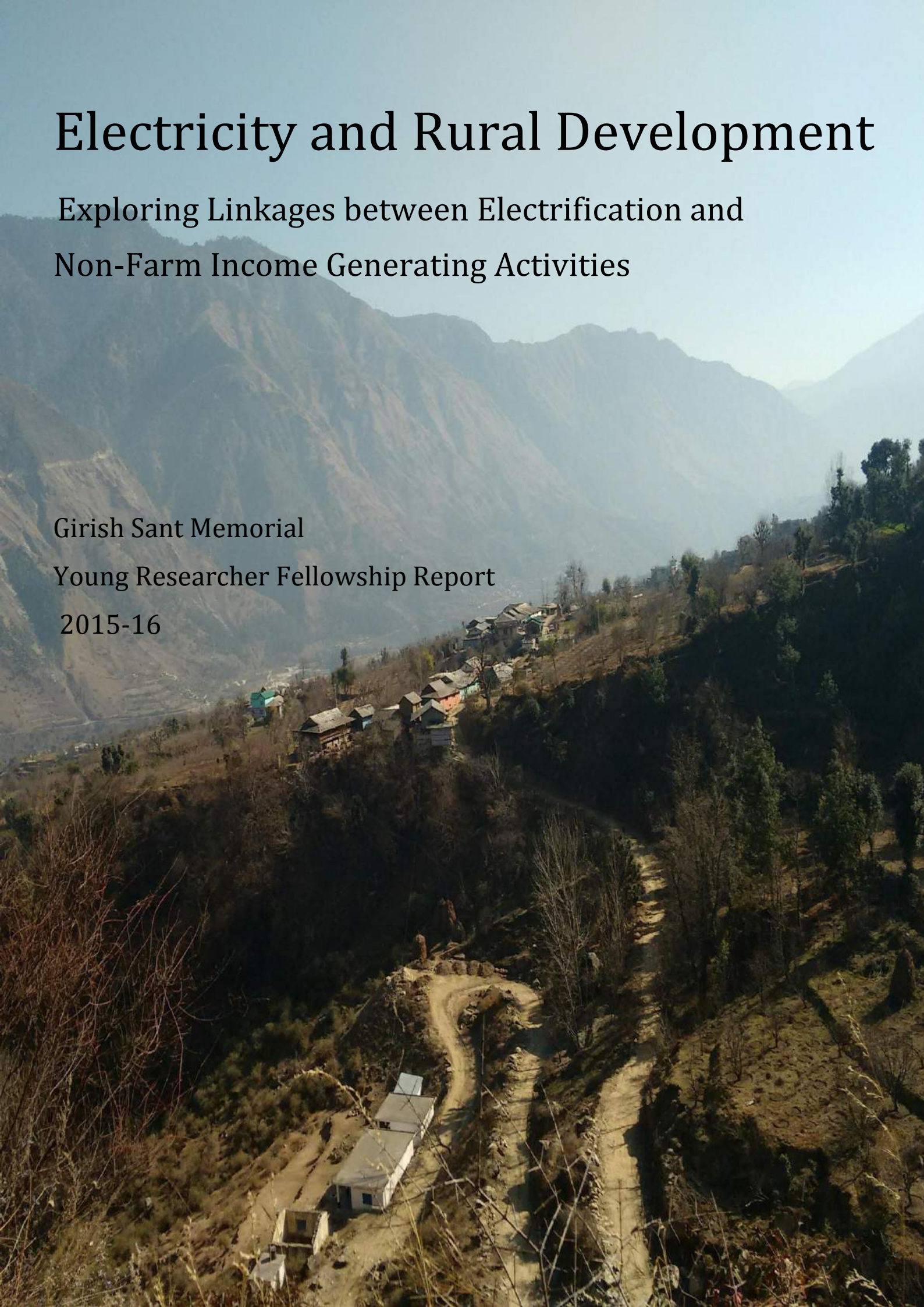
Electricity and Rural Development

Exploring Linkages between Electrification and Non-Farm Income Generating Activities



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Electricity and Rural Development

Exploring Linkages between Electrification and
Non-Farm Income Generating Activities

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List of Abbreviations

BDP	Business Development Program
DDG	De-centralised Distributed Generation
DDUUGJY	Deen Dayal Upadhyay Gram Jyoti Yojana
DISCOMs	Distribution Companies
DRE	De-centralised Renewable Energy
DST	Department of Science and Technology
FGD	Focussed Group Discussion
IEG	Independent Evaluation Group
IHDS	India Human and Development Survey
LPU	Load Promotion Unit
MSME	Micro, Small, and Medium Enterprises
NCSB	Non–Corporate Small Business Sector
NFE	Non-Farm Enterprises
NT	Notified Tribes
OBC	Other Backward Classes
OC	Open Category
PMMY	Pradhan Mantri Mudra Yojana
RE	Rural Electrification
REA	Rural Electrification Administration
REC	Rural Electrificaton Corporation
RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojana
SBC	Special Backward Classes
SC	Scheduled Castes
SFD	Society for Farmers' Development
ST	Scheduled Tribes
STD	Society for Technology & Development
TVA	Tennessee Valley Authority
TVE	Township-Village-Enterprises

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Anjali Sharma
1st June, 2016

EXECUTIVE SUMMARY

It is widely recognised that electricity can be instrumental in promoting education, healthcare, reducing drudgery, improving sanitation, and encouraging income-generating opportunities etc. (Reddy, 1999). However, electrification programs have traditionally focused on providing lighting services. There is a broad consensus in academic literature that use of electricity should not remain restricted to that; rather, it is essential to encourage the 'productive uses' of electricity as well. Generally, all the uses of electricity apart from lighting get clubbed under the category of 'productive uses'. Though, some definitions use the term 'productive use' of electricity to only refer to the use of electricity for income-generating activities. A separate focus on income-generating activities can be useful for an important reason: promotion of such activities can play a significant role in sustainable operation of electrification programs, especially in rural areas. Expansion of rural electrification is considered to be extremely cost-intensive. The infrastructure needs to be set up in remote locations with low population densities. At the same time, the purchasing power and electricity demand of potential consumers is expected to remain low. These factors make expansion of rural electrification financially unsustainable for utilities. Promoting income-generating activities can be crucial in this situation. It can not only lead to load development, but can also aid 'cost recovery' for rural electrification operations by expanding opportunities for income-generation for the rural populace.

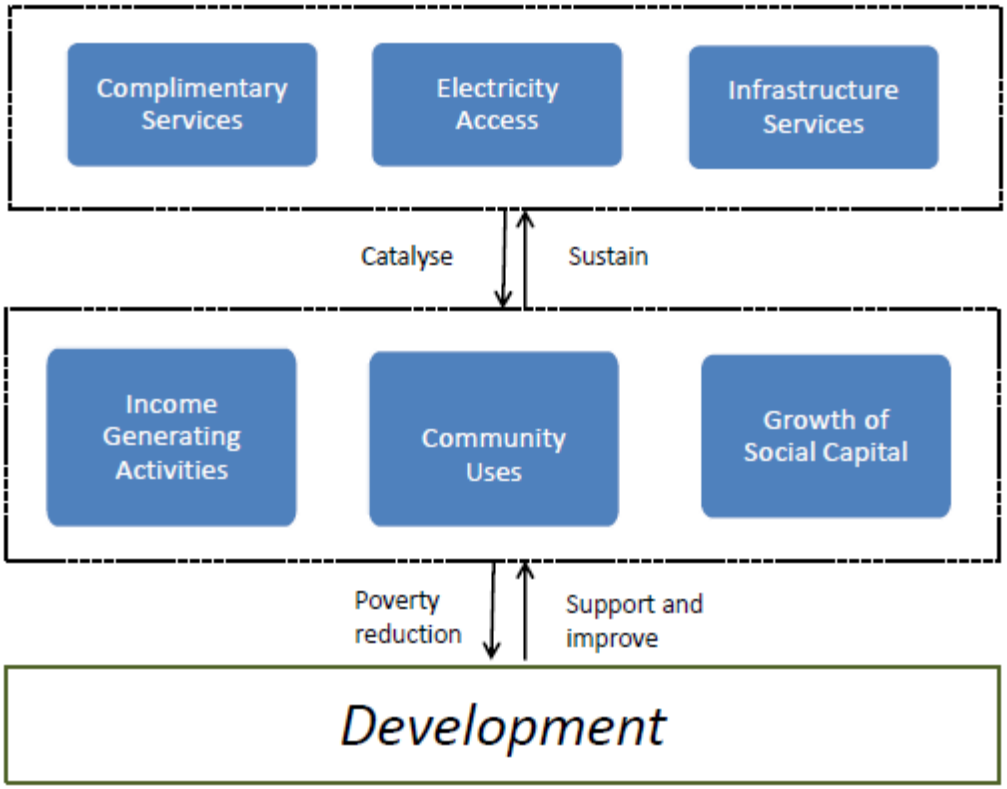
This study began with the broad aim of understanding the linkages between electrification and income-generating activities in rural areas. Owing to constraints of time and research interests, the scope was narrowed down to non-farm activities. Since rural areas are relatively understudied with regard to income-generating activities, the focus was kept on rural areas only. Another reason behind restricting to the rural region was to explore income-generating opportunities in the larger context of rural development. Moreover, only grid-based electrification was considered for this study. The current rural electrification program aims to expand grid-connectivity to as many villages as possible. According to Central Electricity Authority (CEA, India) statistics, grid connectivity has reached ~98% of villages as on March, 2016. Hence, it becomes imperative to evaluate how 'meaningful' this expansion has been to the consumers. Understanding its impact with regard to promotion of income-generation can be an informative parameter.

With an increasing focus on the goals of poverty alleviation and improvement in welfare, interest in encouraging productive uses of electricity, especially income-generating opportunities, has increased (Cook, 2011). However, though academic literature offers strong theoretical conceptions for the relationship between electricity and income-generation, quantitative evidence for the same is limited. One reason for this could be the way in which their relationship has been explored. Majority of the studies have focussed on finding co-relation or the direction of causality between the two, with little emphasis on understanding the reasons behind that causality or the factors affecting it (Rao, 2011). That's why the objective of this study was to understand the causal mechanisms between electrification and income-generating activities in rural areas.

Case studies of two villages were carried out in order to explore the factors and circumstances which could impact the proliferation of income-generating opportunities. One of the surveyed villages was located in Nashik district of Maharashtra, while the other was situated in Mandi district of Himachal Pradesh. In Nashik, the non-farm activities included weaving of *paithani* saarees on handlooms & cotton cloth on powerlooms, whereas in Nagwain, it was weaving of *Kullu* shawls and knitting of socks. Apart from these, both the locations had a handful of other non-farm enterprises such as flourmills, motor-repair shops, grocery (or *kiryana*) shops, tyre-puncture shops, furniture workshops, and retail clothing shops etc. Using purposive and snowball sampling, households engaged in non-

farm income-generating activities were surveyed. Structured and semi-structured questionnaires and Focussed Group Discussions (FGDs) were employed for data collection.

The following schematic represents the understanding of the relationship between electricity and development which was developed over the course of this study. It is grounded in the academic literature which was reviewed and the experiences on field.



Access to electricity alone cannot steer development of non-farm income-generating activities. Provision of complimentary infrastructure and services such as roads, water, market, skill development, training, credit, and raw material etc. are equally important for such activities to flourish. Moreover, electricity complimented with these inputs can also drive the improvement of community services such as healthcare, education, communication, sanitation and reduction in drudgery etc. Together, these productive uses can help in realizing developmental goals: by providing employment opportunities and assisting the improvement of indicators such as education and health levels, communication, and equity. It is also important to acknowledge the two-way nature of the relationship between electricity and development. Development leads to an increase in the demand of electricity as well (Cook, 2011). Moreover, development of productive uses can aid the financial sustainability of the infrastructure facilities.

Apart from the infrastructure and services mentioned above, it was found that the historical and current occupational structures of the region under consideration, situation of agriculture, history of trade, and manufacturing were important determinants of the uptake of non-farm enterprises in rural areas.

This study was a small effort towards gaining a better understanding of the relationship between electricity and development. Although empirical and quantitative evidence substantiating their relationship is scarce, the significant role which electricity can play in meeting developmental goals cannot be denied. In spite of explicit recognition in international rural electrification literature, promotion of productive uses of energy does not find mention in India's current rural electrification

program. It was explicitly stated in the mandate of a rural electrification program for the first time when Rajiv Gandhi Gram Vidyuteekaran Yojana (RGGVY) was launched. However, over the years of its implementation, the commitment towards productive uses was watered down. The current rural electrfication program, DDUGJY (Deen Dayal Upadhyay Gram Jyoti Yojana), does not include promotion of productive uses of electricity either in the mandate or in the objectives of the scheme. Though, the list of expected benefits from this program include a host of productive uses of electricity such as growth in small and household enterprises, agricultural productivity development, improving in health, education, banking, and communication etc. (PIB, 2015). Hence, based on the literature reviewed for this study, earlier work done at Prayas Energy Group (PEG), and the observation from this study, following are a few policy recommendations aimed at encouraging the use of electricity for income-generating activities in rural areas:

a) Promotion of productive uses of electricity should be included in the mandate of rural electrification programs and in the definition of village electrification.
b) There is a need to assess the current and latent demand of electricity for non-farm activities in rural areas so that the planning for deployment of electricity infrastructure can be aided.
c) Alternatives such Rooftop PV could be explored to ensure reliable supply of electricity for economic operations where possible.
d) Requirement of an integrated approach for the promotion of non-farm sector, with coming together of different ministries.
e) Pragmatic planning of schemes, taking the ground realities and implementation logistics into consideration.

CHAPTER 1

INTRODUCTION

Electricity can play a crucial role in achieving the goals of poverty alleviation and improved standards of living. It can facilitate better healthcare and education services, reduction in drudgery, provision of potable water, irrigation facilities, clean cooking options, and diversification of income-generation activities (Cook, 2011; Cabraal, Barnes, & Agarwal, 2005; Reddy, 1999). Despite the widespread recognition of the significance of electricity beyond lighting, electrification efforts around the world have traditionally focussed on provision of lighting services only. There is a broad consensus in academic literature that use of electricity should not remain restricted to that; rather, it is essential to encourage its 'productive uses' as well.

