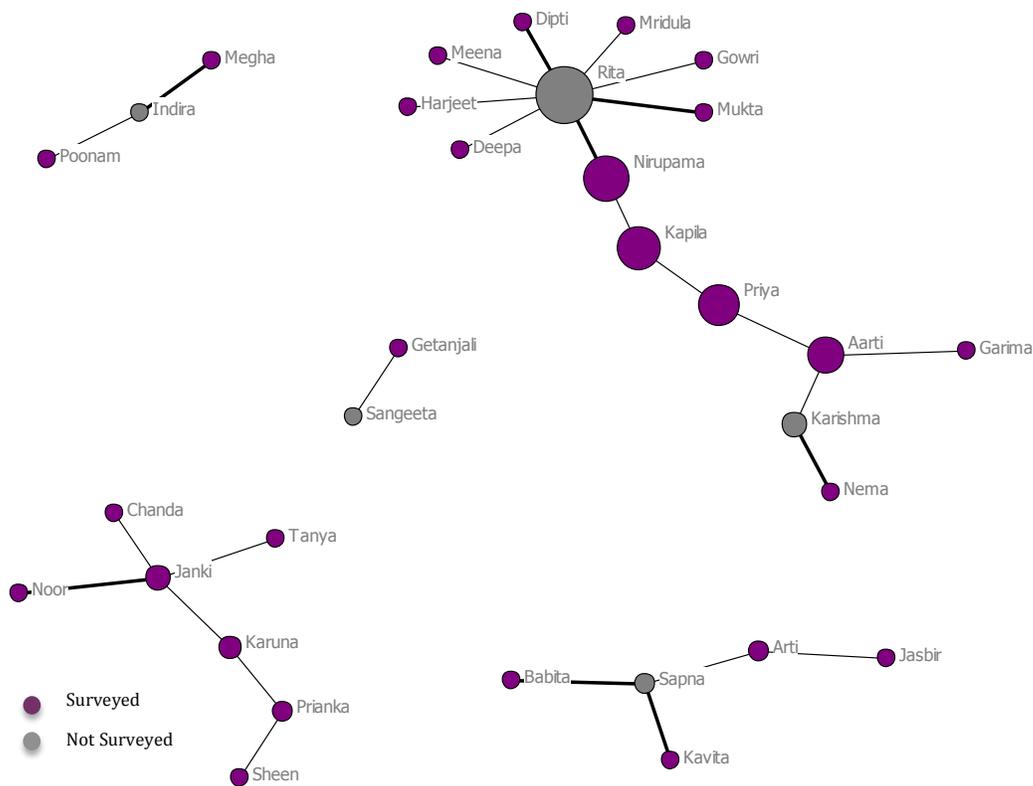


Figure 3: Invitation Network illustrating who initially invited or recommended whom to join ANKURI

Kapila is just one of many women invited to join ANKURI by Rita. In a qualitative interview, Kapila describes being introduced to Rita by Narupama. She repeatedly mentions that Rita is both the reason she joined ANKURI and the reason she feels she has a safety: “I first came to the center with my feisty son in tow, unsure of what to expect. The owner of ANKURI gave him a banana to distract him so that I could learn the patterns with the other women. I don't know what I would have done without Rita's support.”

Rita's support of Kapila and so many other women has made a positive impact on their lives. When considering the future of the NGO, though, her enthusiasm may have repercussions—Rita is the only central and there are no other highly central nodes or redundant network ties. Women like Kapila tend to see Rita, rather than the broader ANKURI community, as the safety net. This dependence on Rita has created a brittle network structure, meaning that, if Rita does not continuously recruit people to ANKURI, the organization will stagnate. However, the invitation network is the only network in which Rita has such a high centrality measure. In the following networks administrators, craft managers, and advanced knitters take center stage.

Advice Network

After joining ANKURI, women receive training from Sangeeta and Karishma at the knitting center. They then join a knitting circle according to geographic location and product (e.g. poncho, scarf, cardigan). By having a hierarchy in combination with the formation of knitting circles, ANKURI participants can expect to gain practical advice on knitting and finances from other more experienced participants. *Figure 4* shows the advice network at ANKURI. Notice that advice ties are directed: women elect other women that they have received advice from. Many arrows pointing towards one woman means she gives lots of advice. In this figure, we see the some semblance of the hierarchy discussed in the full network section: Janki, Karishma, Sangeeta, Mukta, and Megha are central actors with an

appointed role, though not all central actors in this network have a specific job at ANKURI. Instead, it comes down to level of expertise. Mridula is one example of an advanced knitter without a formal role at ANKURI.

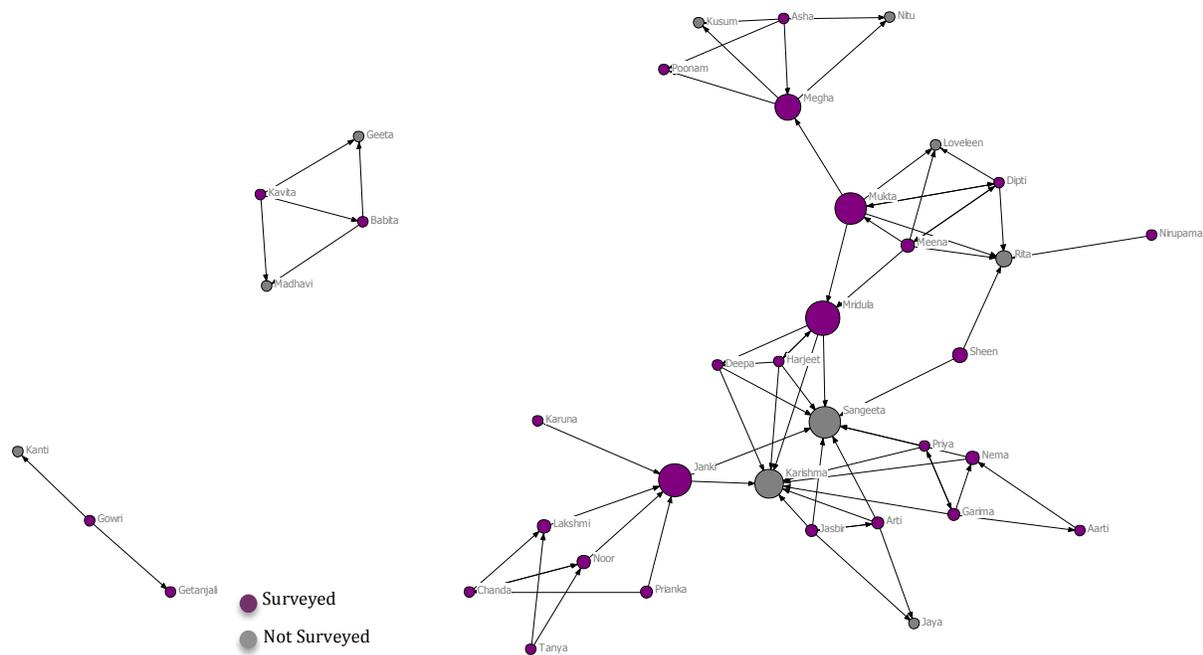


Figure 4: Advice In Network

This network shows a directed advice network, in which nodes point to other nodes that they receive advice from. (Find Advice Out network in Appendix D.2) For example, Janki has an edge directed at Karishma, meaning that Janki often receives advice from Karishma.

In the above network, advice-takers elect other women they see as mentors and leaders. I also wanted to know whether central actors perceive themselves as leaders and financial experts—such self-perception is an indicator mental empowerment. Figure 5 shows a self-reported network of activities women choose to pursue. Janki, Mukta, and Megha are all positioned between finance, leadership, and advanced knitting activities. The women who go to these central actors for advice, such as Lakshmi and Noor, fall closer to activities of beginner knitting, relaxation, and creativity and are often new. Figure 5 shows that, by entering the

network of ANKURI, women have available mentors who are willing to coach knitters in new skills such as finance and more advanced knitting, but that this number is limited: just five women in total saw themselves as leaders at ANKURI. Meanwhile, the some of the most seasoned knitters (Nirupami and Arti) prefer to pursue creative and advanced knitting.

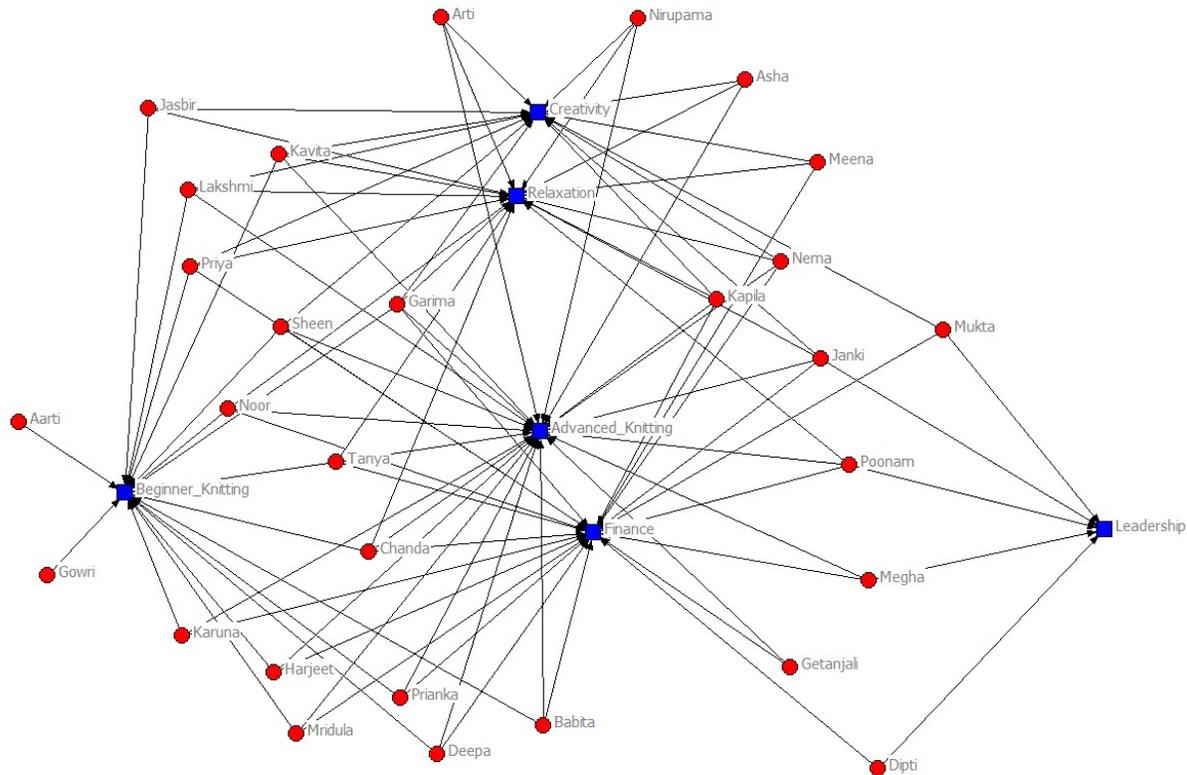


Figure 5: Network of Activities at ANKURI

This multi-mode network shows a self-reported network of activities women participate in. The red nodes represent surveyed women, while blue nodes show common activities, including leadership, finance, advanced knitting, relaxation, creativity, and beginner knitting. The category of 'other' was an additional option that no one chose.

Who, then, is likely to see themselves as a leader at ANKURI? One qualitative interview with Janki, we learn that leadership skills may be fostered in experiences outside of ANKURI. So far Janki has taught knitting and finances to over twenty women in her village since joining the NGO, and since word has spread, other women from surrounding areas are coming to learn

from her as well. In a qualitative interview, she describes why her knowledge, resources, and authority are greater than most women in the surrounding villages.

Around the same time that I started working for ANKURI six years ago I became the *pratap*—our village head woman—of Shigli. I am in charge of the local administration of my village. This includes the organization and management of our water, roads, and electricity, in addition to ensuring everything is working smooth.