Generally, all uses of electricity except the ones at household level[1] get clubbed under the broad category of 'productive uses'. However, the scope of these 'productive uses' can be varied. On one hand, 'productive uses' are defined as 'activities in agriculture, commercial and industrial sectors which involve direct input of electricity for production of goods and services' (Brüderle, Attigah, & Bodenbender, 2011). Hence, according to this definition, the focus of productive uses of electricity is on income generation only. On the other hand, many scholars prefer an expansive definition for productive uses. In addition to income-generation opportunities, this definition also includes use of electricity for improvement in health, education, security etc. in its ambit (Cabraal, Barnes, & Agarwal, 2005). Segregating the use of electricity for income-generation from its other productive uses can be useful for a couple of reasons. Firstly, access to electricity can have direct impact on income-generation opportunities. These impacts can be assessed from improvement in factors such as income and employment (ESMAP Technical Report, 2015). However, in case of use of electricity for welfare activities such as improvement in education and health, impacts may appear after a long time and can be indirect. It is difficult to draw a causal relationship in those cases (Brüderle, Attigah, & Bodenbender, 2011). Secondly, income-generation opportunities can play a crucial role in sustaining electrification. This argument is particularly significant in the case of rural electrification. Expansion of electrification in rural areas is extremely cost-intensive for power utilities. Infrastructure has to be expanded in remote locations with low population densities. At the same time, purchasing power and consequently the electricity demand of potential consumers is expected to remain low, at least in the beginning. Given these factors, utilities have to provide wires and supply at subsidized rates so as to make electricity affordable for rural population. Although provision of this subsidized power plays a critical role in expanding access to electricity in rural areas, it also results in heavy financial burden for power utilities. In fact, for every unit of power supplied to a newly electrified household, the utility loses as much as Rs 4-5 per unit (Sreekumar & Josey, 2015). Paucity of funds hinders O&M operations which in turn has a direct impact on the quality and reliability of power supply. That's why, 'cost recovery' is considered one of the crucial determinants of efficacy and sustainability of rural electrification programs (Barnes & Foley, 2004). 'Productive uses' can play an important role in this regard. Firstly, promoting productive uses can be beneficial in increasing income-generation opportunities for rural population; thus, enabling them to pay more[2] for the electricity they consume. Secondly, promotion of productive uses helps in increasing quantum and type of use. High paying commercial and industrial establishments which come up can be an important source of revenue generation. This can have positive impacts on the financial viability of rural electrification programs[3], which in turn can also contribute towards better quality of electricity supply (ESMAP Technical

[1] Electricity can be used at household level for lighting, appliance-use, heating and cooking.

[2] The use of the word 'more' is to imply that rise in income will enable rural population to move towards paying the 'actual' price of electricity consumed by them. However, it is equally true that the price of electricity can come down if the electricity services company can reduce the cost of electricity supplied by increasing efficiency.

[3] Revenue generation from promotion of product uses is subject to tariff design. Since commercial and industrial tariffs are much higher as compared to domestic tariffs (Figure 4.1.4 (Planning Commission, 2014)), (Planning Commission, 2014) increase in electricity demand for these activities can be an important source of revenue generation

Report, 2015; Independent Evaluation Group , 2008; Bastakoti, 2006; Barnes & Foley, 2004). Drawing from these two reasons, the scope of 'productive uses' in this study has been kept limited to income-generation opportunities only.

Productive uses of electricity in rural areas can be broadly classified in three categories – a) on-farm uses such as pump-set irrigation; b) farm-based uses such as dairy farming, grain mills, processing of fruits and vegetables, cold-chains; and c) non-farm uses such as retail shops, carpentry, welding, sewing and cottage industry[4]. But in the case of rural India, electricity for productive use has remained excessively concentrated in only one activity i.e. ground-water irrigation (Independent Evaluation Group , 2008). It is important to note here that this phenomenal rise of groundwater use in the country has been chiefly attributed to provision of electricity to farmers at cheap flat rates or even free of cost (Dubash & Rajan, 2001). As far as non-farm[5] productive uses are concerned, although the mandate of RGGVY and Rural Electrification Policy (2006) recognized that encouraging the use of electricity for economic activities plays a crucial role in facilitating employment generation, poverty alleviation and rural development, this recognition did not translate into active promotion of non-farm productive uses of electricity on ground (Planning Commission, 2014; Comptroller and Auditor General of India, 2014; Dixit & Sreekumar, 2011). In fact, during the implementation of RGGVY, commitments for this objective were watered down with time (Dixit & Sreekumar, 2011). Project activities were broadly restricted to the fulfilment of definitional requirements of 'village electrification'[6] only. The current rural electrification initiative, DDUGJY, also does not have a specific mandate for encouraging productive uses. It is unfortunate that promotion of productive uses of electricity has not received adequate attention in the context of rural electrification in India- not only with regard to policy formulation, but within academic spaces as well.

1.1 Rationale and Scope

In order to bring out the importance of productive uses of electricity with regard to rural electrification, this study aimed to understand the linkages between electrification and productive-uses. However, the scope was limited to non-farm productive uses only. There were a couple of reasons for that: a) given the history of subsidies for on-farm productive uses (i.e. pump-set based irrigation), on-farm uses have received considerable attention in academic and policy spaces. Study of non-farm productive uses, especially in the context of electrification, has remained largely neglected. b) With issues such as disguised unemployment and decreasing productivity grappling the agriculture sector, there is an urgent need to look into non-farm income generation opportunities in rural areas. Thus, the focus was on non-farm income generating opportunities in rural areas, and their linkages with electricity.

An important point should be noted here – access to electricity is not sufficient for the promotion of income-generating activities. For such opportunities to flourish, electricity needs to be supplemented by 'complementary services and infrastructure' (Independent Evaluation Group , 2008; Bastakoti, 2006). Potential and current enterprise owners encounter numerous dilemmas in the process of developing their enterprises using electricity, such as potential replacement of cheap labour due to rise in productivity, difficulty in recognition of potential uses and benefits of motive power, inadequate capital assets, lack of transportation services, and limited market facilities for produced goods etc. (Khatun & Roy, 2012). Complimentary services can play a critical role in addressing these issues.

[4] This classification has not been taken directly from the literature. It is just an attempt to classify the different productive uses into logical categories for better understanding.

[5] Henceforth, 'non-farm' uses would be used to denote both 'farm based and non-farm' productive uses which have been mentioned at the beginning of this section.

[6] A new, more detailed definition of 'village electrification' was adopted for RGGVY, which included electrification of public places and at least 10% of households as necessary conditions to deem a village as 'electrified'. Although this new definition has been an important step towards increasing 'access', but, only fulfilling these definitional requirements, which are primarily focused at improving basic lighting services, cannot ensure that the larger goals of rural development, poverty alleviation and income generation are realized.

Another category of factors which can play an important role in uptake and proliferation of rural enterprises is 'socio-economic factors'. Factors such as caste, gender, religion, and personal wealth etc. can have a direct translation on social status, position of assets, and access to electricity services, credit, rural infrastructure, and level of training (Khatun & Roy, 2012). Hence, it is crucial that these factors are also looked into while understanding of the linkages between electrification and non-farm income generation opportunities.

Based on the insights offered by academic literature, the following factors were explored in this study to understand the relationship between electrification and the proliferation of its productive uses. The enquiry was not limited to only the attributes of electricity. Rather, a holistic approach was followed, where complimentary and socio-economic factors were also taken into consideration.

Table 1: Factors impacting the relationship between electrification and its productive uses

Factors	**Components**	**Impact**
Electricity Services	Affordability, Reliability, Accessibility	Demand, Productivity, Cost, Price
Complementary Services and Infrastructure	Access to infrastructure such as roads, communication services; access to markets, inputs; Complementary services such as credit facilities, skill development, awareness programs	
Socio-Economic Factors	Caste, Gender, Religion, Wealth	

The final scope of the study can be listed as follows:

a) Study of linkages of electrification to *only* non-farm income generation activities

b) Factors other than those related to electricity, which include complimentary services & infrastructure and socio-economic factors were also studied.

c) The area of focus was rural area, and not semi or per-urban areas - This is because of two reasons:
   - Rural areas are relatively understudied
   - One of the motivations for this study was to explore income-generation opportunities in the larger context of rural electrification and rural development

d) Study was focussed on areas served by grid-based electricity, and not on off-grid renewable systems–

   The focus of rural electrification programs in India has been to expand grid connectivity to as many villages as possible. Grid connectivity has reached ~98% of villages as on March, 2016 (Central Electricity Authority, 2016). The way in which rural electrification infrastructure has developed in India, electricity through De-centralised Distributed Generation (DDG) or De-centralised Renewable Energy (DRE) are suited to play a complimentary role. These options have can be important for remote areas, where it is expensive to extend the grid and alternate options are based on kerosene or diesel. In areas where grid has reached or is likely to reach, connecting such stand-alone systems to the grid can supplement the grid power (Prayas Energy Group, 2013). However, it has been found that uptake of industrial and commercial applications of electricity has remained highly limited in off-grid projects (World Bank, 2008). Contributing factors could include lack of appropriate technology for supporting motive load, intermittent supply, high cost of power, difficulty in securing credit for operation, and enabling policy & institutional framework etc. (Gambhir, Toro, & Ganapathy,

2012; Palit, Malhotra, & Kumar, 2011). Hence, given these reasons, and especially because of the widespread presence of grid infrastructure, the focus was kept on grid-based electrification.

1.2 Research Questions

Given the rationale and the scope, this study attempted to answer the following research questions:

a) What practices are considered important for development of rural electrification? And what importance is given to 'productive uses' for the same?

b) How do different actors perceive the role of electricity in improving income generation activities, particularly non-farm activities?

c) What is the demand of electricity for non-farm income-generating activities in rural areas?

d) What are the most important factors, electricity related or others, which impact (assist or impede) the promotion of non-farm income generation activities?

1.3 Research Methodology

In order to answer the first research question, review of energy-development literature and international rural electrification experiences was carried out. Rural electrification programs which have been operational in India since independence were also studied to understand the importance given to productive uses of energy in the country's electrification programs so far.

Secondary data were investigated to explore the usage of electricity for non-farm income generating purposes in rural areas. However, such data sources were found to be limited and scattered.

To answer the remaining three research questions, two case studies were conducted. The scope of the case studies was restricted to the non-farm income-generating activities being carried out in the villages. The two villages were chosen based on presence of field-support. The first one to be surveyed was Nagde village in Nashik district in Maharashtra. After a pilot study in October 2015, the survey was carried out in the month of December. The second village was Nagwain in Mandi district of Himachal Pradesh. Here, the survey was carried out in January 2016. In Nashik, the non-farm activities included weaving of *paithani* saarees on handlooms & cotton cloth on powerlooms, whereas in Nagwain, it was weaving of *Kullu* shawls, *pattu* and knitting of socks. Apart from these, both the locations had handful of other non-farm enterprises such as flourmills, motor-repair shops, grocery or *kiryana* shops, tyre-puncture shops, furniture workshops, and retail clothing shops etc.

Using purposive and snow-ball sampling, households engaged in non-farm income-generating activities were surveyed. Structured & semi-structured interviews and Focussed Group Discussions (FGDs) were employed for data collection. Some relevant stakeholders such as electricity utility personnel, bank officials and members of local civil society organisations were also interviewed in order to understand their perspective regarding non-farm income-generating activities.

1.4 Outline of the Report

The next chapter, literature review on the linkages between electricity and development, with a specific focus on non-farm income-generating activities is presented. It also covers review of successful strategies for rural electrification programs from around the world.

Chapter 3 focusses on secondary data sources for non-farm income-generating activities in India.

The next two chapters present the field observations from Nagde and Nagwain respectively.

The last chapter sums up the learnings from the field & literature and draws out conclusions from this study.

CHAPTER 2

LITERATURE REVIEW

With an increasing focus on the goals of poverty reduction and improvement in welfare, interest in developing energy services, especially rural electrification, has intensified (Cook, 2011). The current discourse on rural electrification is markedly different from what was prevalent about two decades back. According to Cook (Cook, 2011), World Bank and other international development agencies have played a critical role in shaping this change. In 1994, an Independent Evaluation Group (IEG) raised concerns World Bank's rural electrification (RE) projects in Asia on the grounds of low rates of return (Independent Evaluation Group , 2008). Based on its assessment, the groups argued that RE programs were financially burdensome because of dismal performance with regard to cost recovery low and economic returns. Moreover, expected benefits such as positive impacts on industrial development remained unfulfilled. This appraisal resulted in a significant transformation in the Bank's strategy towards rural electrification. The IEG report prompted a study of rural electrification in Philippines with the aim of quantifying the 'broader benefits' of RE using a new methodology (ESMAP, 2002). In the years that followed, poverty reduction became not only one of the most crucial rationales for rural electrification programs, but also an important parameter for evaluating the RE projects (Cook, 2011).

The reasons behind the emphasis on rural electrification are twofold. Firstly, a growing body of academic literature has been highlighting a positive relationship between electricity consumption and economic growth & 'development' (Cabraal, Barnes, & Agarwal, 2005). Secondly, it is argued that electrification would foster use of electricity for productive uses, such as for small & medium enterprises and in the farms (Niez, 2010). The resultant increase in demand of electricity would result in a 'virtuous cycle' of profits, both for electricity providers and consumers. This is particularly desirable for rural areas, where issues with regard to cost recovery and load development are considered critical impediments to the expansion of electrification (Cook, 2011).

2.1 Electricity and Development

Either directly or indirectly, energy plays a significant role in development. It acts as a factor of production, as a facilitator of developmental pursuits. However, in spite of a strong theoretical conception of the relationship between electricity and development, quantitative evidence for their relationship is limited and 'mixed'. Most of the quantitative exercises have been econometric in nature, with a narrow focus of exploring the co-relation or causal relationship between electricity consumption and growth & development. Relatively much lesser work has been done to understand the reasons behind these causal links and the factors which drive development using energy (Rao, 2013).

Only studying the co-relation between rural electrification and development is inadequate because in a lot of cases, electricity is introduced to regions which show the greatest promise of growth. Hence, a co-relation does not reflect 'what caused what' (Cook, 2011; Khandker, Barnes, & Samad, 2009). Moreover, even the results from causality exercises present an uncertain picture. The empirical outcomes of these studies have been conflicting and nothing conclusive can be drawn from their findings. For different regions and sometimes the same region as well, the causality between electricity consumption and development has been found to vary from unidirectional to two-way to no causality at all. Such wide differences have been attributed to difference in data sets, econometric methodologies and variation in the characteristics of countries studied (Ozturk, 2010).

Although empirical evidence for the relationship between electricity and development is plagued with uncertainty, it cannot take away the crucial role it can play in facilitating development. To achieve these goals, it is essential to promote the usage of electricity beyond lighting, and encourage its productive uses (Cabraal, Barnes, & Agarwal, 2005; Reddy, 1999). The following section analyses the conditions for development of rural electrification programs and the role of promoting productive uses of energy for the same.

2.2 Promoting Productive Uses in Grid-based Rural Electrification

Expanding rural electrification is generally considered a loss-making preposition for those who invest in these projects (Independent Evaluation Group, 1994). Some of the biggest challenges in the process include largely poor consumers, low population densities, and limited avenues for load development. These factors make RE programs extremely cost-intensive projects, which are usually afflicted by cost recovery issues. Hence, ensuring the financial viability of rural electrification drives is considered essential for their successful implementation (Barnes & Foley, 2004).

Successful grid-based rural electrification experiences from around the world have a number of common learnings to offer. Some of them, based on the work of Barnes and Folley (Barnes & Foley, 2004), are enumerated below:

a) *Reducing cost of construction and operation*: Minimizing the cost of setting-up and operating the electrification infrastructure by targeting villages which show considerable potential for take-up of electricity, adopting single-phase distribution systems in the beginning, and using local raw material for construction etc.
b) *Pragmatic approach towards cost recovery*: Recovering O&M costs at least by not setting extremely low tariffs, encouraging more people to take up electricity connections by reducing initial charges for a connection or spreading the same over years
c) *Involving local community:* Making the local community more involved and aware about the electrification projects by engaging them in the process of construction, demand assessment, and general awareness drives to make them familiar with the uses and benefits of electrification.
d) *Alternative to grid in remote areas:* Employing off-grid solutions in areas where it is too difficult and expensive to extend the grid.

In addition to the list of factors mentioned above, promoting ‘productive uses’ of electricity has also been found to be useful in developing rural electrification programs. Though, in this regard, ‘productive uses’ primarily refer to using electricity in agriculture, industries and commercial sector to produce goods and services (Brüderle, Attigah, & Bodenbender, 2011).

The table below presents how promotion of productive uses of electricity has been a part of grid-based electrification programs in 6 different countries of the world. It is based on the work of Niez (Niez, 2010) & Barnes and Foley (Barnes & Foley, 2004).

Table 2: Productive uses in rural electrification programs around the world

USA	In 1930s, Rural Electrification Administration (REA) started Travelling 'Electric Circus' to promote the use of electricity in farms and households; Provision of lower cost supply with Tennessee Valley Authority (TVA) under New Deal
Ireland	Aim of RE was to increase farm productivity and decrease drudgery of farm life, especially of women; Promotion of electricity was done through rural shows and exhibitions; Govt. started economic expansion program in 1960s to promote rural industrialisation Over 95% of the consumers were on single-phase but 3-phase backbone lines were set up so that the future demands of growing load could be met. This helped reducing cost on infrastructure.
China	Early recognition of linkages between rural electrification and rural economic development; Focus on irrigation in the first phase of RE, and later on Township-Village-Enterprises (TVE, 1970s onwards)
Indonesia	The RE program consisted of a Business Development Program (BDP) to promote load and profitability; it involved developing market strategies for suppliers, addressing issues of information, tariffs and quality of supply
Thailand	Active promotion of productive uses to increase load; RE program consisted of a Load Promotion Unit (LPU) to identify potential use, assess current demand, price and availability of equipment, disseminate information through exhibitions and provide assistance in securing finance; Detailed Village Selection Mechanism was followed to prioritise villages for electrification, so as to maximise benefits and minimise cost
Brazil	Current universal access program 'Luz para Todas' prioritises investment that focus productive uses and integrated local development projects; Community Centres (CCPs) for promotion of productive uses have been envisaged but only three have been developed so far

2.3 Productive Uses in India's Rural Electrification Programs

When India gained independence in 1947, rural electrification rates were almost zero. This vacuum in electricity development in rural as well as semi-urban areas was recognised as a major challenge in the Electricity (Supply) Act of 1948. That's why the primary aim of that act was to develop grid-based electricity in a 'healthy' and 'economical' manner - so that the areas which till then had remained underserved could also benefit from electricity. Nothing much changed in the intial years after independence. However, the drought during the mid-1960s and the resultant shortage of food lead to a renewed interest in the development of rural electrification (Kale, 2014). Based on the recommendations of All India Rural Credit Review Committee, Rural Electrificaton Corporation (REC) was established in 1969. The objective of the corporation was to accelerate rural electrification across the country so that the irrigation facilities could be developed, which in turn would raise

agricultural production (Khunteta, 2011). The agricultural situation at that time necessitated a distinct shift towards pumpset energisation as one of the primary goals of rural electrification (Kale, 2014).

All the electrification programs which followed in the coming decades - such as rural electrification under Minimum Needs Program (1974), Kutir Jyoti Yojana (1988), Pradhan Mantri Gramodaya Yojana (2000-2001), Remote Village Electrification Program (2001), and Accelerated Rural Electrification Program (2003) - were primarily aimed at expanding 'access' to electricity[7]. Promoting productive uses of electricity did not find mention in the mandate of India's rural electrification till the launch of RGGVY in 2005.

One of the objectives as well as rationale for RGGVY was to promote electricity use for agriculture, small & medium industries, and *khadi* & village industries. This was deemed essential foster development in rural areas using electricity. The Rural Electrification Policy of 2006 also asserted that mandate. However, the commitments with regard to promoting productive uses of electricity were watered down in the subsequent years (Dixit & Sreekumar, 2011). Although RGGVY started with a more holistic vision of rural electrification, its implementation remaining mainly restricted to fulfilment of the definition of 'village electrification' only.

In 2014, the current government announced Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY). Apart from subsuming the RGGVY scheme and its targets, DDUGJY has set additional targets which include separation of agricultural and non-agricultural feeder and augmentation & strengthening of sub-transmission and distribution infrastructure. Promotion of productive uses of electricity has not included specifically either in the mandate or the objectives of this scheme. However, the list of expected benefits from this program include a host of productive uses of electricity such as growth in small and household enterprises, agricultural productivity development, improving in health, education, banking, and communication etc. (PIB, 2015). The other initiative to expand electrification is the Power for All initiative. It aims to provide reliable 24/7 power supply to domestic, industrial and commercial consumers by 2019. However, there are no specific measures for providing connections for productive uses, encouraging such uses, or providing affordable power supply (Sreekumar & Josey, 2015).

2.4 Rural Electrification and Income-generating activities

There is a strong case from promoting productive uses of electricity which lead to income-generation. In fact, as the tables mentioned earlier highlight, such uses have been a part of RE programs all over the world. Numerous academic studies have tried to understand the relationship between rural electrification programs and income-generating activities. Since the scope of this study is limited to only non-farm activities, only studies pertaining to non-farm income-generating opportunities have been considered here.

In a study of ~20,000 households in rural Bangladesh, it was found that rural electrification had a strong and robust impact on a household's income (Khandker, Barnes, & Samad, 2009). Exploratory analysis of national-level household survey data from South Africa attributed ~50% of the increase in small and medium enterprises in the country to the expansion of grid-electricity (Prasad & Dieden,

[7] The different programs aimed at improving access for different sections of population. Eg. Kutir Jyoti Program aimed to provide single-point light to BPL rural households, while the aim under PMGY was to electrify un-electrified villages as per the definition launched in 2003. Remote village electrification program was aimed at electrifying remote village through renewable sources of energy, while Accelerated Rural Electrification Program was an interest subsidy scheme aimed at electrifying un-electrified villages, hamlets, dalit *bastis* and tribal villages.

2007). After an econometric analysis of India Human and Development Survey (IHDS) data for 8125 households, Rao (Rao, 2013) found that improvement in electricity access was likely to increase the earning of non-farm enterprises. Moreover, better supply ensured higher incomes.

While such large-scale data analysis exercises have mostly generated evidence for a positive relationship between electrification and income-generating opportunities, outcomes of studies based on small, primary data samples present a somewhat different picture. Based on the empirical data from 264 small-scale enterprises in Indian Himalayas, Kooijman (Kooijman, 2011) concluded that though the uptake of electricity was high among the enterprises, its impact on the income of enterprise-owners was low. A study of villages from three countries – Bolivia, Tanzania, and Vietnam – showed that changes in income due to electricity were small and often, profit per enterprise reduced because of saturation in the market (Clancy & Kooijman, 2010) Both these studies highlighted that only electricity could not lead to development of income-generating activities in rural areas. A host of complimentary services, such as access to infrastructure such as roads and water, market, skill development, and market intelligence also play a crucial role in the process. The study of enterprises in Indian Himalayas concluded that access to market, not electricity, was the biggest obstruction in the development of non-farm enerprises.

An increasing body of academic literature, including that from international development agencies, is realising the importance of complimentary services for the proliferation of non-farm income-generating activities (Cook, 2011; Independent Evaluation Group , 2008). However, understanding of the causal mechanism of their impact on the relationship between electrification and non-farm enterprises is still limited. This could be largely attributed to the fact that these factors are usually not studied with a particular focus in the exercises aimed at quantifying or exploring the relationship between electrification and non-farm enterprises.

2.5 Livelihood Perspective on Non-Farm Income-Generating Activities

Rural 'non-farm' sector has been researched more extensively from the 'livelihood diversification' perspective. According to the definition, rural livelihood diversification is 'the processes by which households construct a diverse portfolio of activities and social support capabilities for survival and in order to improve their standard of living' (Ellis, 1999).

Rural areas, especially in developing countries, have a primary dependence on agriculture for income-generation. However, studies have found that numerous problems plague this sector: risk with regard to return, decreasing productivity, and disguised unemployment (Jha, 2006; Ellis, 1999). This forces rural population, particulrly the poor, to look towards alternative opportunities for income, majority of which are casual and marginal in nature (Khatun & Roy, 2012). Hence, it is imperative to develop 'non-farm' income-generating opportunties in rural areas. Diversification into such livelihoods can be helpful in ensuring incomes, decrease the risk of shocks associated with dependence on only agriculture, and curb migration etc. (Jha, 2006; Ellis, 1999).

Apart from looking into the reasons which necessitate livelihood diversification, academic literature has also explored the factors which are essential to this process. According to studies (Khatun & Roy, 2012; Jha, 2006; Ellis, 1999), complimentary services such as credit, infrastruture such as road and water, and awareness & training facilities etc. play a critical role in process. However, these are not the only factors. The socio-economic factors associated with an individual or a household, such as caste, gender, and personal wealth etc. determine the their asset-base and the ability to take risk and

delve into new livelihoods. Hence, study of livelihood diversification is incomplete without the examination of these factors.

2.6 Conclusion

Regardless of the quantitative evidence regarding the relationship between electrification and development, it is essential to provide electricity services which can be utilised beyond lighting. In a country like India, where the current extent of grid-based electricity is pegged at 98%, it is essential to evaluate how 'meaningful' this expansion is for the consumers. Understanding its impact with regard to promotion of income-generation can be a useful parameter in that regard.

Income-generating activities are considered as an important outcome and even rationale for the promotion of rural electrification in India. But there are no specific policy prescriptions for their promotion in our current rural electrification program.

Moreover, as academic literature has highlighted, electricity is not the only factor which leads to development of income-generating opportunities. It is important to look into the condition of complimentary infrastructure and services as well. This study has aimed to take into account both kinds of factors. It also delved into the question of the reasons or determinants which make people take up non-farm income generating opportunities in rural areas. Though this question has usually been the starting point of livelihood diversification studies, it has not received much attention in the studies exploring the relationship between electrification and income-generating activities.

CHAPTER 3

SECONDARY DATA

Two of the most important country-level data sources are the Economic Census and the Indian Human Development Survey (IHDS). The latest Economic Census was conducted in between January 2013 and April 2014, almost eight years after the previous census was released. This is the sixth such census which has enumerated 'various agricultural and non-agricultural activities excluding crop production, plantation, public administration, defence, and compulsory social security'. It aims to provide reliable and comprehensive data on all kinds of establishments till the level of tehsils/villages in rural areas and wards/towns in the case of urban areas, so that decentralized planning and policy formulation can be aided.

According to the provisional results released till now, there are 58.5 million establishments in the country and nearly 60% of these are located in rural areas. There has been a growth of ~42% in the total number since 2005. Interestingly, five states constitute almost 50% of the total establishments – Uttar Pradesh, Maharashtra, West Bengal, Tamil Nadu, and Andhra Pradesh. This Economic Census is the first census where data on handlooms and handicrafts has been collected separately. Though raw data has not been released yet, provisional results suggest that these kind of establishments account for ~4% of the total number (MOSPI, 2014)

The schedule for the latest Economic Census included a Yes or No question regarding the use of power in production of goods and services in the establishment. The major focus was on capturing social and economic variables such as type of establishment, no. of people employed, sex, social group, and religion of the owner, and major source of finances etc.

A relatively more detailed questionnaire is followed for the IHDS survey. It is a household based survey which also gathers information on non-farm businesses being run by the household members. The first such survey was conducted in 2004-05, which was followed by a second round in 2011-12. The second survey is also the latest one. Apart from gathering information on the type of enterprise being pursued, it covered questions regarding the cost of operation such as expenditure on rent, inputs, electricity, transport, water, and loan installments etc. It did not have questions on the quantum of electricity used. Moreover, it is important to note that the expenditure on electricity, transport, and water were clubbed together and not recorded separately.

Another source of information for non-farm enterprises is the all-India census for Micro, Small, and Medium Enterprises (MSME) conducted by the Ministry of MSME. Data for the fourth and the latest census was collected till 2009 and the results were published in 2011-12. According to the census results, manufacturing enterprises constituted majority of enterprises, followed by service and repair & manufacturing. It also collected data on type of ownership, social variables of owners, employment, investment, and gross output etc. for each enterprise. It also collected data on the primary source of power for the enterprises. Overall, electricity was recorded as the primary source for 67% of the registered enterprises and 48% of the unregistered ones (Ministry of MSME, 2015).

In addition to these surveys, data provided by power distribution companies (DISCOMS) can be useful in exploring the use of electricity for non-farm income generating activities. Data such as the number of industrial and commercial consumers, their connected load, tariffs levied, rate of recovery, and the time of the day when power is consumed etc. can be used to assess the use of electricity for non-farm activities in a region, its consumption patterns, and the expenditure on it. Though, the data available is disaggregated and its availability varies across states.