Janki has used her unique position of power to promote her passion of teaching the women in her village how to knit, as she saw the potential of helping them become financial empowered. There are few women who have culminated leadership skills purely through experiences at ANKURI. ANKURI could improve this by encouraging advanced knitters to enter into a leadership role, as this would keep the most senior women engaged. Mentorship is invaluable in fostering the skills of beginner knitters. ANKURI could ask for volunteers who want to become leaders; there are many areas such as accounting, marketing, and selling knit products at bazaars that do not require advanced knitting.

Knitting Network

The knitting network's structure does not revolve around women from 'upper management' as the full network and invitation network did. Rather, these knitting circles connect regular participants and there is potential for information sharing that is informal and based on equal hierarchical standing. Tanya, Chanda, Noor, Prianka, and Preena are examples of knitters who do not have an appointed administrative role at ANKURI, but appear highly central to the knitting network shown in *Figure 6*. These nodes have the highest betweenness score, partially because they are members of the largest clique: the group of women who live in Shigli, the closest village to ANKURI. All other nodes share a similar level of betweenness.

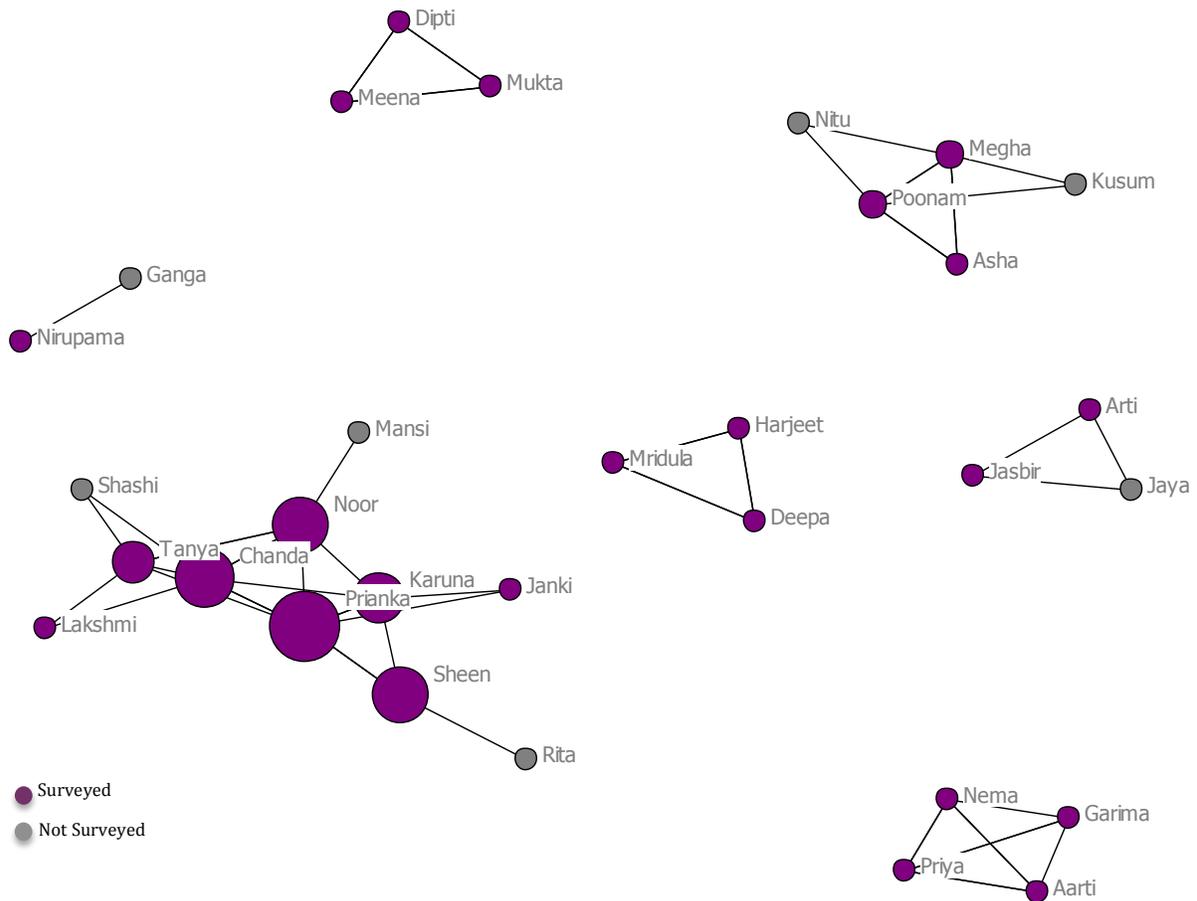


Figure 6: Knitting Network

This network depicts the knitting circles within ANKURI, which are based on geographic location or product. The largest clique depicts the village of Shigli.

While surveying these women, we asked what topics they might talk about in knitting circles as opposed to friendship groups, to find out what types of information and resources being shared. Results from both the surveys and interviews showed a trend to talk about health, education, and business related topics in knitting circles. More specifically, topics included the progress of children’s education, how to open a bank account, how save money on shopping, how to knit more efficiently, and how to deal with sickness in the family. For example, Noor has found significant value in conversing about these topics with ANKURI women:

I now run the house with my earnings, and can keep extra money for my children to learn, study, and hopefully become something...My eldest son is seventeen and

has troubles with walking, speaking, and hearing, so he has had to leave his studies. He hasn't been to a doctor so we can't be sure, but the women I knit with think he has polio. I talk about his health and my finances often with the women I knit with. It is difficult because I lost my husband six years ago to tuberculosis.

Such conversation topics can share progressive ideas of gender roles and also lead towards measurably better financial and educational situations. Often times, though, women above the age of twenty-eight spoke in terms of benefitting their children with their new income, bank account, and knitting skills instead of benefitting themselves. Noor is one such example, but her situation is atypical. Let us look at a more common scenario, from an interview with Priya:

I did not finish school, and now that I am married that is not a possibility. With my earnings I want to help my children finish school—I hope that they get to learn English. I am currently saving up to open a bank account for my daughter.

After having ANKURI in the community for fifteen years, there still seems to be an assumption that if you do not start off getting a good education and job, it is hard to change your situation after getting married. In summary, the knitting network allows the circulation of information on health, education, and business between women that would not otherwise interact as often. Women who are younger and unmarried tend to take greater advantage of this information.

Friendship Network

The friendship network, shown in *Figure 7*, overlaps with the knitting circle network, but reintroduces women who are hierarchically important to ANKURI. For example, Janki and Nirapama are central and are both craft managers. In contrast to the knitting network, topics were of a more personal nature, including personal health issues (such as pregnancies and menstrual cycles), depression or happiness, and relationships with husbands and other family members. These friendship circles provide a psychological and financial security network for women who come from unstable or abusive homes or who have gone through depression. One such story was

explained by Karuna in an interview, though she did not want to dwell on the subject extensively:

I started working with Ankuri three months ago in order to support my five-year-old daughter since I left my husband because of his domestic violence. I needed to be independent and stand on my own feet and earn a little bit, and I felt that I could talk about this situation with the women here.

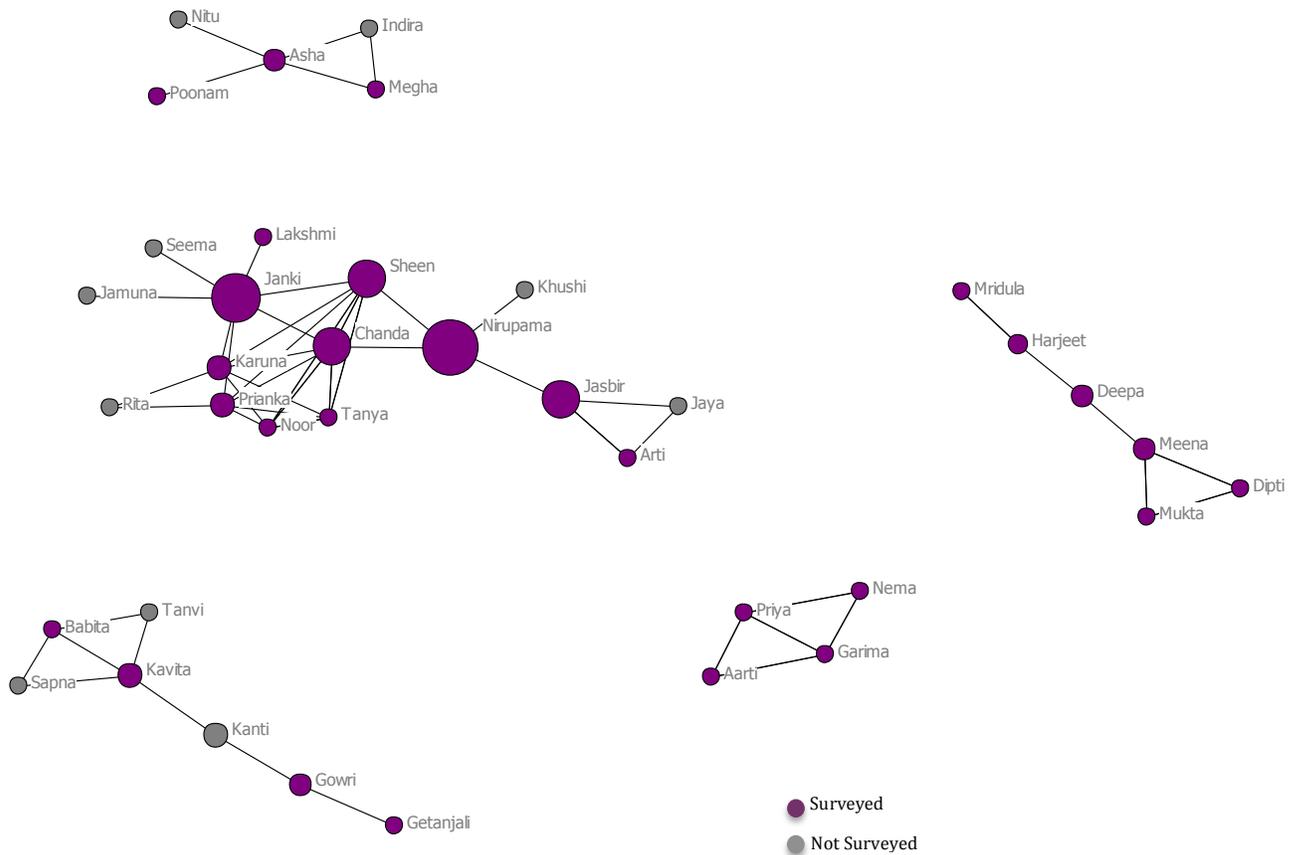


Figure 7: Friendship Network
 This network depicts the friendships that ANKURI participants have within of the NGO.

Karuna is quite new to the network, but has already gained four friends. This brings us to one of the goals of this analysis: gauging whether ANKURI help to facilitate the creation of networks. It is uncertain as to whether this friendship network and ability to talk about personal topics is the result of ANKURI's presence in the community, or local tradition and culture. One effort made to explore this involved asking the surveyed women to name friends outside of ANKURI, with whom they could talk about similarly sensitive subjects. When asked, few

women could think of a friend outside of ANKURI, and those that could often listed sister-in-laws. This sparse network is illustrated in *Figure 8*.

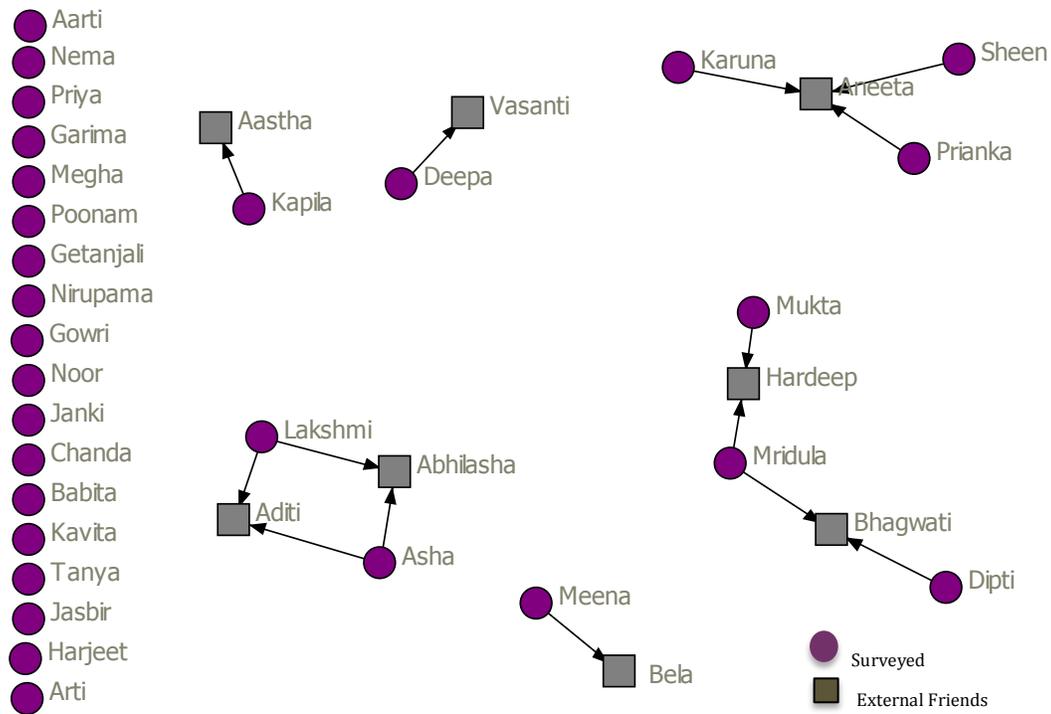


Figure 8: External Friendship Network

This network depicts the friendships that ANKURI participants have outside of the NGO. Each of the eight grey squares represents one person that was listed as a friend outside of ANKURI. The purple nodes to the left indicate all the surveyed women who were unable to list any friends outside of ANKURI.

It is a significant finding that members of ANKURI have social ties mainly within the NGO, as there are plenty of women in the area who are not a part of ANKURI. In 2011, it was reported that 299 adult females were living in Bisht Gaon and 224 adult females were living in Shigli ("Bisht Gaon Population," 2011). ANKURI, by contrast, has only one hundred members and is involved in a total of five villages of comparable size to Bisht Gaon and Shigli. While ANKURI could not be compared to the community of nonparticipating women during my study, the combination of my survey data and census data seem to point towards increased probability of making close friendships in ANKURI.

An interesting follow-up investigation would involve conducting a survey about friendships amongst women in these villages who are not members of ANKURI. If extensive social networks are found to exist outside of ANKURI, the fact that many ANKURI women do not make friendships outside of the organization will show that participating in ANKURI causes isolation from the greater community and limits acquisition of knowledge and resources not found at ANKURI. However, if no large social networks are found outside ANKURI, then ANKURI gives participating women a great network of friendships.

In addition to potential isolation from the greater community, the formation of cliques in ANKURI's network can isolate women from one another. There are clear clique formations in the *Figure 7* friendship network, with little to no interaction between groups from different villages. Even in the full network in *Figure 1* Rita, her administrators, and the occasional weak tie are the only bridges between these cliques. During both the surveys and qualitative interviews, when asked for an open-ended suggestion on what ANKURI might improve upon, 25% of the surveyed women stated a desire to have large gatherings for all ANKURI members to attend, which they used to have in the past. These women recognize that there are alienated groups within ANKURI, and hope to bridge these gaps. Gatherings that bring together all ANKURI members or unite ANKURI with the community could be an excellent way to begin to strengthen networks and increasing diversity of information shared in the community.

Networking Outside of ANKURI

We have already discussed the limited friendship ties between ANKURI members and the rest of the community. It is also important to investigate other connections to organizations and further resources outside of ANKURI. Due to restrictions on my survey, it was not possible to perform a network analysis on contacts women made with organizations outside of ANKURI, but during the qualitative interviews, I was able to ask participants about their goals for the future. Some of the youngest women planned to spend their savings in obtaining a Bachelor's

degree at an Indian university, contingent upon the outcome of their arranged marriages. Others wanted to expand their knitting skills, but did not consider leaving ANKURI or know where else they could obtain materials. The older, married women did not see any reason to pursue personal goals—they instead tended to focus on furthering their children's education in the hopes of an even better future for the next generation.

Several women who appear peripheral in ANKURI's networks have other occupations. Nema, a skilled knitter whose mobility has been hindered by polio, runs a local shop for the children to purchase snacks and drinks. She manages the accounting and sales and clearly wants to keep herself challenged, saying, "Once when my health became too poor I shut the shop down—but I immediately began feeling restless, so I started it back up." Her shop has become a popular place for men, women, and children to meet. Despite her limited mobility, she has made herself central to her village network. Overall, though, there are few women who have sought other networks outside of ANKURI.

Network Conclusions

Based on this network analysis, we can conclude the following information about our four central network topics. First, the structures of ANKURI's networks revolve around women who hold formally appointed roles or have formal relationships such as giving advice to other knitters or inviting new women to the NGO. In the friendship and the knitting network, though, centrality is shared more equitably amongst regular knitters. Second, the mixture of formal and informal relationships lends itself to the sharing of many different types of information. In formal networks, information on knitting, finance, health, and education are shared, which can lead towards concrete improvements for individuals, such as being able to earn more money from knitting or being able to put earnings into a savings account. Informal relations fostered in the friendship network yield the sharing of more personal topics and may lead to more intangible forms of empowerment such as improved mental well-being. Third, ANKURI is limited by an

invitation network that heavily relies on Rita to recruit women, which could cause the NGO to stagnate due to decreasing participation over time. ANKURI is also limited by the fact that they have failed to foster many leaders, making it hard for the NGO to grow and expand—and continue providing new resources to participants. Fourth, ANKURI helps its participants to foster new relationships, such as knitting circles and advice networks. However, it is uncertain whether ANKURI helps to increase opportunities for friendships or whether ANKURI is in fact isolating participants from others in the local community.

2. Empowerment Study

This empowerment study uses IFAD's definition of empowerment, with the additional category of mental well-being. The full definition of empowerment is therefore:

- Changes in women's mobility and social interaction
- Changes in women's labor patterns, including altering gender norms
- Changes in women's access to and control over resources
- Changes in women's control over decision-making
- Changes in women's mental well-being

The survey asks a total of twenty questions about each of these five categories and computes an empowerment number for each survey participant. Questions for the first four categories are based off of suggested survey questions by IFAD and survey questions for the fifth section, mental well-being, were based off of the Warwick-Edinburgh Mental Well-Being Scale (Warwick and Edinburgh, 2006; Stewart, 2011). Questions to determine mental well-being were more numerous in my survey, as this category is difficult to measure. For each of the twenty questions, participants were asked to state their Likert scale rating for conditions before and after joining ANKURI. The 'before' rating was later subtracted from the 'after' rating, giving us a relative change in empowerment for each of the 20 questions.

Empowerment Results

Table 2 shows that the average change in empowerment for all survey-takers was 0.989 (SD=.378) on a scale of -4 to 4. For mobility and labor, the standard deviation is

greater than the empowerment score, so we cannot conclude that there was an overall positive change in empowerment for these categories.

Table 2: Average empowerment scores for 5 categories. Scores based on a 1-5 Likert scale; thus the range of possible empowerment is -4 to 4. 29 survey responses were averaged to display these results.

Category	Mobility	Labor	Resources	Decisions	Well-being	Average
Average	0.207	0.218	1.198	1.437	1.529	0.989
SD	0.354	0.439	0.595	0.968	0.604	0.378

Figure 9 provides further visualization of the distribution of data in each category. Note that the distribution of answers given in each of the five categories of empowerment has a peak between 0 and 1 on a scale of -4 to 4. The well-being category has the longest tail, reaching all the way to 3, and the distribution peaks of the mobility and labor categories are closest to 0.

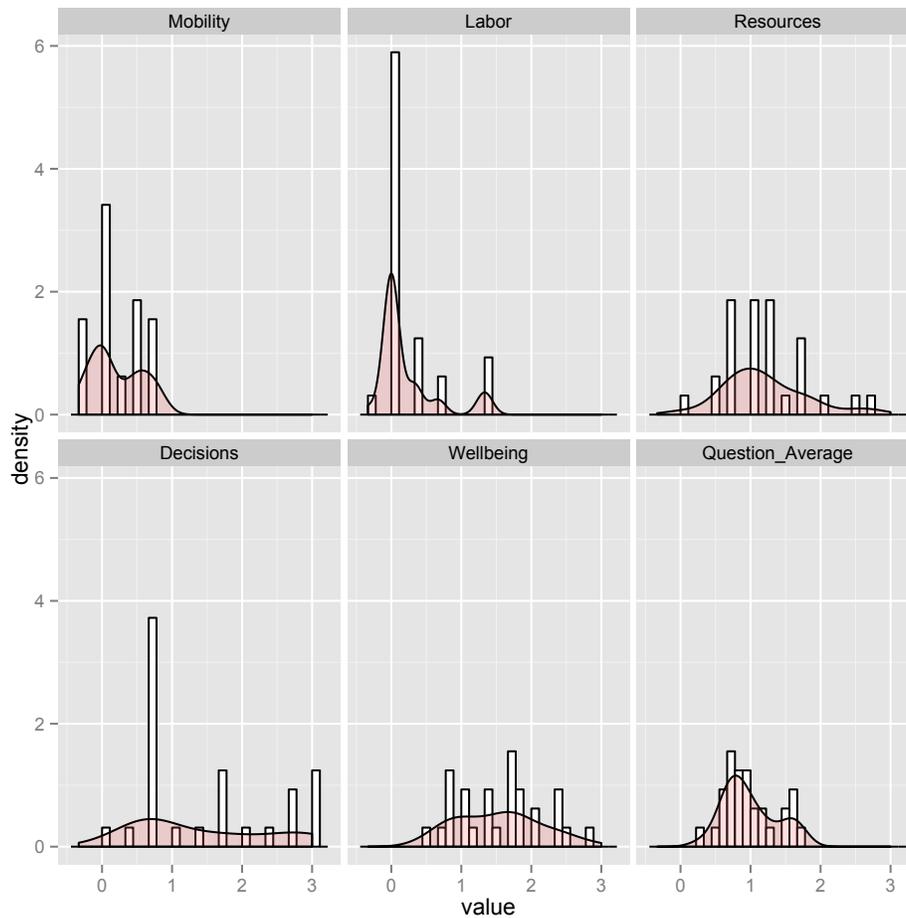


Figure 9: Distribution of Empowerment Categories

Graph of the distribution of empowerment scores for the 5 categories of empowerment (Mobility, Labor, Resources, Decision-making Ability, and Mental Well-being), as well as for the average score.

The low scores in the categories of mobility and labor are of special interest. To investigate this in detail, we can look at the distribution of answers for each of the twenty questions given in the survey, shown in *Figure 10*. This reveals that some women reported a negative change in empowerment for questions 1-4 and 6, which are all questions from the categories of mobility and labor patterns (Full survey found in Appendix A.1).