The table below presents the questions aimed at capturing the role of electricity in the operation of NFEs in different surveys:

Table 3 : Questions in different surveys on the use of electricity in non-farm enterprises

Survey Name	Question on electricity use for non-farm enterprise
IHDS II	How much did it cost to operate this business in the last 12 months?: Electricity, water, and transport clubbed together Hours of Supply
Economic Census 6	Whether using power in production of goods and services (Yes/No)
MSME Census 2006-07	Main source of power for the enterprise (Options include No Power, Coal, Oil, LPG/CNG, Electricity, Others)

Secondary data for non-farm enterprises are limited and scattered. As it can be observed, the data collection exercises have not been conducted regularly in the past. Avenues for exploring latest secondary data are limited. However, working on these data sources can be informative, especially regarding some important social and economic parameters related to enterprises. Though, with surveys being conducted in different years, and with different data sets, it could get difficult to consolidate the information. Moreover, more questions regarding the use of electricity for NFEs need to be included in the surveys which can help in gauging the reliability of power supply. Such questions can include number of hours of supply, time of supply, and use of alternative fuels. A comprehensive survey aimed at understanding the use of electricity for non-farm enterprises purposes would be useful in this regard. Such a survey should inform the currently operative large scale programs like Power For All (PFA).This would not only aid in better planning of the program, but would also help to study the impacts because of the collection of baseline information on non-farm activities.

Owing to paucity of time and data sources[8], raw secondary data was not analysed for this study. Only the final reports of the surveys mentioned above were reviewed in order to understand the extent and nature of non-farm enterprises in the country. Moreover, since the objective of this study was to add to the existing understanding of the causal relationship between electrification and non-farm income-generating opportunities, exploring all the factors which could affect their relationship, prominence was given to primary data collection. Conducting case studies of two villages allowed detailed collection of information regarding the various aspects of non-farm enterprises such as: occupational structure of the household and the region under consideration, other demographic information of the enterprise-owning households, attributes of electricity, and the status of complimentary infrastructure & services.

[8] Financial resources were also encountered as a hurdle during secondary data analysis. The price for data collected in the 5th Economic Census for individual researchers was ~Rs 42,000.

CHAPTER 4

FIELD STUDY - NAGDE

Located in Yevla *taluka* of Nasik district, Nagde is a large village[9] of about 650 households. Multiple occupations, both on and off the farm, are practised here. According to the residents, approximately half of the households are involved in agriculture. Majority of these are *Maratha* households and are landed. Second to *Marathas* in size are the castes categorised as Special Backward Class (SBC). Together, both these social groups constitute about 70% of the households in the village.

Households of the SBC social group in the village mainly belong to *Koshti* and *Sali* castes. Weaving has been the traditional occupation for these communities, and they continue to do the same in Nagde. The village is an important centre of *Paithani* weaving, a craft which has been eulogized as 'a poem in silk and gold' (Qazi, 2014). In most of the cases, the handlooms are set up within the household premises and the weaving is carried out from there. Interestingly, *paithani* saaree is not the only textile which is weaved in Nagde. The village also produces '*Uparna*', a white cloth with golden border which is presented to male guests during Maharashtrian wedding ceremonies. And these *uparnas* are weaved on powerlooms, not handlooms. Though, in the last 15 years, the number of powerlooms has declined drastically in Nagde. Apart from these two activities, some other non-farm occupations are also practised in the village. These include atta chakki, kiryana shop, wood-workshop, welding workshop and poultry farm.

The village got electrified in the early 1960s. It is deemed electrified according to the revised definition of village electrification which came into effect from 2004-2005. Currently, the village experiences at least 6 hours of load-shedding for single-phase power supply every day. Whereas, three-phase power supply is available only for about 8 to 9 hours daily.

4.1 Sampling Methodology

Nagde village is located at a distance of about 5 kms from the nearest town Yevla. According to the census of 2011, the village has a population of 2673, out of which 1298 are females and 1375 are males (Census Organisation of India, 2015)

To collect data regarding powerlooms and other non-farm enterprises (except handlooms), purposive sampling strategy was followed. Semi-structured questionnaires and Focussed Group Discussions (FGDs) were employed for data collection. All the individuals who are engaged in these occupations in Nagde were interviewed in the survey.

However, the same could not be done for handloom weavers. During the fieldwork, no official record enumerating the *paithani* weavers in Nagde could be procured, either from the gram panchayat or from the office of *talathi*. Discussions with residents of Nagde informed that there are about 200 to 250 *paithani* weaving households in the village currently. Hence, based on that, purposive and snowball sampling strategies were applied to cover ~25% of the weaving households. Two major reasons behind restricting the sample size to almost a quarter were limitations of time and person power.

[9] Nashik district falls in the 'Khandesh' region (i.e. the north western part) of Maharashtra and Yevla is a municipal city in the district. According to its 2011 Census profile, Nagde has been described as a 'large village'. Although the number of households in the village has been listed as 523 on the Census 2011 website, the latest number, according to the gram panchayat, is 657.

Nagde has a considerable population of traditional weaving castes[10], which form the majority of *paithani* weavers in the village. However, today, *paithani* weaving in Nagde is not restricted to only *Koshti* and *Sali* castes. Other communities such as those belonging to Open Category, Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Classes have also taken up this craft. The reasons for this include both opportunity as well as distress. It was ensured that all the castes which are engaged in *paithani* weaving were covered in the sample. Though, because of limitations in data availability, the sample was not exactly proportionate to the caste-based composition of weavers at the village level. Secondly, only the households with ownership of handlooms were considered for this survey. This was done in order to gain better insights on questions of electricity usage and complimentary services as the weavers who do not own looms are not involved in securing any of the complimentary infrastructure or services.

The following table (Table 4) presents the caste-wise breakup of the sample of *paithani* weavers who were interviewed:

Table 4: Caste-based distribution of the surveyed paithani-weaving households in Nagde

Distribution of surveyed households by caste			
Caste Category		Number	Proportion
Special Backward Class (SBC)		18	33%
Open Category (OC)	Maratha	12	22%
	Muslim	4	7%
Scheduled Caste (SC)		8	15%
Other Backward Class (OBC)		10	18%
Scheduled Tribe (ST)		1	2%
Nomadic Tribes (NT)		2	4%
Total		55	100%

Although not in exact proportion, this sample is a reflection of the caste-based breakup of handloom owners in Nagde. Muslim and NT households formed such a small percentage of the sample because of their overall low population in the village. The reasons behind low proportion of ST households were twofold: firstly, these households also form the minority in the village and secondly, among the ST households who are engaged in paithani weaving, majority do not own their own looms. The weavers from this community usually work as skilled labourers for others' looms.

The next section describes the observations and findings of the fieldwork which was conducted in Nagde. After a pilot study in October, 2015, the survey was conducted in December, 2015. The section is divided into four parts: the first part talks about *paithani* handloom, the second is about powerlooms, and the third segment covers the remaining non-farm activities in the village. The last segment sums up the findings and learnings from Nagde.

[10] ~25% of the total households in the village belong to SBC group, according to the Gram Panchayat.

4.2 Paithani Handloom

The *Paithani* Museum housed in Yevla *Paithani Paryatan Kendra*[11] informs that this craft has a legacy of over 2000 years. It was born in 200 BC in the capital city of Satvahana dynasty, the city which is known as 'Paithan' today. Over the centuries, this art was patronized by rulers of different dynasties because of its rich and intricate designs. However, it was during the rule of Peshwas that *paithani* flourished beyond Paithan and reached Yevla in Nasik. Today, the weavers of Nagde claim that '*Yevla Paithani'* saarees rule the *paithani* market. And only a handful of looms remain in Paithan - to cater to the foreign tourists who flock to the city to experience this art in person.

During the pilot study, caste was observed as one of the most important determinant of a weaver's condition. Questions such as the occupation structure of a household, income-dependence on *paithani* weaving, and access to finance etc. could be better understood if the paradigm of caste was taken into consideration. That was one of the major reasons for using it as the stratum for sampling. Analysing the survey data on the basis of caste has brought out some interesting insights regarding the weaving community in Nagde.

4.2.1 People involved in paithani weaving

There are two main actors in the *paithani* business in Nagde: the *bunkar* or weaver and the *seth* or trader. Largely, the weavers are only engaged in the process of weaving. They weave the saarees on order for traders who are based in towns such as Yevla. These traders also provide the designs as well as the raw material for weaving. Once an order is ready, wages are negotiated between the weaver and trader on the basis of time taken and intricacy of design. The payment of these wages is not immediate and can take some weeks or even a few months to get cleared.

The weavers in Nagde can be classified into three categories:

a) Master weavers – This category of weavers usually own more than the average number of looms and hire skilled labourers, called *kaarigar*, to operate their looms. The looms are set up in a *kaarkhaana*, a big and well-lit room which is usually located within the house itself. Some of the masterweavers engage in the process of selling *paithani* saarees as well. They collect finished orders from weavers all over the village and take them to saaree traders based in far-off cities such as Hyderabad, Bengaluru and Aurangabad. The motivation behind travelling such large distances for selling the saarees is to secure better wages.

Out of the 55 surveyed households, ~25% were of master weavers. About half of these belonged to the OBC social group, followed by SBC and Open Category households. None of the SC, ST or NT households reported any masterweavers.

The number of looms in the *kaarkhaanas* of the interviewed master weavers varied between 2 and 11. On an average, a master weaver owned 4 looms. Generally, one *kaarigar* was employed per handloom by the master weaver.

b) *Bunkars* or weavers– There is no specific name for the weavers belonging to this category. They operate on their own looms, in a room or a part of it within their households. Weaving is carried out by the members of the household and no outside labour is utilized. They prepare saarees on order, either for traders based in Yevla or for the masterweavers based in Nagde itself. Majority of the interviewed Open Category and SBC households constituted this category.

[11] 'Yevla Paithani Paryatan Kendra' is located at the outskirts of Yevla and serves as a museum cum showroom for Paithani saarees.

c) *Paithani* labourers or *kaarigars* - They work as wage labourers in the *kaarkhaanas* of masterweavers. They are only involved in the process weaving, using raw materials and designs which are provided by the masterweaver. For this research, only masterweavers and weavers were interviewed. However, the demographic information of *kaarigars* was covered during the interviews of masterweavers.

Weavers from ST and SC households constituted the category of *kaarigars* among the interviewed households. However, since the last few years, some of these labourers have started working on their looms. This trend is more pronounced among the SC households as compared to the ST ones.

Photo 1: A kaarigar weaving in a kaarkhaana

Women are also actively engaged in *paithani* weaving process in Nagde. Amongst the interviewed households, about 40% of the workforce was composed of women. Though, fewer women worked on the looms as compared to males. Before the actual process of weaving begins, the dyed silk threads need to be strengthened (sizing), untangled (winding) and finally transferred to small bamboo spindles (threading). Contribution of women was recorded to be higher in these processes, especially in winding. It is important to note here that these processes do not entail separate wages. The payment for these gets subsumed under the wages which are received for weaving. Hence, the women who were engaged in pre-weaving activities did not receive payment for their work separately.

4.2.2 Spread of weaving in Nagde

Paithani weaving is a relatively recent phenomenon among the castes which have not been traditionally engaged in weaving. For households in the Open Category, the average number of years of being engaged in *paithani* weaving came out to be around 10 years. Whereas, for households belonging to SC, ST and NT caste categories, this number was about 5 years or less than that. However, there was one exception to this trend: the OBC households. 70% of the interviewed OBC households had taken up *paithani* weaving more than 15 years back.

Although weaving has been taken up across different caste categories in Nagde, it has not happened at the same time for all the non-weaving castes. This difference could be partly explained by the upfront monetary investment which is required to begin weaving as an occupation. If one has to buy a new

handloom today, it would cost around Rs 40,000. This could be a significant amount to arrange for a household, especially for those belonging to SC and ST households[12]. However, since the past few years, the traders of Yevla have started 'aiding' the purchase of handlooms. The aid is usually offered to the *kaarigars* belonging to SC and ST households. This could explain the relatively recent take up of weaving among these social groups.

According to the experienced weavers in Nagde, providing monetary aid is a strategy to increase competition by increasing the number of weavers in the village. Since the young weavers become indebted to the traders and are low in experience, they agree to settle for lower wages during negotiations. This in turn reduces the bargaining power for the seasoned weavers as well because the floor rates get reduced.

The phenomenon of occupational mobility towards *paithani* weaving cannot be fully understood without examining the past and present occupational structure of the weaving households. The next section has tried to explore the major trends among different social groups.

4.2.3 Occupational structure of paithani households

When enquired about the number of occupations being practised in the household, ~55% of the surveyed households listed two or more than two occupations. This question was asked to understand the reliance of households on *paithani* weaving for income and also capture their dependence on other activities, both off and on the farm, for income-generation.

Among the 45% of the households which listed *paithani* weaving as the only occupation of the households, the majority belonged to the SBC category. In fact, 72% of the interviewed SBC households relied solely on *paithani* weaving for income-generation. These proportions were much lesser for other categories. None of the ST and NT households reported dependence on only *paithani* weaving, though these figures should be considered with caution because the number of households belonging to these caste categories was very low in the sample.

Table 5: Proportion of surveyed households engaged only in paithani-weaving

Proportion of Households engaged in only *Paithani* weaving	
Caste Category	Proportion (in %)
Open Category (OC)	25
Scheduled Caste (SC)	38
Special Backward Class (SBC)	72
Other Backward Class (OBC)	56
Scheduled Tribe (ST)	0
Nomadic Tribe (NT)	0

Diversity in livelihoods among the households engaged in *paithani* weaving was largely present at the household level, and not at the individual level. To better understand the patterns of occupational mobility towards *paithani* weaving, the respondents were also asked about the occupational portfolio

[12] This could be attributed to higher incidence of poverty and prevalence of casual labour (and thus lack of regular income) among SC and ST households. These observations are well-documented in govt. reports and academic literature. See: (Rawal & Swaminathan, 2011); (NSSO, 2014)

of the household before *paithani* weaving was taken up as an occupation. Examining the responses to this question along with the current occupational structure reveals some interesting observations.

About 75% of the households surveyed in the Open Category were engaged in multiple occupations. Agriculture was the most common occupation among these households after weaving. In all these cases except one, the elder male members of the household were still practising the same occupation in which they were engaged before weaving was taken up in their household. It was the younger working members in these households who reported taking up weaving. Although ages of all the weavers were not recorded in this survey, the respondents of the questionnaire were asked to share their age. On an average, they were a little less than 30 years old.

Occupational mobility towards *paithani* weaving in SC households has followed a pattern similar to the one among the Open Category households. In their case, ~60% of the surveyed households were engaged in two or more occupations. The biggest proportion of occupations practised in these households except weaving was comprised of non-agricultural jobs such as security guard and bank clerk in Yevla.