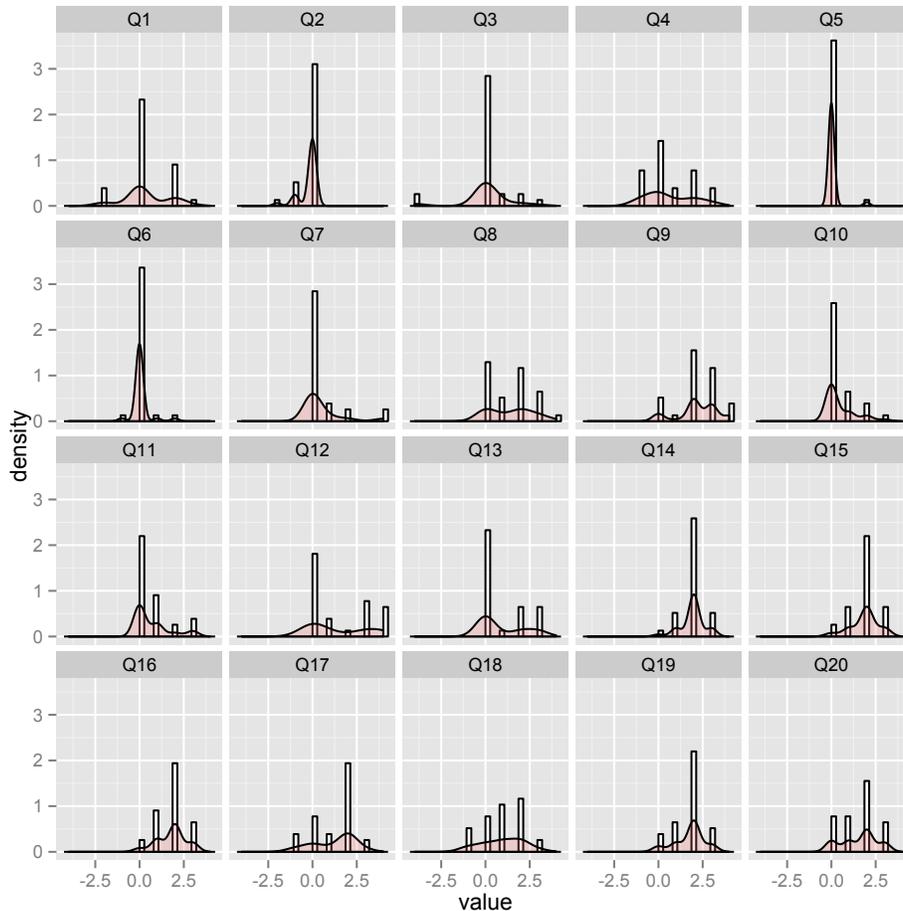


Figure 10: Distribution of Empowerment Questions

Graph of the density distribution of all empowerment survey questions. Survey questions can be found in Appendix A.1.

Qualitative interviews provide the contextual information needed to understand why this is the case. ANKURI allows for a comfortable work environment in the household for some women who wouldn't have the option to work anywhere else—but other women have left their jobs in the city of Dehradun for the more relaxed working conditions of ANKURI. While this

improves mental health and ability to take care of children, it also means fewer trips into town, fewer chance meeting of useful acquaintances, and less need to work at a job outside of the house. Switching a job opportunity in an urban setting to ANKURI decreases levels of mobility and causes a reversion to stereotypically female labor patterns in which knitters are working on craft items and remaining in the private spheres of their houses.

In a qualitative interview, Aarti explains that she used to work with an organization similar to ANKURI, but she had to travel to work at the center (Full interviews found in Appendix B.2). She states:

The school my children attended also required us to work for them. I worked at a craft center and the school for five years, but after a while I couldn't walk the distance. I often knitted sweaters for my children, and then a friend taught me how to knit for ANKURI. I just have to be shown something once, and then I can get it. It feels nice to create something while taking care of my children.

Aarti is an example of the pros and cons of working for ANKURI. She is happier because she now stays at home with her sister, Nema, and her children, who are attending a closer school—yet she travels less and interacts with fewer authorities, organizations, and individuals. There are examples of women who have experienced holistic empowerment, such as Babita. Babita exemplifies empowerment in decision-making and control over resources in a qualitative interview where her family affirms her authority:

When asked who is the primary decision maker in their household was, her listening family members burst out in laughter. Babita laughs too, saying her husband makes the decisions. Sitting on the porch nearby, her husband says, “you’re lying through your teeth. You make all of the decisions in this household.” She shrugs and bobs her head from side to side (the Indian equivalent of nodding “yes”). Babita is an example of the holistic empowerment ANKURI strives for.

Empowerment Conclusions

The average change in empowerment for all survey-takers over all twenty questions was 0.989 (SD=.378) on a scale of -4 to 4 and therefore we can conclude that ANKURI has helped to increase empowerment. In *Table 2* from the results section, the five categories of empowerment are arranged from the smallest change in empowerment to the greatest. Doing so reveals less empowerment in tangible categories (ability to travel, financial means, resources) and greater empowerment in abstract categories (decision-making ability and mental well-being) and is further illustrated in a two mode network of survey participants and empowerment categories, found in Appendix D.3. For the categories of mobility (0.207) and labor patterns (0.218), the standard deviation is greater than the empowerment score (SD=0.354 and SD =0.439 respectively), so we cannot conclude that there was a positive change in these two categories of empowerment. These weak scores of mobility and labor patterns contrast with the stronger empowerment scores in the categories of mental well-being and decision making ability may reveal that participants perceive their situation in a more positive light, but are not in fact getting the financial, political, or social resources needed—an opposite effect of the Indian government’s tactic of providing economic and political resources and failing to address mental health and perceptions of women’s social situation.

3. Linear Regression Analysis

This final results section seeks to analyze whether network centrality is indeed predictive of empowerment, using a linear regression. This approach is common for modeling relationships between a dependent variable and one or more explanatory variables, and takes the form $Y = \beta_0 + \beta_1 x_1 \dots + \beta_k x_k + \epsilon$. In this case, the dependent variable is empowerment and the explanatory variables will include centrality measures and control variables such as age and

schooling in individual regressions. If the coefficient of an explanatory variable is statistically significant, we can have confidence that this variable is predictive of empowerment.

In the network results section, the size of the nodes were weighted according to betweenness scores in each network. For this regression analysis, we expand our scope and utilize a total of four commonly used centrality measures for possible explanatory variables: degree, closeness, betweenness, and Bonacich Power. The first three were proposed by Freeman (1979, p. 215), while Bonacich Power is an eigenvector measurement proposed by Bonacich (1971, p. 176). Though these centrality measures all measure an actor's prominence in a network (Wasserman and Faust, 1994) and should correlate with one another, each measurement represent a different process by which key players might influence the flow of information through a social network (Valente et al., 2008). Therefore, we may find that one centrality measurement is more predictive of empowerment than another. These four centrality measurements are defined as follows:

Degree Centrality

Degree centrality is the simplest measurement of centrality; it is a measurement of how many ties each node has in the network (Freeman, 1979; Borgatti, 2005). We can also find the average degree of a network to do a rough estimate of the speed at which information can pass through a network. For example, if the average degree of a whole network is high, information will percolate throughout the whole network quickly. In the context of ANKURI, high average degree is instrumental in sharing tips on how to knit a product, sharing community-wide events such as the death of a friend or birth of a child, or even sharing opinions about the NGOs presence in the community.

Betweenness

Betweenness is a measurement of the potential brokerage power that individuals in a network possess (Freeman, 1979; Borgatti, 2005). It is calculated as the frequency that a single

nodes is on the shortest pathway to other nodes. A high betweenness, or brokerage potential, for a select few nodes implies inequality of resources and information in a network. Betweenness can tell which participants in ANKURI hold in-demand knowledge, skills, and respect amongst the community. I predict that in a traditional Indian village, the oldest women in the community (the matriarchs) would already have high levels of betweenness. Given this context, high betweenness for young, un-married, uneducated, or other less powerful individuals would be surprising and could imply that ANKURI has created new avenues through networking to give these marginalized women brokerage power.

Closeness (Path Length)

Average closeness of a node is defined as the shortest path length of that node to another node in the network averaged over all nodes in the network (Freeman, 1979; Borgatti, 2005). This measurement shows, on average, how many steps it will take to get from one node to another. It is useful in understanding the connectedness of the whole network. In the case of ANKURI participants, the general goal is to have the smallest average path length possible, so that information, advice, and reciprocity are quick to circulate. In an unconnected network, isolated nodes and pendants exist, making it impossible to circulate these things.

Bonacich Power Centrality

Bonacich Power is an eigenvector measure of centrality in which the actor's centrality is equal to a function of the centrality of those they are directly connected to (Bonacich, 1972; Borgatti, 2005). Thus, actors who are tied to very central actors should have higher centrality than those who are not. A simple illustration of Bonacich is as follows: Consider Barack Obama's secretary, Katie Johnson. Johnson is hierarchically not as powerful as Obama, but by virtue of being his secretary, she gains a high amount of power by controlling information, who meets with the president, and by meeting a plethora of other powerful people.

Regression Results

Before performing attempting to fit each of the four centrality measures and empowerment to a linear regression model, we need to know whether the degree, betweenness, closeness, and Bonacich Power correlate to one another. The correlation matrix in *Table 3* shows that all four centrality measurements positively correlate with one another, though betweenness has a weak correlation with Bonacich Power.

Table 3: Average Correlations Between Centrality Measures

	Degree	BonPwr	Closeness	Betweenness
Degree	1.00			
BonPwr	0.70	1.00		
Closeness	0.75	0.75	1.00	
Betweenness	0.80	0.34	0.60	1.00

In an initial linear regression analysis, none of the centrality measures alone are predictive of empowerment. However, when a multiple linear regression in the form ($Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon$) is performed with two centrality measures the coefficient Bonacich Power proves to be significant in many combinations. For example, when Bonacich Power and degree are paired in a regression, the coefficient of Bonacich Power is significant and degree is not. Because degree and Bonacich Power are correlated, we can say that that degree is not predictive of empowerment, but is instead accounted for by Bonacich Power. Thus connections to key people in the network are predictive of empowerment, while sheer number of ties is not.

The coefficient Bonacich Power is significant at a p-value of 0.05 in seventeen out of ninety possible pairings,³ whereas the coefficients of the other three centrality measures are not significant. When analyzing all the coefficients of Bonacich Power, eighty-four out of ninety regressions have a positive coefficient (Full report found in Appendix C.1)—a robust indicator that Bonacich Power is positively correlated with empowerment. The bar of the Bonacich Power

³ There are 3 types of centrality paired with Bonacich Power, 5 different networks, and 6 categories of empowerment when including the average score.

Positive Coefficient graph below shows this data. As we decrease the p-value of Bonacich Power's coefficient in predicting empowerment from 1.0 to 0.01, there also exist more coefficients that are both positive and significant than we would expect in a random scenario. Expected positive, significant coefficients in a random scenario are shown in the second graph and can be compared to observed results in the first graph.

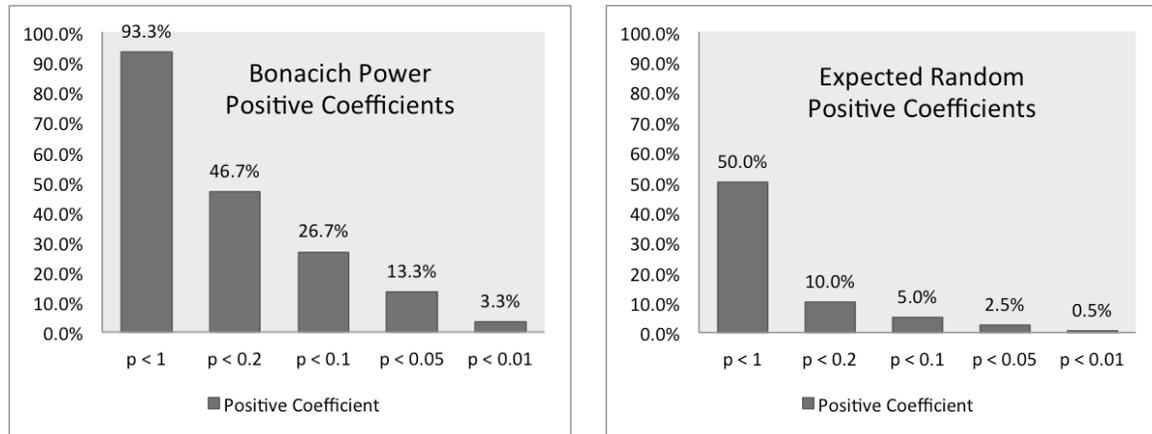


Figure 11: Observed positive Bonacich Power coefficients compared to positive expected random positive coefficients.

The significance of Bonacich Power across a variety of models and the lack of significance of betweenness, degree, and closeness may seem puzzling. Degree and closeness do not assign weighted values based on whom a node connects to or based on the shortest paths on which a person lies. A person who connects to influential people or who lies on a shortest path between influential people will have more social capital than someone who connects fringe people or lies on a short path between non influential people (Bonacich 1972).

Bonacich Power takes these into account by assigning weighted values. As an analogy, degree could correspond to the number of bills in a person's wallet. Bonacich Power takes into account the denomination of the bills. Five twenties are worth more than fifteen ones. For this reason, social network theorists see path length and degree as crude proxies of social capital and more sophisticated measures like Bonacich Power as better predictors (Valente, 2008). My

results align with this intuition; Bonacich Power often correlates at significant levels while other measures do not.

It is important to note that in some networks, Bonacich Power was more predictive of empowerment than in other networks. This is illustrated in *Table 4*.

Table 4 The frequency at which Bonacich Power predicts Empowerment when paired with Degree, Closeness, or Betweenness. Bonacich Power is tested in combination with the three other centrality measurements, so each cell in the table is on a scale 0-3, with a score of 3 meaning that the Bonacich Power linear regression coefficient was statistically significant for all three combinations. P-value < .05. Full regression data found in Appendix C.1

Empowerment	Full	Advice	Invitation	Knitting	Friendship
Average	2	1	0	0	2
Mobility	0	0	0	1	1
Labor	0	0	0	0	0
Resources	0	0	1	0	1
Decisions	0	0	0	0	0
Wellbeing	0	2	3	0	3

This table shows that in the full network the Bonacich Power coefficient is predictive of average empowerment, while Bonacich Power measurements extracted from the invitation and friendship networks are predictive of mental wellbeing. Recall in the network results section that both the invitation and friendship networks held central actors who had a formally appointed role at ANKURI, including the owner and craft managers, indicating that women tend to feel mentally empowered if they are able to access women higher in the hierarchy. Therefore, creating a large network alone does not lead towards empowerment.

Additional regressions were performed with other control variables, to see if these are more predictive of empowerment than centrality. Control variables include age, time spent knitting at ANKURI, level of education, and number of children. Out of these variables, age was significant, with a coefficient of -0.0247 and a p-level of 0.0125, while the others were not significant (Full report found in Appendix C.3). This negative coefficient shows that women who are younger are more likely to experience empowerment at ANKURI. Such women may be unmarried and able to choose their job or pursue a bachelor's degree.

Regression Conclusion

In attempting to correlate network centrality with empowerment, it was revealed that Bonacich Power centrality is predictive of empowerment, while betweenness, closeness, and degree centrality are not. A node's Bonacich Power score is a function of the centrality of its surrounding network contacts. Thus actors may be connected to central actors or a central clique, though they are not central themselves, and experience an increase in empowerment. Additionally, the younger an ANKURI participant is, the more likely she is to become more empowered.

Discussion

This thesis began with a discussion of how India's government has made many attempts to empower women, using top-down economic and legislative approaches that have proved limited. In studying ANKURI, the purpose was to evaluate the extent to which an organization designed to create empowerment was able to create social networks to do so. I hypothesized that this approach puts opportunities to make decisions and obtain resources in the hands of the women—rather than in the hands of the government and other organizations acting on the government's behalf.

According to the network analysis, it appears that ANKURI has served as a stimulant for the creation of informal and formal ties amongst local women. This idea is supported by the number of ties at ANKURI that exist beyond friendship; advice and knitting relationships have served to bring women together who might not have otherwise interacted. These ties introduced women to useful information, such as how to open a bank account, how to make a market-worthy product, and how to plan basic household finances. Further support of ANKURI's success in creating a networking environment is found in the fact that all survey participants could list friends at ANKURI, while over 60% of all survey participants failed to list a single

friend outside of ANKURI. However, this finding should be taken with a grain of salt: it is hard to tell whether ANKURI has really increased friendship opportunities or isolated women from the community.

Despite positive opportunities for networking, the measurable change of empowerment created during ANKURI's fifteen years of existence is limited. The most positive areas of empowerment revolved around the less tangible categories of improved mental health and increased control of decision-making. While a positive perception of one's situation is an excellent foundation of empowerment, there is a lack of improvement in categories of tangible aspects of an empowered lifestyle, including ability to travel, buy food and clothing, and obtain an education for one's children. Some women even reported a negative change in mobility and labor. This is an area of concern that ANKURI should focus on in the future. Where government involvement has focused on economic empowerment and failed in areas of mental health and decision-making, ANKURI's approach suffers from the exact opposite.

Regression results show that there exists a weak relationship between Bonacich Power and empowerment at ANKURI and therefore the hypothesis that ANKURI creates useful, empowering network ties, and therefore creates social capital, is supported. Results may have proven more robust with a greater data set and a control group of women outside of ANKURI. My regression analysis shows that, amongst the four centrality measures, Bonacich Power is most predictive of empowerment. This result indicates that, by virtue of becoming connected to central actors, previous fringe members of ANKURI have been able to achieve greater empowerment. ANKURI is the most beneficial to women who had a smaller number of friends or less powerful friends, who then entered the network and experienced increase in resources and knowledge due to important connections. A regression analysis of control variables reveals that age is also predictive of empowerment. The younger the participant, the more empowered they are likely to be. This can be explained by the fact that younger women may be unmarried,

interested in pursuing further education, or are newly weds with few connections in the village when they arrived. The conclusions of the three sections of my study are summarized in the following table:

Table 5 Summary of Hypothesis Conclusions

Hypothesis	Conclusion
ANKURI promotes networking	Supported
Participants have experienced positive empowerment	Supported (To a lesser extent in categories of mobility and labor patterns)
ANKURI promotes social capital via a correlation between network centrality and empowerment	Weakly Supported (Bonacich Power is predictive of empowerment)
Age, schooling, time at ANKURI, and number of children is not significantly predictive of empowerment.	Not Supported (Age is predictive of empowerment)

It is therefore useful for ANKURI to continue to provide an environment where women can meet new members of the community in both formal and informal settings, as this offers a form of empowerment that government projects, such as Five-Year economic packages and legislative changes to increase women's rights, cannot offer. However, my study revealed that the impact of organizations like ANKURI may be limited to the realm of social empowerment more so than economic empowerment. Additionally, ANKURI may have negative side effects, such as isolating women from the greater community, reinforcing gender stereotypes, and creating dependency. These are concerning issues with heavy implications. As such I will offer several possible solutions and areas for development.

Implications

Isolation

My network analysis reveals formation of cliques in ANKURI, which limits the diversity of information and resources available. It would be beneficial for ANKURI to

facilitate group meetings, so that women from different villages may network with each other. Group meetings have already been suggested by several senior ANKURI members, who remember benefitting from this in the past. Allowing ANKURI members to organize and plan these meetings could be another way of improving decision-making ability.

Evidence from the qualitative interviews and from the empowerment survey also point towards isolation from the rest of the village and from other organizations. One way to connect ANKURI participants back to the community is to host events that are open to the public, such as health clinics or financial workshops. Another option is to host dialogue groups for open discussions about issues in the community, in order to provide opportunities for ANKURI participants to be leaders in voicing their opinions and organize these meetings.

It is also necessary for women to be able to further pursue connections beyond the villages involved in ANKURI. Sangeeta and Karashima, the administrators, are the only two who regularly travel to different cities to sell products at the market and negotiate new contracts. If these two brought other ANKURI participants with them, they could pass on informal training in how to barter, market products, make business connections, and negotiate contracts. The information they would bring back to the community would be invaluable to the other knitters.

Reinforcing Gender Stereotypes

NGOs that focus on producing craft items often face the criticism of encouraging women to conform to traditional roles, reinforcing gender stereotypes and reinforcing women's inferior position in society (Mazumdar-Shaw, 2012; Sharma, 2005). Creating a textile or craft product, such as knitting, is a traditionally female activity and, while the product itself can be part of a great tradition and exercise in creativity, the process often

encourages women to stay in their private homes while they work. This was illustrated in Aarti's qualitative interview, in which she gave up traveling to the city of Dehradun in order to work for ANKURI at home with her children. Apart from reinforcing gender stereotypes, working at home limits the outside connections these women could acquire while traveling.

ANKURI does not need to give up creating knitted products, but it should encourage women to work in public spaces, in the company of both men and women. Sharma (2005) suggests that it is important for men to see women working and to also join in with the process, as this begins to break down strict gendered roles. This is a tricky thing to arrange, because most women are tied to household duties and many men hold jobs elsewhere. A good start would be to organize open knitting circles, for both men and women outside of ANKURI to join in. Alternatively, ANKURI could focus on teaching about the business aspect of selling crafts. This role is a more stereotypically male role in India.

Dependence on Rita

Rita, the owner of ANKURI remains the only educated, well traveled, and well-connected individual involved in the organization. If she were to end her support, ANKURI would quickly fold. Rita fronts large financial transactions, which are recuperated by the knitted products months later, and negotiates the purchase of raw materials such as wool. In this sense, Rita is making a mistake similar to the Indian government: she is maintaining control over decision-making and resources, instead of priming participants to take control. In addition to heavy dependence on Rita, there is a low rate of leadership and goal setting amongst participants: some of ANKURI's knitters have been involved for twelve years, and they see no reason to pursue personal ventures outside of ANKURI. Recall *Figure 6*, the activity network at ANKURI, where only five people agreed that they participated in leadership

activities at ANKURI. Village meetings, trips to the marketing, and workshops are all potential opportunities for Rita to begin the process of distributing leadership to active participants and increase the number of women who see themselves as active leaders.

Broader Implications of the NGO sector

This study focuses on the strengths and weaknesses of one NGO, but it is also implicative of greater challenges, concerns, and advantages of the NGO sector. Some authors have raised criticism of the Indian NGO sector, with concerns including internal weakness, such as a lack of a clear agenda, and external constrains, such as lack of funding. The argument that many NGOs lack a clear agenda originates in the difficulty of measuring outcomes, an issue which I have broached in the design of this study. It has become clear through my research that there are indeed ways to measure success or failure for an NGO, but that this is an area of study that needs further refinement and standardization. Lack of funding is indeed a common problem for the NGO sector, but the method of selling knitted products allows ANKURI to sustain the organization and its participants. The concept of empowerment through learning a skill to support oneself is an increasingly popular one, is financial feasible for an NGO, and it proving successful according to this case study.

If ANKURI is a representative case of other Indian NGOs related to empowerment of women, we can say that this sector is beneficial in changing perceptions of women's role in Indian society and in increasing mental-well being and decision making ability for women—but it must actively avoid reinforcing gender stereotypes as well. This sector should further be supported by the economic and political empowerment offered by government Initiatives. This will bring about a multi-dimensional transformation, which neither the Indian government nor grassroots organizations can accomplish alone.

Further Research

My thesis consists of just one case study of empowerment; an option for further research would be to apply a similar study to many NGOs in India or to analyze the networks between government programs and the NGO sector. However, there is a much larger issue that merits further research: the valid concern that the NGO sector focuses so much on creating empowerment within individual communities that it fails address the greater need to redistribute power and wealth all throughout India. If I were to perform further research, it would be fascinating to study the extent to which NGOs can or cannot empower women within the current Indian structure. This research might reveal that there is a plateau or equilibrium for the extent of empowerment possible within India's current structure and tradition.

My thesis focused on the measurement of a hypothesized *Big Coefficient*, a heavily weighted independent variable that predicts a dependent variable, but it ignores the possibility of a *New Reality*—a reorganization of the current system (Page, Unpublished, p. 131). Many other researchers focus their studies on measuring various coefficients, and then use their discoveries of a *Big Coefficient* as clout when lobbying for changes within our existing system. For example, if education is more predictive of empowerment for women in India than age, there would be lobbying for changes in government legislation to allow more women to go to school. This approach is limited by our understanding of the issue and by our ability to measure the relationships between certain variables. In the grand scheme of things, we may be missing out on a much greater opportunity for change, which can only be realized through imagining a new way of organizing aspects of our society. This involves jumping beyond the incremental, safe changes that can be made by focusing on the *Big Coefficient* to designing a *New Reality*.

If I were to perform research on whether empowerment for women in the given Indian structure will plateau, regardless of NGO support, I would perform an analysis using a *Markov Chain model* (Page, Unpublished, p. 411). This model is based on two main assumptions: in a Markov chain there exists *states* and there exist *transition probabilities* of switching states. For example, assume that the state of each community in India can be either empowered or relatively not empowered. The transition probability is the probability that an empowered community switches to a non-empowered and vice versa. In this model, a community can switch states based on the transition probability. Over time, we will come to a long term, statistical equilibrium. This means that individual communities may continuously switch back and forth between being empowered or not, but an overall percentage of communities will be empowered or not empowered. This unchanging percentage is considered the equilibrium.