In contrast to the above mentioned categories, only about 30% of SBC households were engaged in multiple occupations. Weaving remained the predominant occupation of this community. Interestingly, close to 30% of the *paithani* weaving SBC households were earlier involved in powerlooms. This shift from powerloom to handloom will be discussed in detail in the next section.

OBC was the only social group which did not follow the trend of other non-weaving castes. More than half of the OBC households reported relying only on weaving for income-generation. This, in part, could be because of the involvement of the earlier generations in the textile industry. In 55% of the interviewed households, members of the previous generations had been engaged in textile industry through powerlooms, handlooms and dyeing. This association could have been responsible for making their shift to *paithani* more organic as well as sooner among the OBC households.

For all the castes except SBC, the take up of weaving is a clear case of intergenerational occupational mobility. None of the previous generation members of these communities were engaged in weaving. The primary reason behind the take up of *paithani* weaving has been the monetary remuneration associated with it. Weavers of Nagde claimed that they could earn as much as 500 rupees in a day by working for about 7 to 8 hours. Moreover, since the looms were located within their own homes, they could schedule their work as per their wish.

In some ways, *Paithani* weaving has broken the occupational hierarchy associated with caste in Nagde. Traditionally, weaving castes have been considered to have an 'inferior social standing' (The Gazetteers Department, 2006). Although this caste-based prejudice is still visible in the village, *paithani* weaving has been taken up by all the other castes in the village, irrespective of their social standing on the caste ladder. Since the driving force for this uptake has been high wages and assured work, the elders of the non-weaving castes are not concerned with their children not taking up the family occupation. In fact, during the survey, elders as well as youngsters across all the castes repeatedly expressed their happiness at having *paithani* weaving as a livelihood option in the village. They claimed that because of *paithani*, everybody had work in the village. None of the young boys strayed or fell prey to bad habits such as drinking and smoking because they did not have free time at their hands.

4.2.4 Electricity and paithani weaving

The conventional style of *paithani* weaving involves using 'the ancient tradition of tapestry where multiple threads of different colours are weaved along with gold and silver threads'[13]. Weaving the borders of these saarees requires immense patience as well as dexterity. Although mechanical techniques to produce these designs are available in the market[14], the weavers in Nagde still follow the traditional means of weaving. To weave the elaborate borders which are the trademark of *paithani* saarees, weavers work with tiny bamboo spindles or *tillis*, patiently interlocking the silk or gold yarn on these *tillis* on the weft. Based on the width and intricacy of design, the number of these *tillis* from 15-20 to even a few hundred.

In Nagde, though none of the weaving processes are carried out using electricity, the weavers still reported an indispensable dependence on electricity. According to them, the intricacy of their work made it almost impossible to work with tube-lights. Although some of them had employed techniques to take as much advantage of natural light as possible, such as by placing the looms near windows or doors, or by making slits in the part of the roof beneath which the loom is placed, all the interviewed weavers maintained that tube-light was the best source of lighting for their looms. Moreover, given the width of the saaree and presence of intricate borders on both the sides, any other source of electric lighting, such as a bulb, was not very helpful.

All the interviewed households were using tube-lights for lighting the handlooms. In all the cases, one 40-watt tube-light was being used per handloom.

Next to tube-lights, fans were reported as the most commonly used appliance amongst the weavers. And the most common type of fan was the table-fan because it provided better cooling than the ceiling fans, according to the weavers. In more than 80% of the households, table fans were being used by the weavers to keep themselves cool and avoid sweating. Though, these fans were used only during the four summer months, from April to June. The weavers informed that they could not afford to have the stains of sweat droplets on the saarees. Even a single stain, or *daag* as they call it, resulted in a significant reduction in their wages.

The third most common electrical appliance used by the weavers was the locally produced music-system, commonly known as 'home-theatre' in the village. Music provided entertainment to the weavers and helped them to pass the long hours of weaving. About 55% of the interviewed households reported using these music systems.

The number of electrical appliances being used for *paithani* weaving is dependent on the number of looms in the house. On an average, the interviewed households reported two looms per household. Caste-wise breakup of the average number of looms provided the same figure for all the castes except the OBC social group. Among the OBC households, the average number of looms per household was 4. Thus, on an average, the interviewed households were using two tube-lights and two-table fans for *paithani* weaving (one for each loom). An important point to note here is that there were no separate metres for handlooms. Since the looms were placed within the households, they received electricity through the domestic connections.

[13] Paithani Museum, Yevla Paithani Paryatan Kendra

[14] Jacquard or *jala* techniques are available in which the entire design is imprinted on the saaree with one stroke of the loom. *Paithani* saarees produced using this technique are called semi-*paithanis.*

Photo 2: Use of electricity in the weaving of paithani saarees

During the pilot study in Nagde, it was observed that the village had a widespread presence of inverters. Interestingly, those inverters were not being used to run the household appliances; rather, they had been bought to ensure smooth functioning of handlooms during power outages.

Nagde experiences at least six hours of power cuts every day. The weekly load shedding schedule for the village is as follows:

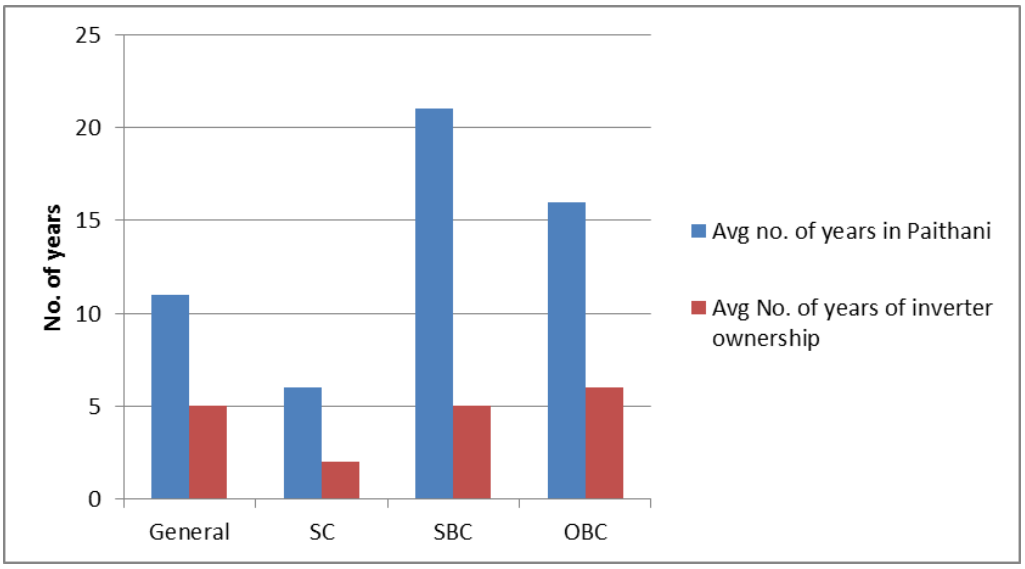
Table 6: Load-shedding schedule for single-phase power in Nagde

Days	Duration
Mon to Wed	3:30 am to 9 am
Thurs to Sun	9 am to 3 pm

Since *paithani* weaving relies heavily on electricity in Nagde, as outlined in the last segment, usage of inverters was reported as a common phenomenon among the weaving households. More than 80% of the interviewed households were using inverters. On an average, there was one inverter per household. Conversations with the weavers informed that having an inverter is now considered a norm for the weaving households. Except for the SC households, 80% or more of the households in each caste category owned an inverter. This proportion was approximately 60% for the SC households. This, in part, could be explained by the relatively recent uptake of weaving in this social group.

The figure below highlights an interesting trend regarding the uptake of inverters in Nagde. Among the interviewed households, estimates for the average number of years of inverter ownership came out to be similar for different caste categories. The only exception was the SC category. ST and NT households were not included in this graph because of their small sample size.

Figure 1: Years of inverter ownership among surveyed paithani-weaving households



The most probable reason behind the almost simultaneous take up of inverters could be competition, for work. The interviewed households did not report any decline in the availability or reliability of power supply over the last decade or so. In fact, they claimed that the number of hours of single-phase power supply had constantly increased over the years. Nonetheless, the hours of outages had remained significant. As power outages mean loss of work and consequently loss of wages, uptake of inverters allowed the weaving households to not lose their working hours owing to outages and even take up more work. And thus, a few households buying inverters triggered its uptake across the village.

One of the most intriguing aspects of the widespread usage of inverters was the cost attached to it. If one has to install an inverter today, it would cost somewhere around Rs 14,000 which includes Rs 4,000 for the inverter and Rs 10,000 for the battery. Moreover, on an average, the interviewed households replaced the batteries every three years. Apart from that, operating an inverter also involved periodical expenditures on distilled water and maintenance.

These significant upfront as well as maintenance expenditures immediately raise questions about the rationale as well as the affordability of inverters for the weaving households. As voiced by the weavers, the most important rationale for the uptake of inverters was to prevent loss of work due to load shedding. Weavers are in Nagde are primarily engaged in weaving expensive *paithani* saarees with elaborate patterns. These designs are extremely time-consuming, so much so that for some patterns, a weaver can only weave about half an inch in a day. This compels them to work throughout the year. Load shedding could reduce the number of person-days of work for a weaver by almost 120 days, which would mean a loss of almost a third of a year's work.

During the survey, the weavers reported that they could weave a saaree worth Rs 3000 in almost 7 person-days. This implies that their daily wage is somewhere around Rs 430. Although this amount could change based on the intricacy of design, it was taken as an approximate estimate here to calculate the incomes. Using this figure, it was found that load shedding could reduce an average household's annual income by almost one lakh rupees by resulting in loss of work. In comparison, the annual cost of operating an inverter was only about Rs 6000.

The following table (Table 7) compares the average annual household incomes for households engaged in *paithani* weaving under three different scenarios. The w/o load shedding scenario presents the best scenario, in which the weavers receive power supply without any outages. The second

scenario is the one with the current load shedding schedule. The third and the last scenario is an estimate of the annual income where the load shedding has been offset using an inverter.

It is important to note here that the incomes calculated here are indicative, and are not necessarily equal to what the weavers actually received from the traders. Also, these pertain to a household, and not an individual weaver. Household incomes were calculated by assuming two looms, and corresponding two weavers working throughout the year in an average household. These assumptions were based on the observations of the survey of the weaving households.

Table 7: Net annual income of paithani-weaving households under different load-shedding scenarios

Scenario	Net Annual Income of a Household from Paithani weaving
w/o Load Shedding	Rs. 3,12,000
with Load Shedding	Rs.2,06,000
with Inverter	Rs. 3,06,000

Moreover, because of the high value of their product, weavers could make the required upfront investments. Saarees ranging from a few thousands to a few lakhs are produced in Nagde. Although the final wages are negotiated with the trader after the saaree had been weaved, a weaver can go to the trader at any point of time to ask for an 'advance'. And that was reported as one of the most common means of credit for securing an inverter. In fact, it was reported that the traders encouraged that uptake of inverters by providing wages in advance. According to the weavers, the primary reason behind this was to increase the competition among weavers. Just as in the case of providing financial aid to buy new handlooms, traders encouraged uptake of inverters so as to expand the pool of weavers who could produce saarees for them on orders. This, in turn, steered the terms of wage negotiations in their (traders') favour.

Interestingly, during the survey, many respondents expressed willingness to adopt solar-energy based solutions to tackle the load-shedding. They claimed that since their dependence on electricity was primarily for lighting purposes, and they usually carried out their work during the day, rooftop solar systems could be a viable alternative for them. They also felt that it could help them to reduce their electricity bills as they would not be using inverters then. Also, according to them, the supply of single-phase power had been relatively better in 2015 as no power was being drawn for agricultural purposes because of drought. Otherwise, many a times they faced power outages for more than 6 hours in a day which resulted in their inverters getting discharged. They felt that solar-energy based solution could help them to ensure reliable supply.

Understanding the relative performance of solar-based solution such as rooftop PV (individual or community owned) and inverters could be extremely useful in the case of Nagde. As the primary concerns of the weavers include expenditure and reliability of supply, it would be helpful to compare the two options on both these grounds. The village might not face agricultural distress in the future and then, it would be imperative to look into the reliability of power offered by the grid. Further, power tariffs in Maharashtra have been increasing steadily and depending on inverters which just store power from the grid could soon make power consumption unaffordable. On the other hand, the price of power generated from rooftop solar systems is fixed for a 25 year period and thus, could

insulate weavers from tariff increase for the power used from solar systems. However, this study does not cover a comparison of the financial viability of the two options.

4.2.5 Complimentary infrastructure

The last part of the survey focused on assessing the situation and importance of complimentary infrastructure for *paithani* weavers. The weavers were asked questions regarding skill development, market accessibility, raw material, and credit opportunities. It is telling that these questions evoked the longest discussions during the survey. One of interviewed weavers claimed, "*Idhar to sab mushkil hai* (everything is a problem for us)". Her views were echoed by a lot of weavers. However, the relationship which these weavers shared with the traders was their biggest concern.

a) Skill Development

Only about 20% of the interviewed households reported receiving training for skill development. Out of these, more than half belonged to the SBC social group. However, these training programs were not recent. Most of these people had received training through certificate courses of NABARD before 2000.

Majority of the interviewed weavers had learnt weaving through family and friends. Among the SBC households, it was mainly through family as the art was passed from one generation to other. Weavers of all the non-weaving castes had learnt it though their friends. When asked about skill development programs, the weavers claimed that they did not need training programs per se because people in the village were always ready to help each other to learn and improve their weaving skills. Moreover, this sharing of knowledge and skills happened across caste boundaries.

b) Market Accessibility

The survey highlighted that the weavers hold very little freedom over what they produce or at what price want they sell their product. Terms of trade are dictated by a handful of traders, who are not involved in the process of weaving.

Out of the 55 interviewed households, 75% produced saarees on orders by the traders. Since the saarees were produced on order, their designs were also provided by the traders. Only one of the households reported producing saarees which were self-designed. The reason why weavers refrained from weaving saarees with their own designs was the difficulty in selling such saarees. In absence of any market space except the showrooms of traders, the weavers eventually had to approach the traders to sell their saarees. Negotiations for wages were very difficult in this case as the traders would invariably find faults with the design or the finish. Approximately 25% of the households engaged in both self-designed saarees as well as orders. The self-designed saarees were usually taken up when the weavers were not able to secure orders.