It is questionable as to whether this model is applicable in this context, but it is true that India has lobbied for many changes and has seen very little overall improvement in empowerment over the years. We could therefore make a conjecture that, if the Markov model is applicable, an NGO's involvement in an individual community does not permanently increase the overall status of women throughout India. Markov models have recently been applied to similar topics, such as network effects on customer trust in social media (Khong et al., 2013) and labor market dynamics in developing countries (Bosch and Maloney, 2010).

ANKURI has no doubt made a positive movement towards empowerment in its community by creating a venue for networks that lead to social capital, but this is just one community amongst many that may rise and fall in level of empowerment. The legacy of ANKURI is likely to remain confined to this community due to lack of expansion, lack of networking between other organizations, and reliance on the owner's eternal support. In order for the status of women to change in India, therefore, the transition probability—the number of villages that are moving between greater or lesser empowerment—must change. The individual

state of a community does not matter in the long run equilibrium if that community is not interacting with other communities. This is where the some sort of *New Reality* is necessary to change transition probability. A *New Reality* could involve a strong partnership between the government and grassroots organizations to redistribute power and wealth, a large event that triggers a nation-wide movement uniting many communities in fighting traditional structures preventing women from attaining equality, or in expanding upon the idea of using networks. In a further study, it would be fascinating to study how NGOs that encourage women to network beyond the constraints of their village and local resources increases long-term empowerment in an entire region of India.

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Appendices

Appendix A Survey

Appendix A.1 Final Survey Outline

Interviewer Protocol

1. At least one trained English speaker and one trained Hindi speaker must be present to administer the survey.
2. You must ask the following before beginning: "Are you willing to take a survey on your experience at ANKURI, including providing names of other women you have spoken with?"
3. Tell the interviewee the following: "You may stop any time if you do not want to continue the survey and your responses will not count. You may tell us stories or additional information if you would like to. Your name and the names you mention will made anonymous."
4. The interviewers may rephrase a question if the translation is not clear.

Full Name of Survey Taker: _____

1. Social Networks

1.1 How did you first hear about ANKURI?

- | | |
|---------------------------------------|-------------|
| <input type="checkbox"/> Family | Name: _____ |
| <input type="checkbox"/> Friend | Name: _____ |
| <input type="checkbox"/> Other | Name: _____ |
| <input type="checkbox"/> ANKURI owner | |

1.2 Why did you decide to join?

1.3 What do you create for ANKURI?

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Scarves | <input type="checkbox"/> Sweaters |
| <input type="checkbox"/> Stoles | <input type="checkbox"/> Administration |
| <input type="checkbox"/> Ponchos | <input type="checkbox"/> Teach Knitting |
| <input type="checkbox"/> Hats | <input type="checkbox"/> Design Products |
| <input type="checkbox"/> Leg Warmers | <input type="checkbox"/> Other _____ |

1.4 How long have you been at ANKURI?

1.5 How many items do you create each month?

1.6 What skills have you learned here?

- | | |
|---|-------------------------------------|
| <input type="checkbox"/> Beginner Knitting | <input type="checkbox"/> Leadership |
| <input type="checkbox"/> Advanced Knitting | <input type="checkbox"/> Relaxation |
| <input type="checkbox"/> Financial Planning | <input type="checkbox"/> Creativity |

1.7 Who do you knit with? (Please write the names below.)

Ex) Craft Manager, Group Leader, Elder Siblings, Other Knitter

1.8 Is there anyone that **gives you suggestions** on how to **make** your product?

Name

Ex) Craft Manager, Group Leader, Elder Siblings, Other Knitters

1.9 Is there anyone that **you give suggestions** on how to **make** their product?

Name

Ex) Craft Manager, Group Leader, Elder Siblings, Other Knitters

1.10 A. Do you feel comfortable talking about personal topics with women who knit for ANKURI? *Yes / No*

1.10 B. If yes, which women involved in ANKURI do you talk to?

Name

Ex) Craft Manager

Topic

Family Issues

1.11 Which women outside of ANKURI do you talk to about personal topics? Please list any names and topics below.

Name

Topic

2. Empowerment Section. For this section I will be creating an Empowerment Index Number using the Likert Scale for each response (a scale of one to five). Categories are blocked out in separate colors here, but in the interviews questions were asked in random order. Categories one through 4 are based on IFAD's four categories of empowerment. Category 5, Mental-Wellbeing, is based on the Warwick-Edinburgh Mental Well-Being Scale (Stewart-Brown 2001).

		Strongly Agree		Neutral		Strongly Disagree
Question		1	2	3	4	5
2.1	Before coming to ANKURI I often travelled into Dehradun					
	After coming to ANKURI?					
2.2	Before coming to ANKURI I travelled to distant areas					
	After?					
2.3	Before coming to ANKURI I interacted with local officials when I needed help					
	After?					
2.4	Before ANKURI I was					

	interested in socializing with other men and women outside my family					
	After?					
2.5	Before coming to ANKURI my husband often helped with food preparation, cleaning, and taking care of the children *Likert responses are flipped					
	After?					
2.6	Before coming to ANKURI I worked at a job outside of my home.					
	After?					
2.7	Before coming to ANKURI I often took care of my children alone					
	After?					
2.8	Before coming to ANKURI I used the services of banks, such as opening a banking account					
	After?					
2.9	Before coming to ANKURI I provided income for my family					
	After?					
2.10	Before coming to ANKURI I was able to provide a good education for my children					
	After?					
2.11	Before coming to ANKURI I was able to provide steady nutrition for my family					
	After?					
2.12	Before coming to ANKURI I often participated in important household decisions					
	After?					
2.13	Before coming to ANKURI I controlled some of the finances of my household					
	After?					
2.14	Before ANKURI I felt confident in voicing my opinion on a decision.					

	After?					
2.15	Before coming to ANKURI I felt optimistic about the future					
	After?					
2.16	Before ANKURI I often felt energetic					
	After?					
2.17	Before ANKURI I was able to deal with problems that arose					
	After?					
2.18	Before coming to ANKURI I felt good about myself					
	After					
2.18	Before ANKURI I felt useful					
	After?					
2.19	Before ANKURI I felt loved and appreciated					
	After?					
2.20	Before ANKURI I found myself interested in new things					
	After?					

3. Further Independent Variable Questions

3.1 How long did you study in school?

3.2 What is your caste?

3.3 What village/area of the village do you live in?

3.4 What mode of transportation do you use to get to other stores, houses, etc?

3.5 How many children you have that live in your house?

3.6 What is your age?

Thank you so much! We are asking these questions so that we can understand how ANKURI could be improved. Do you have any suggestions or comments for ANKURI?

Appendix A.2 Omitted Questions

The following are questions that were omitted upon the request of the owner of ANKURI. I have included commentary on what I had hoped this question would achieve and reasons it was omitted. Most questions seek to determine whether participants are dependent on ANKURI.

1.1 What is your plan for the future? (Five years, Ten years).

In asking this question, I hoped to learn whether these women are have future goals of education, autonomy, and entrepreneurship or if they are going to continue to rely on ANKURI. This was omitted by request under the reasoning that "No one will have a plan for the future and they will not understand this question."

1.2 What people/organizations do you get raw materials for your product from?

In asking this question, I hoped to learn whether participants have access to resources outside of ANKURI (if women wished to develop their own craft product). This was omitted by request under the reasoning that "No one is pursuing their own products or have easy access to raw material outside of ANKURI."

1.3 What people/organizations do you sell your product to?

In asking this question, I hoped to learn whether participants have access to other business partners or vendors apart from ANKURI. This was omitted by request under the reasoning that "All products are sold exclusively through ANKURI."

1.4 Where else would you go for these resources if ANKURI didn't exist?

Again, this question aims to learn whether participants are fully dependent on ANKURI. This was omitted by request with no reason given.

Appendix B Qualitative Interviews

Appendix B.1 Interview Questions

While at ANKURI, I conducted thirty informal case study interviews with a team of ANKURI employees and two other University of Michigan students, Luna Anna Archey and Amanda Grayson. A series of twenty questions were asked in English, translated to Hindi, and repeated back in English. Voice recordings allowed me to more accurately translate the conversations—and to clarify specific Hindi phrases with the translators. The interview questions are listed below, though women were encouraged to talk about other topics as well.

1. What is your name?
2. How long have you been at ANKURI?
3. Why do you participate in ANKURI? Why do you knit?
4. What do you like to knit?
5. Do you have an expertise in knitting or another subject?
6. Did you have any knitting experience before joining ANKURI?
7. What is your favorite part of the day?
8. Describe your daily routine.
9. How do you find time to knit?
10. Do you have children? Siblings? A husband?
11. Does your family participate in ANKURI?
12. How long did you go to school? Why did you stop?
13. Where are you originally from? What was the transition to a new village like?
14. Do you get to make decisions in the household? How does your household make decisions?
15. What do you like to spend your money on/save your money for?
16. What do you wish you had enough money for?
17. Does ANKURI pay you enough?
18. What did you do before ANKURI? Did you work? Why did you leave this job?
19. How would you like to improve ANKURI?
20. What are your goals for the future?

Appendix B.2 Interviews

This appendix includes the several complete qualitative interviews and several excerpts, which are mentioned throughout the thesis. These interviews were chosen because these women were also able to take the extensive survey, allowing me to compare the survey results with the interviews. In several cases, we will see instances where self-reporting in the survey did not accurately depict these women's situations or networks. Whether this is shyness, humility, or another error in the survey, it is hard to tell.

Additionally, references will often be made to others at ANKURI. Many of these women are sister-in-laws or are directly related. It is common for women in rural India to marry into another village, less than a day's walk away. Note that names throughout the qualitative interviews matched all the coded names used in the survey results.

Aarti and Nema

Sitting on the steps of their house, sisters Aarti and Nema tease each other lightheartedly in rapid Hindi. “We have to stick together. Our father died suddenly of cancer last year,” Aarti explains. “He was a taxi driver. Now whenever there is a festival or whenever we go out, we especially feel his absence. We miss him.” After a silent pause in the conversation, Nema begins explaining the other challenges she has faced since childhood.

“I became afflicted with a fever when I was six months old. The doctors told me I would be able to walk when it passed. I tried my best but I never was able to walk after that. Over time it became apparent that I in fact had polio. I was only able to study until my third year because I couldn’t walk to school.”

Despite this, Nema successfully runs a local shop for the children to purchase snacks and drinks at. She manages the accounting and sales with a sharp mind and clearly wants to keep herself challenged. “Once when my health became too poor I shut the shop down—but I immediately began feeling restless, so I started it back up.”

In addition to running this shop, Nema is proud of her ability to knit complicated, beautiful patterns. “I just have to be shown something once, and then I can get it.” Aarti chimes in, saying, “If I don’t know how to knit something, Nema shows me. We rotate throughout the day to complete our projects. I knit in the morning while Nema cooks, and in the afternoon we switch.” Nema remains an invaluable teacher for both her sister, Aarti, and for many other ANKURI knitters.

Aarti explains that she used to work with an organization similar to ANKURI but she had to travel to work at the center. “The school my children attended required us to work for them. I did that for five years, but after a while I couldn’t walk the distance. I knitted sweaters for my children, and then a friend taught me how to knit for ANKURI. I just have to be shown something once, and then I can get it. It feels nice to create something. We are able to sit at home and learn.”

Nema is able to both knit and run her store from her own home. In a society where the family traditionally takes care of those with physical ailments such as polio, Nema’s situation is very positive—her interview indicates that she has been able to provide for herself and that she feels pride in the work she does. In other interactions at her home, I often saw her knitting with two to three other women, sometimes teaching or evaluating others' knitting. Nema’s responses to the survey seem accurate—her mobility patterns have not changed, but she reports improvements in her labor patterns and mental wellbeing. The later has been an especially positive experience for her, it seems.

Priya

“After I began working with ANKURI many people began coming to me to learn. This small thing makes me very happy—I love that I can teach my friends and family. It is also nice to have our own money as opposed to relying on someone for help. We don’t have to ask our elders to leave the house—we have the freedom to just go whenever we want to. I did not finish school, and now that I am married that is not a possibility. With my earnings I want to help my children finish school—I hope that they get to learn English. I am currently saving up to open a bank account for my daughter. We also have a special festival for our husbands to pray for their long life here. Now I am able to get myself and the girls dressed up and have some money to spend on the celebration.”

Priya's short interview is of special interest, as her survey responses showed a drop in her mobility and little change in her labor patterns. Contrasting this, she mentions enjoying the freedom of not having to ask her elders for money. The money she receives for her knitting also is notably going in part to her children to her husband. We could conclude that ANKURI's program reinforces the values of being a housewife—she remains at home and uses her money to meet the expectations of her husband.

Kapila

“I never thought that I would be involved in a place where I would be provided with quality wool, thinking of new designs for the center, and knitting as well as I can now. The best part is that I am employed, yet I don’t have to leave my home or my kids behind to work.”

As a child Kapila learned how to knit using broomstick twigs. This was common so that kids wouldn’t ruin their mother’s needles. She soon began to knit simple patterns for her immediate family. Kapila joined ANKURI ten years ago and fondly recalls her first interactions with the women. “I first came to the center with my feisty son in tow, unsure of what to expect. The owner of ANKURI gave him a banana to distract him so that I could learn the patterns with the other women. I don't know what I would do without Rita's support.”

With the first money that Kapila earned, she decided to buy a traditional gold necklace, called a *mangalsutra*. This is an important symbol of marriage, which her in-laws weren’t able to provide for her at the time of their marriage. Kapila smiles shyly as she tells us, “My husband doesn’t know, but I am now slowly saving up to buy a pair of matching gold earrings. When I knit I earn money to first look after my family’s needs. Then I am able to make sure that any small desires I have are fulfilled.”

Today she is a prolific knitter and clearly finds comfort in this creative and rhythmic craft. “When I am knitting, I don’t have time for any kind of gossip. Even if I am upset or angry, I can just take it out on my knitting and it calms me down.”

Kapila is one of the first members of ANKURI. Her interview speaks highly of the relationship she has fostered with the owner of ANKURI over the past decade. Both her interview and survey reveal her shy nature—she remains focused on the upbringing and interacts with very few of the

women when she knits. She repeatedly mentioned that Rita was the reason she joined ANKURI and that Rita creates a safety net for her.

Getanjali

“I am the type of person who cannot sit empty-handed. Before marriage I just worked around the house—ANKURI is my first real job. I had to stop studying in my 8th year when my mother fell ill and my sister was married away. With six other sisters, it was hard for my parents to support us all. I left my original village and entered a new community when I got married. Knitting has allowed me to become immersed in this new place.”

Marrying and moving to a new village is a common, yet difficult event for many girls like Getanjali. She describes adapting to her new household duties and how she used to see her sister-in-law, Seema, knitting away in the evenings. She decided to join Seema and has been knitting at ANKURI for three years now. “

With my earnings I love buying my three-year-old new clothes. I want to teach him to knit someday,” she says.

When asked how she is able to balance her household work and knitting for ANKURI, she laughs and says, “the decision to make time for ANKURI came from my heart—I am the type of person who refuses to sit around the house, empty-handed. I know other women around here that used to knit, but have since quit. They tell me that I can only work because I have a lot of free time. I don’t agree with this and I hope to change their mindset. I want these women to realize that it’s not about having the 'free time'—it’s about making the time to do what you want and need to do.”

Getanjali's personality is decisive and full of opinions. She openly discusses improvements she thinks ANKURI needs, including more respect, higher pay, group meetings, and more finance lessons.

Janki

Janki is a role model figure when it comes to leadership. In a qualitative interview, she described why her knowledge, resources, and authority are greater than most women in the surrounding villages. “Around the same time that I started working for ANKURI six years ago I became the *pratap*—our village head woman—of Shigli. I am in charge of the local administration of my village. This includes the organization and management of our water, roads, and electricity, in addition to ensuring everything is working smoothly.”

Janki describes how she uses her unique position of power to promote her passion of teaching. Through teaching the women in her village how to knit, she saw the potential of helping them become more financially empowered. So far she has taught over twenty women in her village, and since word has spread, other women from surrounding areas are coming to learn from her as well. With ANKURI, she yearns to further excel in knitting and teaching as the opportunity

arises. As a born leader, Janki sees her actions as good karma, utilizing her natural ability to impact the women in a beneficial way.

Janki's contributions to her household's income supplement those of her husband who works as a mason. Together they work to raise their family of three children. Knitting for ANKURI at home allows Janki to spend more time with her kids compared to her previous position she had to commute to.

Lakshmi

"Through knitting, we all have a common interest. It unites the women of our small village. I feel closer to my friends and family through the bond we share. This is why I love to knit."

"Life in the foothills of the Himalayas makes knitting a necessity when winter's cold temperatures come around. Women in these surroundings learn how to knit to keep their family members warm. I was used to knitting as a means of existence, but since working at ANKURI I find my efforts much more productive and goal driven." She has turned a need into a craft. Lakshmi gathers with the other community members to work together and teach each other the patterns and techniques.

Now in addition to keeping her kids warm, her talents can provide them with a safety net. Her four children attend public school, and her husband works as a pharmacy assistant in Missouri. If given the choice, her favorite color to knit with is India's national color, blue.

Karuna

"I started working with Ankuri three months ago in order to support my five-year-old daughter since I left my husband because of his domestic violence. I needed to be independent and stand on my own feet and earn a little bit, and I felt that I could talk about this situation with the women here. I had been married by my own wishes for love. He was in a lower caste but my parents were okay with it and got us married. My mother passed away when I was four years old, so my daughter and I now live with my father and step-mother. Before I started with Ankuri, my sister-in-laws would ask me "Why don't you knit?" But I didn't know how to knit so I would always think "oh, I can't do this." Finally, a friend called and told me "Karuna, you have to do this." and gave me the motivation to start. I feel very empowered that I am now able to create something that can be sold and is worthwhile. In the last 3 months I've made 5 blankets. When I knit I get a great deal of peace and I am happy. When I told my friends at the center that I was worried about being able to learn how to make the cardigans, my five-year-old told me "Mom, don't be silly, of course you can learn!" I think I will try to start knitting the cardigans now."

Noor

"I didn't want to go to school when I was younger and so I have learned how to make money wherever I can. I used to work constructing the mountain roads, and various other jobs. I now run the house with my earnings, and can keep extra money for my children to learn, study, and

hopefully become something. My two youngest attend an English speaking school in Missouri. My eldest son is seventeen and has troubles with walking, speaking, and hearing, so he has had to leave his studies. He hasn't been to a doctor so we can't be sure, but women I knit with to think he has polio. I talk about his health and my finances often with the women I knit with. It is difficult because I lost my husband six years ago to tuberculosis. Traditionally, I should have then married my brother-in-law, but he is a heavy drinker. He lives with us, but does not give any money. He is an added burden."

Babita

"My favorite part of being able to knit is the satisfaction of creating something beautiful, as well as the extra financial flexibility it offers me and the extended family of 10 living with me."

When asked who is the primary decision maker in their household was, her listening family members burst out in laughter. Babita laughs too, saying her husband makes the decisions. Sitting on the porch nearby, her husband says, "you're lying through your teeth. You make all of the decisions in this household." She shrugs and bobs her head from side to side—a playful acknowledgement of the truth. He jokingly adds that he's been waiting for Babita to make him a sweater for two whole years and she responds by saying "if you pay us, I will."

Appendix C Regression Analysis

Appendix C.1 Full Centrality-Empowerment Regression Report

Empowerment and Bonacich Power Regression Data					
Empowerment	Network	Centrality	Coefficient		
Average	Full	Bon-Deg	0.00024	0.0481	*
Average	Full	Bon-Clos	0.00025	0.03778	*
Average	Full	Bon-Bet	0.00017	0.062	
Average	Advice	Bon-Deg	0.00005	0.89522	
Average	Advice	Bon-Clos	0.00088	0.039	*
Average	Advice	Bon-Bet	0.00089	0.07856	
Average	Intro	Bon-Deg	0.00063	0.11146	
Average	Intro	Bon-Clos	0.00079	0.20961	
Average	Intro	Bon-Bet	0.00073	0.06808	
Average	Knit	Bon-Deg	0.00029	0.24686	
Average	Knit	Bon-Clos	0.00014	0.685	
Average	Knit	Bon-Bet	-0.00032	0.352	
Average	Friendship	Bon-Deg	0.00081	0.00102	**
Average	Friendship	Bon-Clos	0.00043	0.09444	
Average	Friendship	Bon-Bet	0.00033	0.02371	*
Mobility	Full	Bon-Deg	0.00021	0.06414	
Mobility	Full	Bon-Clos	0.00015	0.1743	
Mobility	Full	Bon-Bet	0.00008	0.1737	
Mobility	Advice	Bon-Deg	0.00014	0.17037	
Mobility	Advice	Bon-Clos	0.00013	0.17647	
Mobility	Advice	Bon-Bet	0.00059	0.14546	
Mobility	Intro	Bon-Deg	0.00021	0.58298	
Mobility	Intro	Bon-Clos	0.0001	0.87136	
Mobility	Intro	Bon-Bet	0.00023	0.54502	
Mobility	Knit	Bon-Deg	0.00046	0.06641	*
Mobility	Knit	Bon-Clos	0.00059	0.07347	
Mobility	Knit	Bon-Bet	-0.00014	0.68973	
Mobility	Friendship	Bon-Deg	0.00067	0.00453	**
Mobility	Friendship	Bon-Clos	0.00014	0.57757	
Mobility	Friendship	Bon-Bet	0.00018	0.18397	
Labor	Full	Bon-Deg	0.00009	0.54655	
Labor	Full	Bon-Clos	0.00011	0.40063	
Labor	Full	Bon-Bet	0.00008	0.46173	

Labor	Advice	Bon-Deg	0.00048	0.1387	
Labor	Advice	Bon-Clos	0.00053	0.25895	
Labor	Advice	Bon-Bet	0.0006	0.17399	
Labor	Intro	Bon-Deg	0.00044	0.11468	
Labor	Intro	Bon-Clos	0.00022	0.75272	
Labor	Intro	Bon-Bet	0.00065	0.16939	
Labor	Knit	Bon-Deg	0.00027	0.38813	
Labor	Knit	Bon-Clos	0.00029	0.49962	
Labor	Knit	Bon-Bet	0.00011	0.80666	
Labor	Friendship	Bon-Deg	0.00007	0.82265	
Labor	Friendship	Bon-Clos	0.00021	0.51789	
Labor	Friendship	Bon-Bet	0.00004	0.81305	
Resources	Full	Bon-Deg	0.00023	0.22707	
Resources	Full	Bon-Clos	0.00034	0.07589	
Resources	Full	Bon-Bet	0.00021	0.14366	
Resources	Advice	Bon-Deg	0.00107	0.11906	
Resources	Advice	Bon-Clos	0.00102	0.16601	
Resources	Advice	Bon-Bet	0.00138	0.08881	
Resources	Intro	Bon-Deg	0.00094	0.11682	
Resources	Intro	Bon-Clos	0.0012	0.22635	
Resources	Intro	Bon-Bet	-0.00119	0.04991	*
Resources	Knit	Bon-Deg	0.0003	0.46754	
Resources	Knit	Bon-Clos	0.00032	0.54492	
Resources	Knit	Bon-Bet	0.00033	0.58697	
Resources	Friendship	Bon-Deg	0.00113	0.00543	**
Resources	Friendship	Bon-Clos	0.00041	0.3374	
Resources	Friendship	Bon-Bet	0.00033	0.16478	
Decisions	Full	Bon-Deg	0.00034	0.28912	
Decisions	Full	Bon-Clos	0.00037	0.24449	
Decisions	Full	Bon-Bet	0.00019	0.43017	
Decisions	Advice	Bon-Deg	0.00045	0.66478	
Decisions	Advice	Bon-Clos	0.00058	0.58324	
Decisions	Advice	Bon-Bet	0.0002	0.84278	
Decisions	Intro	Bon-Deg	0.00054	0.60518	
Decisions	Intro	Bon-Clos	0.00035	0.83397	
Decisions	Intro	Bon-Bet	-0.00067	0.52335	
Decisions	Knit	Bon-Deg	0.00059	0.7081	
Decisions	Knit	Bon-Clos	0.00032	0.7081	
Decisions	Knit	Bon-Bet	0.00109	0.26281	
Decisions	Friendship	Bon-Deg	0.00122	0.07653	
Decisions	Friendship	Bon-Clos	0.00025	0.72505	