The weavers also reported that they seldom received their payments on time. The traders would frequently delay their payments on the pretext of the saarees not getting sold. Generally, it took four to five visits and a few months for the weavers to receive their payments.

Although more than 60% of the weavers worked for traders who were based in Yevla, about 10% had moved to traders based in Aurangabad in search of better wages. This had mainly happened through the masterweavers in the village.

Discussions with the weavers underlined that their access to market was dependent on the traders. It was difficult for them to venture on their own. Being based in a village, they realised that it was difficult for them to have a direct contact with the customers. Moreover, given the time-consuming

nature of *paithani* weaving and the expensive raw materials, it was difficult for a single weaver to produce a variety of saarees which could compete with arrays of saarees which were on display in the showrooms of the traders. In the past, a couple of self-help groups had been formed by the weavers but none of those are functional today. They asserted that it was very difficult to form a 'union' of the weavers. Because someone or the other would be in need of money and subsequently approach the traders and the trend would continue.

In 2014, a *paithani* cluster by the name *Yevla Paithani Paryatan Kendra* (or Yevla Paithani Tourist Centre) was inaugurated in Yevla. The aim of this centre was to showcase the history of *paithani* weaving and also provide a platform for the weavers to sell their saarees. However, none of the interviewed weavers in the village reported receiving any benefit because of the tourist centre. They claimed that it was not plausible for them to go to the centre and set up their own stalls, which is how the marketplace for weavers had been envisioned. The primary reason was that a single weaver could seldom provide the variety which the customers were looking for. Secondly, it did not guarantee assured sale of their products. Weavers were also wary of selling their saarees through the showroom housed within the tourist centre. They complained that if their saarees did not get sold in the showrooms, they were returned back to them after a few months. That's why the weavers chose to stuck to the traders, who at least guaranteed sale of saarees, if not timely wages.

c) Raw Material

Cost of a kilogram of silk varies between Rs 1300 to Rs 1500. Usually, this much of silk goes into weaving one saaree. Moreover, between Rs 150 to 200 are spent on *zari* which is used for weaving the designs and borders. Interestingly, for any saaree, whether produced on order or not, the cost of raw material is supposed to be borne by the weaver.

Majority of the weavers procured silk and *zari* from the yarn shops which were located in Yevla. However, about 30% of the interviewed households were solely dependent on the traders for providing them raw material. These households avoided purchasing their raw material on their own because of the high cost of silk and *zari*. In this kind of arrangement, the cost of raw material was cut from the wages which they were paid after the saaree was ready. Many weavers revealed that the traders generally charged 100-150 rupees extra per kilogram of silk. That's why the majority preferred to buy raw material on their own.

d) Credit

Majority of the interviewed households reported taking 'advance' from traders as and when they required money. However, they explained that an 'advance' is *not* a 'loan'. Since their wages were provided after the weaving was complete and the process of weaving could take a few weeks or a few months, they took their own wages in advance so as to meet their daily needs. No interest was charged on these amounts. The 'advance' would simply get cut from their wages at the time of payment.

Nonetheless, given the difficulty as well as delay which they faced while dealing with the traders, about half of the interviewed household reported applying for a loan. The most common reasons were purchase of raw material and upkeep of looms. Majority of the households were aware of the Pradhan Mantri Mudra Yojana (PMMY). And those who had applied for loans had mainly applied for the scheme itself. The following table gives a caste-based breakup of those who applied for loan and the ones which got approved.

The table below presents the proportion of interviewed *paithani*-weaving households who had applied for a loan at the bank and the proportion of those which got approved. This analysis was based on caste categories.

The difference in the number of households which applied for loan could partly be because of the difference in their number in the sample size. However, the rates of approval were observed to be higher for Open Category and SBC households as compared to the SC and OBC households. According to the weavers, this was because of the better 'connections' which these communities had with the officials at banks.

Table 8: Distribution of households engaged in paithani weaving who applied for loans in banks

Caste Category	HH which applied for loan	Approved	Proportion
Open Category	8	7	88
Scheduled Caste (SC)	4	2	50
Special Backward Class (SBC)	10	9	90
Other Backward Class (OBC)	6	3	50
Scheduled Tribe (ST)	0	0	
Nomadic Tribe (NT)	1	0	0
Total	29	21	72

Interestingly, only about 50% of the households which had applied for a loan finally received or chose to receive the loan amount. In some of the cases, the loan got approved but the funds did not get released. In other cases, the loan got approved for a very small amount. Sometimes, the amount of money which they spent in preparing the 'files' for the loan application exceeded the sanctioned loan amount itself. The weavers reported that application process consisted of three steps: firstly, the weaver had to fill the loan application form. Procuring the required documents as listed on the loan application form for PMMY resulted in considerable delay as well as monetary expenditure for the weavers. Once the application 'file' was in place, the weaver was interviewed by the bank officials. The third and the last step was a visit by the bank officials to their handloom units. And even after going through all these steps, the weaver was not certain of getting the approval. That's why majority of the interviewed weavers either did not apply for a loan or chose not to take up the approved amount.

In Nagde, disbursement of money under the PMMY is being handled by banks. The two most important banks, which have financed almost all the loans in the village, are Bank of Maharashtra and Dena Bank. The weavers reported that they are asked for collateral by banks in case the proposed amount was high. It could be any immovable property: their house or their land. The demand for collateral goes in direct opposition to the intent of the PMMY, which aims to provide collateral-free loans of up to 10 lac rupees for the Non–Corporate Small Business Sector (NCSB). In fact, collateral was also reported as a major reason for not approaching banks for loan.

Because of these hassles involved in the process of getting a loan, the weavers preferred to rely on the traders for credit. Although the traders are exploitative in settling their wages, the weavers could approach them anytime and take an 'advance'.

The major observations with regard to handloom weaving in Nagde are listed as follows:

a) *Paithani* weaving is one the most remunerative occupations in Nagde. A weaver can earn as much as Rs 500 a day weaving *paithani* saarees.
b) Because of the good remuneration, people who have not been traditionally engaged in weaving are also taking up weaving in the village. This trend is generally visible among the younger generation.
c) Although no process of weaving uses electricity, it is indispensable for the weavers as they need it for lighting because of the highly intricate nature of *paithani* weaving.
d) Apart from lighting, electricity was also being used to run table-fans (for cooling) and music systems (for entertainment).
e) Load-shedding resulted in loss of work for the weavers as it is difficult to weave without adequate lighting. Hence, majority of the weavers have invested in inverters because Nagde experienced at least 6 hours of load-shedding every day.
f) Annual cost of operating an inverter was found to be nominal (approximately Rs 6000) when compared to the loss in income of a household because of load shedding (almost Rs 1 lac).
g) Although majority of the interviewed weavers had purchased inverters, they were eager to try solar-energy based solutions to tackle the problem of load-shedding. They felt that it would help them to reduce their electricity bills and ensure reliable supply.
h) Having overcome the unreliable power supply using inverters, load-shedding was not a major concern for the weavers. Their biggest problem was the unfair market structure and the monopoly of a few traders over the terms of trade.

4.3 Powerloom

Till about 2000, Nagde used to be a bustling powerloom centre. There were around 150 to 200 powerlooms in the village at that time. However, no more than 10 functional looms remain today. The powerloom industry has been almost wiped out of the village. And the residents blame it on the decline of reliable 3-phase power supply in the village.

4.3.1 Rise and fall of powerlooms in Nagde

Interestingly, 20% of the interviewed households who are engaged in *paithani* weaving today were earlier involved in powerlooms. Majority of these belong to the SBC social group.

Table 9: Rise and fall of powerlooms in Nagde

Rise and Fall of Powerlooms in Nagde	
Till 1940s	Himroo Shawls
1950s	Cotton Saarees
Early 1960s	Diesel-based loom introduced for Cotton Saarees
1964	Village Electrified
1965 onwards	Powerlooms introduced
Late 1970s	Cotton handloom weavers start shifting to *paithani* because of growing competition from powerlooms
2000s	Powerlooms start declining

Nagde village has a long history of weaving. However, the village was not always engaged in *paithani* weaving. Till the 1940s, weavers in this village used to weave *himroo* shawls. But because of their expensive nature, the market for these shawls was highly limited. That's why, in the late 1940s, the weavers started shifting to cotton saarees. Slowly, all the weavers had shifted to cotton saarees from *himroo* shawls. Then in 1960, diesel-based looms were introduced for the cotton saarees. These looms could provide produce five times more saarees as compared to the handlooms. With the introduction of electricity in the village in the mid-1960s, these diesel-based looms started getting replaced by powerlooms. However, not all the weavers could afford investments which were required to shift to powerlooms. Hence, for almost a decade after that, cotton saarees were produced both on handlooms as well as powerlooms in the village. In the late 1970s, the cotton handloom weavers started taking up *paithani* weaving. The primary reason was their decreasing profits because of the competition from powerlooms. When *paithani* was introduced in the village, powerlooms were weaving saarees on coloured cotton cloth. However, after an order from the government in 1972[15], powerlooms were asked to stop producing coloured cloth. After an order of the Supreme Court which followed later, a clear distinction between the kinds of products which could be weaved on powerloom and handloom was made (Pawar, 2013). Handlooms could weave coloured textiles, with designs and borders, whereas, powerlooms could only weave white textiles with minimal borders. Owing to these orders, powerlooms shifted to weaving '*uparnas'*. According to the powerloom owners in village, the order did not lead to a decline in their work or wages. Since the powerloom owners shifted to *uparna*, they had a considerable market to sell their product. Thus, between early 1980s and 2000, both powerlooms as well as handlooms flourished in the village. However, hours of 3-phase power supply started declining from 2000. And with this decrease, powerlooms started declining as well. Between 2000 and 2010, majority of the powerloom owners closed their business in Nagde. They either shifted to Yevla, which has better power supply, or changed their occupation. Only a fraction of these owners still operate in Nagde.

4.3.2 Reasons for decline of powerlooms

According to the interviewed households, hours of single-phase power supply have consistently increased in the village. However, along with that, quantum of 3-phase power supply has decreased. According to the residents of the village, in 2000, the number of hours of electricity supply for agriculture were reduced and fixed at 8 hours per day. And that lead to an immediate reduction in 3-phase power supply to village. Operation of powerlooms, which were running for at least 16 hours a day at that time, was reduced to almost half.

The powerloom owners informed that the looms were generally operated by *kaarigars*, who used to work on the owners' looms for daily wages. With the decrease in number of hours of electricity supply, opportunities of work declined considerably. This directly impacted the wages of *kaarigars*. They started moving out of the powerloom industry. Some shifted to Yevla, while some others shifted to *paithani* weaving. In the absence of *kaarigars* it became very difficult for the owners to keep their looms functional. And thus, they started closing down their business and selling their looms. In a lot of the cases, they sold their looms to the powerloom owners of Yevla. The power supply was told to be much better in Yevla, which allowed power-based looms to flourish there.

4.3.3 Situation of powerlooms today

There are only 5 households with powerlooms in the village today. All of them belong to the SBC social group except one, which belongs to Open Category. The average number of functional looms per household has decreased to 2. In the heydays, a household used to own 4 to 6 looms on an average. Usually, a single powerloom runs on a motor of 1 kW of power. In addition to that,

[15] None of the weavers or residents could remember the exact time when the order was enforced.

powerloom owners employ a couple of small motors (of 0.5 kW) to warp the yarn on the beams which are then used in weaving. The average connected load among the remaining powerloom connections was observed to be ~7kW. However, because of the unavailability of three-phase power, the powerloom owners were not able their looms to their maximum capacity.

It is interesting to note that none of these households reported powerlooms as their major source of income. They are being run by elder male members of the family only with the hope of turnaround of their fortunes one day. The younger working members of these households have moved out of powerloom industry and taken up other occupations such as *paithani* weaving, salaried-job and business.

Photo 3: A power loom which is not in use any more (left)
Photo 4: One of the remaining powerloom owners working on his loom (right)


4.3.4 Issues plaguing powerlooms

a) Power Supply

The remaining powerloom owners asserted that availability of reliable 3-phase power supply was their biggest concern. The current weekly schedule for three-phase power supply in Nagde is as follows:

Table 10: Weekly schedule of availability of 3-phase power supply in Nagde

Days	Schedule
Mon to Wed	9 am to 5 pm
Thurs to Sun	11 pm to 8 am

Earlier, 720 *uparnas* could get produced per household in a week. The power outages have reduced that number to almost 40. Their working hours have decreased from 16 to only 5 hours in a day. Moreover, for four days in a week, they receive power at night. It has reduced their working days too only three days in a week as it is almost impossible to find labourers who are willing to work through the night.

Because of the heavy motive-load, the powerloom owners did not consider running diesel-based generators as a financially viable alternative source of energy. According to the powerloom-owners, it

was expensive. Furthermore, given the uncertainty involved in procuring diesel and the ability of the generator to sustain motive-load for longer duration, the powerlooms owners considered generators unreliable. Besides, powerloom owners could not invest in inverters like the handloom weavers to ensure reliable power supply because their work involved heavy motive lead unlike the handloom weavers, who were primarily dependent on electricity for lighting.

The following table (Table 11) presents an illustrative case of the approximate incomes of powerlooms-owning households, comparing the current situation with the scenario of no load-shedding.

Table 11: Net annual income of powerloom households with and without load-shedding

Case	Avg. net annual income of a powerloom households
with Load-shedding	Rs. 25,000
w/o Load-shedding	Rs. 5,00,000

It can be observed that decline in 3-phase power supply has reduced their profits to a mere 5% of what they could have been earning if the supply had been reliable and accessible. Though, it is important to note that had the powerlooms been running on their full capacity all over the village, there would have been more competition with regard to the cost of *uparnas* which in turn would have brought their prices down. Moreover, the weavers would have been spent higher amount of money in the maintenance of their looms in that scenario. However, at the same time, scale of production would have brought down the cost of production.

b) Lack of support schemes

Apart from concerns of electricity, lack of support from government was reported as a major reason for the current disappointing situation of powerlooms in the village. The weavers argued that it was very hard for them to obtain credit. Being located in a village, they had not been able to gain from government support schemes as those schemes never reached till Nagde. All the schemes focussed on major urban powerloom centres such as Malegaon and Ichakaranji. Though, it should be noted they were being charged the discounted tariff which applies to all the powerlooms in Maharashtra[16]. Moreover, they claimed that though it was easy for handloom weavers to obtain loans, the banks were not ready to lend to the powerloom weavers. Absence of sources of credit has made continuing powerlooms all the more difficult.

4.4 Other Non-Farm Enterprises

Apart from *paithani* handlooms and powerlooms, only a handful of non-farm enterprises are present in Nagde. These enterprises include a couple of *kiryana* shops, a welding-shop, and a couple of *aata-chakkis*, a furniture workshop and a poultry farm. Except for the *kiryana* shops, all these enterprises reported a crucial dependence on electricity. The decrease in 3-phase power supply has seriously impacted their work because the number of working days in a week had been reduced to only three.

[16] As per the Maharashtra Electricity Regulatory Commission (MERC) order dated 26th June, 2015, a sub-category was created for Powerlooms under the LT Industries category. According to this, for powerloom connection between 0-20kW connected load, fixed charges are Rs 220/connection/month and energy charges are Rs 5.43 per unit. All the powerloom owners of Nagde were charged at these rates.

Reliability of power supply was reported as their biggest concern by these enterprise owners.

The *aata-chakki* owners reported losing their work because of unavailability of power supply. Because of its proximity to Yevla, many of the residents of Nagde had started going to *aata-chakkis* in Yevla. Moreover, some of the bigger households in the village had bought their own *aata-chakkis* which could be run on single-phase power.

The poultry owner had invested in an inverter as well as a diesel-based generator for his poultry farm because of the power outages and unreliable power supply. This had resulted in an upfront investment of about a lakh of rupees. Moreover, additional expenses in form of expenditure on diesel were incurred by him in case the inverter failed.

During a focused group discussion, the furniture workshop owner asserted that the residents of Nagde were willing to pay as high as 15 rupees per unit for reliable power supply. When asked questions about complimentary services, especially credit, these enterprise owners asserted that they did not wish to take loans from banks. They claimed that they could run their businesses considerably well if they were provided with reliable power supply throughout the week.

4.5 Conclusion

A history of textile weaving is responsible for the presence of handloom weaving as an important non-farm activity in Nagde today. Besides, electricity has also played an important role in proliferating such opportunities there. Powerlooms were introduced in the village after the introduction of electricity. Moreover, though electricity was not reported as the sole reason behind the uptake of other non-farm opportunities, the enterprise owners claimed that the presence of three-phase power supply in the village had provided them the opportunity to take up new income-generating activities.

The case of Nagde highlights that proliferation of non-farm activities in a village holds an important linkage with the situation of agriculture in the village. In about 57% of the *paithani* households with two or more occupations, the younger working members reported taking up weaving because they did not want to get involved in agriculture as their elders. This shift was observed across all castes. The younger generation of both landed households as well as non-landed households where the elders were involved in farm labour had taken up *paithani* weaving in search of higher income and better work conditions.

Electricity was observed as an important facilitator of non-farm opportunities in the village. That's why the decline in reliable supply of three-phase power supply had led to severe reduction in work and wages for the powerlooms as well as other non-farm income generating activities. According to the owners of these enterprises, unavailability of reliable three-phase power supply was the biggest difficulty in their endeavours. They were confident that if they were provided with reliable power supply, they would be able to earn considerable profits. Also, owners of enterprises with motive-load had not invested in diesel-based generators because they considered that option highly expensive and unreliable. Difficulty in procuring diesel, uncertainty regarding the ability of generator to sustain motive load for longer duration, and the subsequent motor burnouts discouraged them from investing in diesel as an alternative source of electricity.

However, the situation was different for the handloom weavers. Since their primary dependence on electricity was only for lighting, and not for motive-load purposes, they had invested in inverters to ensure reliable supply. Having secured that, electricity was no longer a major concern for them. Their

biggest problem was exploitative terms of trade which were forced upon them by the traders. In the absence of accessible sources of credit, they were forced to rely on the traders for everything: from order of saarees to raw materials to even designs.

The findings from Nagde bring out some important observations. Firstly, non-farm income generating opportunities in villages cannot be looked at in isolation. As in the case of Nagde, these activities could have strong linkages with the history of the economic activity in that region. Moreover, they could be closely affected by the current situation of agriculture in the village. Secondly, although electricity can play an important role in the proliferation of non-farm activities, it is important to give equal attention to the complimentary services and infrastructure. As the case of handloom weavers points out, only access to market or credit facilities might not be enough. It is crucial to understand the market structures within which these enterprises operate. Until and unless attention is given to understand these details as well, proliferation of non-farm activities in rural areas would be difficult to realise.

CHAPTER FIVE

FIELD STUDY - NAGWAIN

About 20 kms before Kullu city in Himachal Pradesh, there is a village called Nagwain. Located along the National Highway 21, this village has more than 550 households and a population of about 2500 (Census Organisation of India, 2015) . It is situated at the base of a hill which houses a dozen other villages, though those villages are much smaller in size. Together, all these 13 villages constitute a gram panchayat which is also known as Nagwain. According to the latest records provided by the panchayat office, the total population of Nagwain panchayat[17] is 5847, out of which 3009 are males and 2838 are females. Open Category and Scheduled Castes are the two major social groups, with their population share being 50% and 44% respectively. The remaining 6% of the population belongs to the Scheduled Tribes (ST).

Majority of the households in this panchayat are engaged in farming. Generally, a portion of land is dedicated to subsistence farming. The rest is used to cultivate vegetables and fruits such as tomato, peas, cauliflower, plum, apple, apricot and pomegranate. Non-farm income generating activities are limited and usually constitute the subsidiary occupation of a household.

Because of its proximity to the national highway, Nagwain village has the maximum presence of retail and service-related establishments in the panchayat. The non-farm occupations in the village include *kiryana* shops, retail clothing shops, tyre-puncture workshops, small eateries, flourmills, tailoring shops, furniture workshops and a printing press. Weaving of shawls is also practised in Nagwain; however, it is primarily limited to self-consumption. Over the last few years, knitting of socks has picked up here and now forms an important non-farm income generating activity. Apart from these, a fruit and vegetable processing unit is located here. It was established by an NGO called 'Society for Technology & Development' which was set up in 1990.

Electricity was introduced in Nagwain in 1962. Today, all the villages in the panchayat are electrified[18]. Except for an extreme weather event or repair work taken up by the electricity department, power is available 24/7 in the panchayat.

The next section describes the sampling strategy which was followed to conduct the survey in Nagwain.

5.1 Sampling Methodology

As mentioned before, Nagwain comprises of 13 villages. As some of the villages are very small, with as low as 30 to 40 households, 6 or 7 of these villages have been clustered together to form one revenue village. Hence, Nagwain consists of three revenue villages: Nagwain, Shil Mashora and Palsed. While Nagwain village is located at the base of a hill, Shil Mashora is situated up the hill, covering its left side. Palsed is also located on the hill towards the right side.

During the pilot study of Nagwain, it was observed that it could get difficult to access all the villages in the panchayat because of the difficult terrain and the bad condition of roads. Hence, 50% of the villages in the panchayat, two each from each of the revenue village, were selected randomly. Although Nagwain village in itself could have provided an adequate sample, the study was not limited

[17] From now on, 'Nagwain' would refer to Nagwain panchayat
[18] As per the revised definition of 'village electrification'

to only Nagwain in order to capture the importance of 'location' of the village as a determinant of the non-farm activity.

Purposive and snowball sampling strategies were followed to arrive at a sample of households which were involved in non-farm activities. Semi-structured questionnaires and focussed group discussions (FGDs) were employed to collect the data.

Owing to time constrains and difficulty in mobility[19], not all the enterprises in the six villages could be interviewed for this survey. In total, 26 households which were involved in non-farm activities were interviewed.

Table 12: Distribution of households interviewed in Nagwain by type of non-farm enterprise

Type of NFEs being practised in the HH	No. of Households interviewed
Weaving	8
Knitting	3
Weaving and Knitting	1
Other NFEs	11
Knitting and Other NFE	1
Total	24

Here, 'other NFEs' refer to the non-agricultural establishments such as flourmills, furniture workshops, printing press, and tyre-puncture workshops. Although a greater variety of such enterprises are present in Nagwain, the focus of the survey was limited to only the ones with motive-load. For the remaining enterprises, such as *kiryana* shops, retail clothing shops, tailoring shops, and eateries, dependence on electricity was observed to be minimal. It was only being used for lighting and did not form an indispensable part of the operation of these businesses. Apart from the 24 households enumerated in the abovementioned table, two more households were interviewed. Both of these had been engaged in weaving earlier and had shifted to agriculture and horticulture in search of better income opportunities.

50% of the interviewed households belonged to the Open Category social group while the remaining 50% belonged to Scheduled Caste (SC). None of the enterprise owner belonged to the Scheduled Tribe (ST) group.

The remaining chapter is divided into four parts: the first part talks about weaving and knitting, the second is about the other NFEs and the third covers the fruit and vegetable processing unit. The last part summarises the findings and observations from Nagwain.

5.2 Weaving and Knitting

Weaving of shawls is a common activity among the households in Nagwain. Since temperature drops to sub-zero levels during winters, shawls help to keep the people warm. The most commonly weaved

[19] There were frequent rains in the panchayat during the duration of the survey. Since there is no pucca road in the panchayat connecting all the villages, it was difficult to move around.

items are kullu shawls and *pattu.* Kullu shawls are lighter in comparison to the *pattus* and are made with finer quality of wool. *Pattus* are generally prepared using wool sheared from the sheep which are reared in the households. Primarily, *pattus* are weaved for self-consumption. However, they also form an important part of a bride's trousseau as well as 'dowry'. According to the residents of Nagwain, heavily-designed *pattus* can constitute a major portion of the 'dowry' given by the bride's family. Moreover, *pattus* are also gifted to a bride by relatives and friends. A few decades earlier, a newly-wed girl could receive as many as 60 *pattus* during her wedding. But over the years, this practice has declined considerably and is mainly limited to the immediate family these days.

Knitting of socks is a relatively recent trend in the village. It has picked up in the last 5 years or so. These socks are prepared solely for the purpose of selling, on the order of *seths* (i.e. traders) who are based in nearby towns such as Mandi and Bhuntar.

5.2.1 Kullu Shawls

In early 1940s, *Bushehari* weavers from Shimla district in Himachal Pradesh came to Kullu valley and introduced their craft of geometrically patterned handloom to the region. Shawls used to be woven in Kullu before their arrival as well, but those were plain shawls (Sharma, Kanwar, & Rekha, 2008). Today, Kullu shawls are mainly characterised by their geometrical borders which resemble flowers[20].

Out of the seven weaving households, five were engaged in making Kullu shawls. Two of these owned small weaving workshops near the highway in Nagwain village. The remaining three reported weaving within their households, for Kullu shawl co-operatives and industries based in Bhuntar and Kullu. A couple of households which were earlier engaged in weaving of Kullu shawls and are now involved in agriculture and horticulture were also interviewed.

Two of the five interviewed households belonged to the Scheduled Caste (SC) social group and three belonged to the Open Category (OC) group. Except for the two workshop-owning households, all the households were engaged in agriculture as well. Though, it was being carried out for their own consumption only.

a) Looms

Kullu shawls are woven on handlooms called '*khaddi*'. If the shawls are being weaved for the purpose of selling, the loom is kept inside the household premises. Otherwise, it is kept in the courtyard or in the open space outside the house.

One of the workshop owners owned 10 looms in his workshop while the other had 8 looms. All these looms were placed within the workshop premises. Two of the household-based weaving households had one loom each. These were being operated by a female member in both the households. The remaining household had 3 looms. The owner of these looms had employed one worker each for each handloom and paid them daily wages based on the number of shawls produced. The same payment method was followed by the workshop owners.

b) Wages

The weavers receive wages based on the number of pieces of shawls which they produce in a day. This amount is known as 'commission'. 'Commission' gets decided based on the number of patterns

[20] The most common borders are known as 'ek phool' and 'teen phool'

weaved on the shawl. Selling price of Kullu shawls start at somewhere around Rs 6000 and can go up to even Rs 20,000 and above. The price of these shawls is governed by the design and type of wool used for weaving.

One home-based weaver reported receiving Rs 300 as wage for every shawl which she weaved. According to her, these shawls were generally sold for Rs 600-700. Hence, she could earn about Rs 300 per day if she could complete the shawl in a day.

One of the workshop owners told that for a shawl which is sold at Rs 2000, the weaver received only about Rs 600. And it generally took the weaver 18 hours to produce such a shawl. Hence, according to him, it was dependent on the weavers as to how much they could earn in a day. By working for more number of hours in a day, they could earn as high as Rs 500-600 in a day.

However, producing more number of shawls did not always translate into higher daily wages. One of the handloom owners paid the workers Rs 50 for every shawl they weaved. He claimed that the weaver could weave as many as 10 such shawls in a day and thus earn Rs 500 per day.

In fact, low wages was one of the reasons why one of the interviewed weavers had stopped weaving and shifted to agriculture. He used to go to the city of Ludhiana to weave Kullu shawls in the workshops of a large industry. Till about 2000, he could earn 200-300 per day as the rate of weaving per shawl was fixed at Rs 70 and he could weave 4 shawls in a day. However, as more people started entering the labour market for weaving Kullu shawls, wages per piece started declining. Even today, the daily wages of workers who weave for industries and co-operative do not exceed Rs 150-200.

c) Electricity and Weaving

Every loom placed indoor had a 60 or 100 watt incandescent bulb attached to it for lighting purpose. Since the weaving process of Kullu shawls is not extremely intricate, a single bulb was reported to be sufficient to provide lighting to the loom. No other electrical appliances were being used in the weaving operation.

The availability and quality of power supply was reported to be good by the weavers. As power outages are seldom in that area, weavers could work on their units as and when they wished. Electricity also allowed them to work at night. Though, generally, the weaving work was carried during daytime.

The weavers which were based within their households received electricity at the domestic supply rates whereas the workshops were charged at commercial supply rates. However, since electricity was being consumed only for the purpose of lighting, weavers spent a nominal portion of their income on electricity.

Table 13: Electricity charges as proportion of incomes for Kullu shawl weavers

Type of weaver	Type of electricity connection	Electricity charges as a proportion of income
Household-based	Domestic Supply	3%
Workshop owner	Commercial Supply	2%

The proportions could vary, especially for the workshop owners. Their incomes were not only dependent on the number of shawls which were weaved in their workshop, but in fact, depended on the number of pieces they were able to sell. However, since electricity was being used only for the

purpose of lighting, it did not form a significant proportion of their incomes even when the sales were moderate or less than that.

Photo 5: A woman weaving outside her household premises

d) Complimentary Services

In order to better understand weaving as an income-generating occupation, the weavers were also asked questions about the availability of training services, ease of access of raw material, access to market and credit facilities.