Decisions	Friendship	Bon-Bet	0.00037	0.34302	
Wellbeing	Full	Bon-Deg	0.00029	0.14449	
Wellbeing	Full	Bon-Clos	0.00037	0.0535	
Wellbeing	Full	Bon-Bet	0.00022	0.13891	
Wellbeing	Advice	Bon-Deg	-0.00197	0.00258	**
Wellbeing	Advice	Bon-Clos	-0.0021	0.00271	**
Wellbeing	Advice	Bon-Bet	0.04964	0.07596	
Wellbeing	Intro	Bon-Deg	0.00141	0.02401	*
Wellbeing	Intro	Bon-Clos	0.00197	0.04391	*
Wellbeing	Intro	Bon-Bet	0.00146	0.02083	*
Wellbeing	Knit	Bon-Deg	0.00048	0.22863	
Wellbeing	Knit	Bon-Clos	0.00058	0.28388	
Wellbeing	Knit	Bon-Bet	0.00059	0.26861	
Wellbeing	Friendship	Bon-Deg	0.00092	0.02393	*
Wellbeing	Friendship	Bon-Clos	0.00085	0.04174	*
Wellbeing	Friendship	Bon-Bet	0.0006	0.0 090	**

Appendix C.2 Principle Component Analysis

Principal component analysis is a statistical technique that is used to analyze the interrelationships among a large number of variables and is used to group these variables in terms of a smaller number of variables, called principal components, with a minimum loss of information. The empowerment analysis included 20 surveys, and therefore 20 variables, which were all supposed to point towards one large category of information: overall empowerment. When performing a factor analysis, the primary factor accounted account for 27%. The secondary factor accounted for 20% and the third factor for 10%. This shows that there are at least two important major factors being measured under the umbrella of empowerment. Each factor component provides weighting coefficients for each variable, based on the component that it is correlating to. In *Table 2* I have used the coefficients weighted for the primary component. This reveals a heavy preference for the most abstract categories.

Table 6 Weighted empowerment scores using the Principle Components method of Factor Analysis, Factor 1.

Category	Mobility	Labor	Resources	Decisions	Wellbeing	Average
Average	0.008	-0.031	0.510	1.029	0.720	0.463

Appendix C.3 Control Variable Regression Report

The following tables show the regressions of the control variables: time spent at ANKURI, schooling, number of children and age. Note that age was significantly predictive of empowerment, and also has a negative coefficient.

$$\text{Question_Avg} = 1.06781 - 0.01329 * \text{Time}$$

ANOVA					
	<i>d.f.</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-level</i>
<i>Regression</i>	1.	0.07009	0.07009	0.48051	0.49411
<i>Residual</i>	27.	3.93819	0.14586		
<i>Total</i>	28.	4.00828			

	<i>Coefficient</i>	<i>Standard Error</i>	<i>LCL</i>	<i>UCL</i>	<i>t Stat</i>	<i>p-level</i>	<i>H0 (5%)</i>
Intercept	1.06781	0.13531	0.79018	1.34544	7.89158	1.74818E-8	<i>rejected</i>
Time	-0.01329	0.01918	-0.05265	0.02606	-0.69319	0.49411	<i>accepted</i>

$$\text{Question_Avg} = 0.86988 + 0.01535 * \text{Schooling}$$

ANOVA					
	<i>d.f.</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-level</i>
<i>Regression</i>	1.	0.08584	0.08584	0.59088	0.44875
<i>Residual</i>	27.	3.92244	0.14528		
<i>Total</i>	28.	4.00828			

	<i>Coefficient</i>	<i>Standard Error</i>	<i>LCL</i>	<i>UCL</i>	<i>t Stat</i>	<i>p-level</i>	<i>H0 (5%)</i>
Intercept	0.86988	0.1691	0.52291	1.21685	5.14408	0.00002	<i>rejected</i>
Schooling	0.01535	0.01997	-0.02563	0.05633	0.76869	0.44875	<i>accepted</i>

$$\text{Question_Avg} = 1.04156 - 0.02636 * \text{Children}$$

ANOVA					
	<i>d.f.</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-level</i>
<i>Regression</i>	1.	0.03263	0.03263	0.2216	0.6416
<i>Residual</i>	27.	3.97565	0.14725		
<i>Total</i>	28.	4.00828			

	<i>Coefficient</i>	<i>Standard Error</i>	<i>LCL</i>	<i>UCL</i>	<i>t Stat</i>	<i>p-level</i>	<i>H0 (5%)</i>
Intercept	1.04156	0.13437	0.76586	1.31725	7.7516	2.45665E-8	<i>rejected</i>
Children	-0.02636	0.05599	-0.14125	0.08853	-0.47074	0.6416	<i>accepted</i>

$$\text{Question_Avg} = 1.8608 - 0.02477 * \text{Age}$$

ANOVA					
	<i>d.f.</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p-level</i>
<i>Regression</i>	1.	0.84003	0.84003	7.1588	0.01252
<i>Residual</i>	27.	3.16825	0.11734		
<i>Total</i>	28.	4.00828			

	<i>Coefficient</i>	<i>Standard Error</i>	<i>LCL</i>	<i>UCL</i>	<i>t Stat</i>	<i>p-level</i>	<i>H0 (5%)</i>
Intercept	1.8608	0.33238	1.17882	2.54278	5.59845	6.13266E-6	<i>rejected</i>
Age	-0.02477	0.00926	-0.04376	-0.00577	-2.67559	0.01252	<i>rejected</i>

Appendix D Further Network Data

Appendix D.1 Centrality Measure Comparison

Top 5	Betweenness	Bonacich Power	Degree	Closeness
1	Janki 624.89	Janki 2633.55	Janki 15	Janki 262
2	Babita 339.02	Chanda 2568.37	Chanda 10	Sheen 211
3	Mukta 321.87	Sheen 2436.23	Sheen 9	Nirupama 194
4	Nirupama 271.86	Prianka 2417.82	Nirupama 9	Chanda 183
5	Megha 256.00	Karuna 2132.27	Babita 9	
Bottom				
25	Arti 2.71	Getanjali 230.01	7-Way Tie 5	Dipti 148
26	Garima 2.71	Megha 152.52	Lakshmi 4	Kavita 142
27	Asha 1.00	Kavita 124.57	Dipti 4	Megha 140
28	Poonam 1.00	Poonam 45.68	Gowri 3	Poonam 128
29	Lakshmi 0.00	Asha 45.68	Getanjali 2	Asha 128

Appendix D.2 Advice Out Network

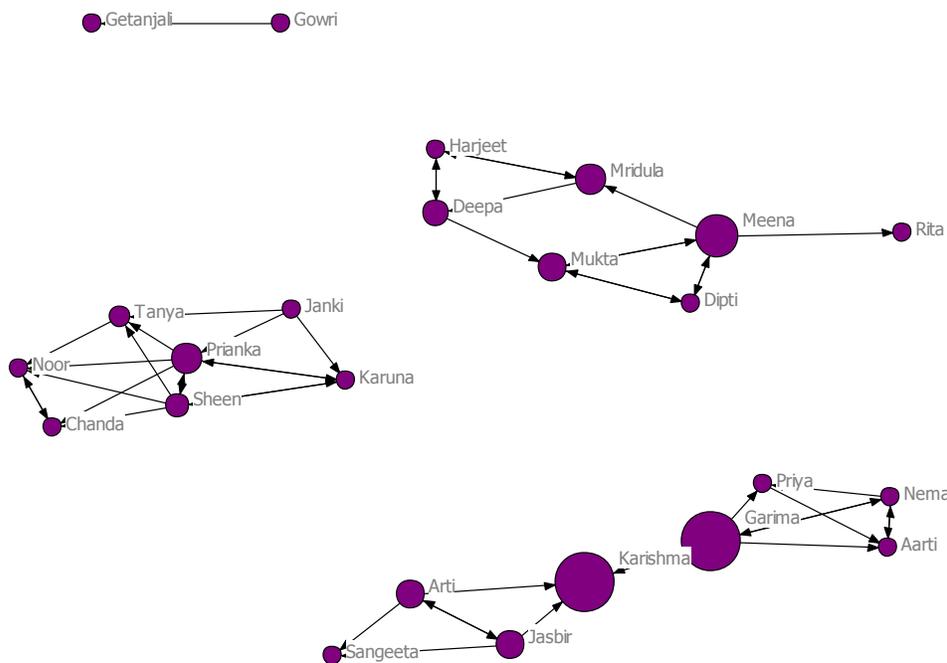


Figure 11 Advice Out Network

Appendix D.3 Spatial Representation of Empowerment

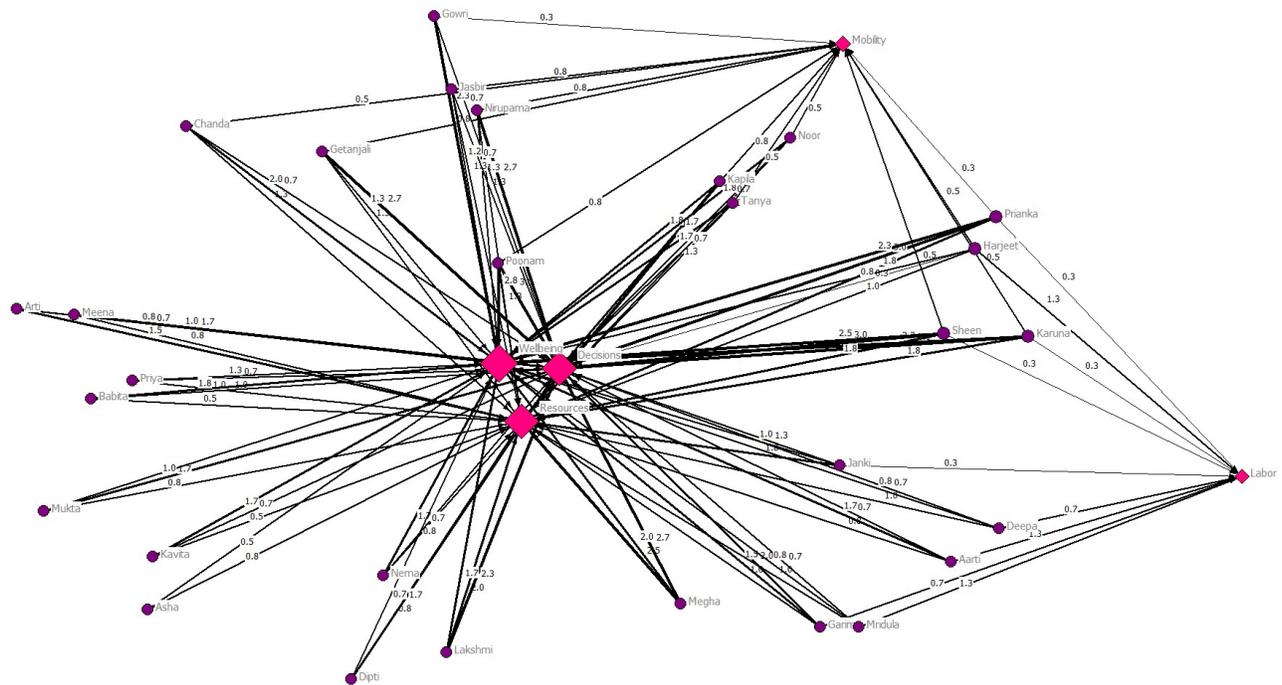


Figure 12: Spatial Representation of Empowerment
 In this multiplex network, the less empowerment a participant received, the more distant their purple node is from the center. Edges are also labeled with specific empowerment measurements. Here, nodes that experienced greater empowerment in labor patterns are distant from the central empowerment nodes, well-being, decision-making, and resources. It is apparent that there are two clear factions in types of empowerment taking place at ANKURI.