Since the household based weavers were engaged in weaving mainly as a secondary occupation, they did not have major concerns regarding such services. Weaving of Kullu shawls is a traditional art of the region and none of the weavers reported receiving any training for that. Moreover, since they produced the shawls on orders, raw material and even designs was provided to them by the big traders for whom they were producing shawls. They generally visited the traders after a month, with the shawls which they had produced over that month. The traders paid them on piece-rate basis and provided them raw material for the next batch of shawls. None of the weavers, both household-based and workshop owners reported borrowing money from the banks and/or moneylenders for the process of weaving.

On the other hand, both the workshop owners lamented that the owners of co-operative societies and big shawl industries had totally captured the Kullu shawl market and the small workshop owners could not compete with them. According to them, every big trader owned 100 or more *khaddis* on which shawls were prepared by labourers whose daily wage did not exceed Rs 100-150. Since Kullu shawls did not take much time to be weaved, considerable number of shawls could be produced by the weavers employed at these co-operatives and industries. Sometimes, in case of heavy demand, they laboured out to weavers based in villages. However, majority of the production happened at their own workshops. Moreover, they obtained raw material in bulk at highly cheap rates from cities such as Ludhiana and Amritsar. Hence, they beat the small workshop owners both in terms of cost of production and variety. The workshop owners also claimed that the big traders used their ‘connections’ and political influence to receive benefits of government schemes designed for the weavers.

Today, the names of big co-operatives and industries have become synonymous to quality and authenticity, and with that it has become even more difficult for the small workshop owners to compete with them. As every customer wishes to buy the 'original' Kullu shawls, they prefer to buy them from the established names. This has put the small workshop owners at a grave disadvantage in accessing the shawl market.

5.2.2 Pattus

In 5 out of the total 26 interviewed households, people were engaged in weaving '*pattus'. Pattu* is a traditional dress of Kullu women and is worn by them to keep themselves warm. According to some of the respondents, *pattus* are also used as blankets during winters in the village.

In all the cases, *pattus* were being weaved at the households by women. At three of the five households, women were engaged in weaving *pattus* on the order of the local population. People who do not own handlooms for preparing *pattus* got them prepared by their relatives or friends. Out of the remaining two, one of the respondent reported preparing *pattus* for her own use while the other was involved in weaving *pattus* for a trader based in Mandi.

Three of the interviewed households were engaged in three occupations: weaving *pattus*, agriculture & horticulture, and salaried jobs in Mandi and Kullu. The remaining two were engaged in agriculture and horticulture as well, except weaving. Weaving of *pattus* was carried out by the women as and when they had time. It was not the primary source of income of the households. Moreover, weaving was done by the elder women of the household. It was neither done nor being taken up by the younger generation.

The women weaved *pattus* on handlooms called *'rachch'.* As they were usually weaved for the purpose of self-consumption or for the use of friends and family, the finish of the product was not a major concern. Hence, the looms were kept outside the household premises, in the courtyard, and were woven under sunlight. In fact, none of the respondents reported using electricity during any stage of weaving *pattus*, not even for lighting.

Weaving *pattus* allowed the women to earn some extra income for the household. The selling price of *pattus* starts from around Rs 1200 and could go up to Rs 25,000-30,000. For a *pattu* worth Rs 1200, raw material of Rs 500-600 was used. The remaining ~Rs 700 were the weaver's wages. An experienced weaver could weave such a *pattu* in a day or could take even a week, depending on how much time she was able to give to weaving.

The *pattus* which were produced on orders were usually made for occasions such as wedding. If such *pattus* were to be bought from the market, they would cost anywhere between Rs 15,000-25,000. The higher cost of these *pattus* was mainly because of the heavy designs which were weaved on them. A household-based weaver could produce these *pattus* at lesser rates. Usually, weavers charged Rs 8,000-9,000 for weaving such *pattus* and these were usually produced in a month. The raw material was either provided by the customer or bought by the weaver and charged separately.

However, weaving *pattus* for the traders was not as remunerative. The only respondent who weaved for a trader reported receiving only Rs 2000 as wages for weaving *pattus* with heavy patterns, which were then sold for Rs 10,000-15,000 in the market.

As *pattu* weaving was the subsidiary occupation for all the interviewed households, none of the weavers reported any concerns regarding the complimentary services and infrastructure. They could procure raw material either from the market in Nagwain village or could obtain wool from their own

sheep. Since *pattus* were weaved either for self-consumption or on order of family and friends, the weavers were not concerned with the access to market facilities. They produced *pattus* as and when it was required or ordered. Moreover, none of the weavers reported borrowing money in order to carry out the process of weaving. In the cases where they weaved on order, the weavers took a portion of their wages in advance in order to cover any costs which they incurred during the process of weaving. The remaining amount was paid to them after the product had been weaved.

Hence, weaving *pattus* was activity to earn additional income as and when possible.

Photo 6: A weaver showing a heavy-patterned pattu woven by her

5.2.3 Knitting

Over the past few years, the popularity of *Himachali* socks has risen rapidly and that's why knitting is being taken up by more and more women in the village. Today, these colourful socks with geometric patterns are famous beyond Himachal Pradesh and thus, have a growing market.

In Nagwain, knitting of socks has picked up as a subsidiary occupation in the last 5 years or so. Five households involved in knitting were interviewed for this study. Four of these were also engaged in agriculture and horticulture for income-generation while in the remaining one household, three occupations were being practised: knitting, agriculture and salaried job. In all the households, knitting was being done by the women.

All the women reported knitting for traders based in Mandi and Bhuntar. Both raw material and designs were provided by these traders. Depending on the time they spent on knitting, they could knit from 100 to 400 pairs of socks in a month. They generally went to the trader after one month, to handover the knitted pairs of socks and obtain raw material for the next lot. Payments, on piece-rate basis, were then made by the traders. About 5 to 7 years back, they used to receive between Rs 8 to 10 for a pair. Today, the rate is Rs 15 per pair. Hence, by knitting an average of 8 to 10 pairs in a day, a woman could make between Rs 120 and Rs 150 in a day.

A ‘knitting machine’ was reported to be commonly uses by them, though it was run manually. It helped the women to knit the designs faster. If one wanted to buy such a machine today, it would cost somewhere around Rs 3000. All the women involved in knitting reported owning this machine.

Usually, the process of knitting was carried out in the open, under the sunlight. Hence, no major usage of electricity for lighting was required for knitting. However, a couple of respondents reported that electricity did allow them to weave at night or inside the house during the monsoon months or peak summer months when it became difficult to sit outside. But it did not result in a significant consumption of electricity because of the limited number of hours of use and usage of only a single bulb for the purpose.

Knitting of socks was introduced in Nagde by traders based in Bhuntar and Mandi. They provided training in the initial phases to help the women learn this craft. Today, all these women prepare socks for the same traders who had provided them training initially. A couple of women also reported receiving training for knitting sweaters as well. However, the demand for hand-knitted sweaters was extremely low and they could not obtain any order for the same. Even the traders who had provided them training for knitting sweaters did not make orders for sweaters. According to the respondents, demand for machine-made sweaters superseded the hand-woven sweaters because of the better design and finish of the former.

Although knitting of socks has picked up in Nagwain, it remains a subsidiary income-generating activity for the households. The market for these socks has been expanding and the demand is on a rise. In fact, two of the respondents who are involved in knitting socks today were earlier engaged in weaving shawls. They shifted to knitting as they saw rising demand for socks which could help them secure almost similar or even better wages as compared to weaving shawls. Moreover, because of their high demand, knitting of socks provided better assurance of work. That’s why, more women, both young and old, were found to be taking up knitting of socks in the village. By devoting 4 to 5 hours every day, knitting of socks could help them to earn as much as Rs 5,000-6,000 per month.

Photo 7: Socks being knitted on the terrace

5.3 Other Non-Farm Enterprises

Apart from the households engaged in weaving and knitting, 12 more households which were engaged in non-farm enterprises were also interviewed. As mentioned before, for this study, only the enterprises with motive-load were considered.

Majority of these households were also engaged in agriculture and horticulture and in fact, termed farming as their primary source of income. Moreover, more than 60% of these enterprise owners belonged to the Scheduled Caste (SC) social group. This could have because majority of the residents of Nagwain village belonged to this social group. Since Nagwain is located along the highway, most of the enterprises had come up within this village so that the enterprises could be easily accessible to the customers from nearby villages as well as those passing by the highway. As in most of the cases the owners of these enterprises belonged to Nagwain village itself, it could explain the more than 60% of enterprises by the members of 'Scheduled Caste (SC) social group.

5.3.1 Electricity use for other non-farm enterprises

Out of the 12 households which were interviewed, majority had been established 10 or more than 10 years back. The primary reason behind taking up these NFEs was to secure additional income for the household. Presence of good quality power supply in the village had allowed the people to start these activities but that was not listed as the primary reason for the take-up of NFEs. Most of the enterprises had come up down the hill, along the highway in order to take advantage of the market facilities which were present there. They catered to the day-to-day needs of the local population.

The table below gives the average motive-load that was recorded for the interviewed enterprises. As the load for the printing press could not be obtained, it is not on the list.

Table 14: Average motive-load for interviewed non-farm enterprises in Nagwain

Type of NFE	Number of Households Interviewed	Average Motive-Load at the Enterprise (in HP)
Flourmill	3	5
Wood-Cutting Workshop	3	10
Furniture Workshop	2	25
Blacksmith	1	3
Tyre-Puncture	2	5

Although the quality of power supply was reported to be good throughout the panchayat, irrespective of height, only 2 out of the 12 interviewed enterprises were located up the hill. This was mainly because Nagwain village provided better access to customers.

Availability and quality of power supply were not reported as concerns by the respondents. Even for the enterprises located up the hill, good quality power supply was available. Their power supply was cut only when some repair measures were underway, which usually happened once a month, or during a natural calamity. All the respondents reported being informed about the repair work in advance.

When monthly electricity bills were calculated as proportions of the incomes which were stated by the respondents, it was found that electricity could form a major percentage of the incomes of these enterprises.

The following table (Table 15: Approximate expenditure on electricity as proportion of income for interviewed NFEs in Nagwain) gives an approximate estimate of expenditure on electricity as a proportion of income for different motive-load categories:

Table 15: Approximate expenditure on electricity as proportion of income for interviewed NFEs in Nagwain

Approximate Motive Load	Electricity as a proportion of monthly Income
3-5 hp (Tyre-puncture shop, Blacksmith	~10-20%
10-20 hp (Welding, and Furniture Workshops)	~50% or even more

For both the types of enterprises i.e. enterprises with low motive-load as well as enterprises with high motive-load, daily wages were reported to be similar: approximately Rs 400-500. That could explain the difference in the percentages as the enterprises using machines with lower motive-load spent much lesser on electricity as compared to the ones based on higher motive loads. However, flourmills were an exception to this pattern. For the three flourmills interviewed, the approximate motive load was about 5 hp. But as the daily wage for flourmills owners was reported to be between Rs 100 and 200, electricity formed a major component of their expenses, nearing ~50% or even more of their income.

The income gained from these enterprises was not a major concern for most of the owners as the NFEs were not the only source of income for their households. However, in one of the cases, owner of a wood-cutting workshop had recently shifted to dairy farming as the latter provided much better income-generating opportunities. While the work at his wood workshop was irregular, selling milk in and around the village allowed him to earn a profit of almost Rs 1,000 daily.

5.3.2 Complimentary services and infrastructure

When asked questions about complimentary services, the respondents did not voice any major issues. As majority of these were located in the marketplace of Nagwain village, they had considerable access to market facilities. Regarding credit, five out of the 12 households i.e. ~40% of the interviewed households had applied for loan and received them as well. The respondents did not report any issues with the process of borrowing. Two banks which acted as the major lending institutions for the village were: HP Grameen Bank and HP Co-operative Bank. However, one of the respondents complained of not being told about credit schemes by the local banks. In fact, none of these enterprise owners were aware of schemes like MUDRA.

5.4 Fruit and Vegetable Processing Unit

In the early 1990s, a fruit and vegetable processing unit was set in Nagwain by an NGO called Society for Technology and Development (STD). This unit worked under STD till 2007, and then branched out as an independent processing unit by the name Society for Farmers' Development (SFD). Fruits and vegetables, some of which would otherwise have been discarded because of not passing the highest grade quality test, are procured by SFD and converted into jams, juices, pickles and squashes.

Recently, carbonated fruit drinks have also been added to the list of products prepared at SFD in order to encash the high demand of fizz-based drinks in the market.

When this unit was started, it used to run on single-phase power supply. As the unit expanded over the years, more equipment was added. Today, the motive-load of this processing unit is 28 hp. Introduction of electricity-based equipment has been helpful in improving the quality of products prepared at this unit. For example, earlier, apple juice used to be prepared over a *bhatti* or a big fireplace. Now the juice is prepared within steel boilers which allow preserving the colour as well as the taste of the juice in a better manner. Introduction of new equipment has also allowed the unit to foray into producing new kind of products such as carbonated drinks. However, while explaining the relationship of this processing unit with electricity, one of the senior staff members at the unit stressed that some of the jobs had consciously been left un-mechanised in order to provide employment to the local population.

The unit employed maximum people between the months of March and November. These were the months when fruits and vegetables were harvested in the region. People, especially women, were employed for cutting fruits and vegetables. However, majority of these women were employed on contractual basis, for the months of March to November. Their payments were made at the rate of Rs 170 per day. Only two women involved in the process of cutting fruits and vegetables had permanent jobs at the processing unit. The received a monthly salary of Rs 6500 per month. Apart from this, the unit has about 10 staff members. About half of these belonged to the panchayat.

Photo 8: An employee of SFD preparing pickle (Left)
Photo 9: Use of electric boilers at the Fruit and Vegetable Processing Unit (Right)

While discussing about the processing unit during an FGD, the residents of Nagwain expressed their desire to have more such 'projects' in the village. However, they claimed that it was not possible for the villagers to set up enterprises on such a scale. Since the processing unit had developed under the patronage of the Department of Science and Technology (DST), Govt. of India, the villages wanted to government to fund more such projects in the village.

When asked about the major issues with regard to complimentary services and infrastructure, marketing of products was stated as the major concern. In the initial years after SFD branched out of STD, the unit tried to market its products all over India by going to exhibitions which were held in different part of the country. However, soon it was realised that the process was costly. Moreover, it required them to rely on middlemen who would take the responsibility of selling their products in those regions. SFD suffered losses of about Rs 10 lacs owing to the middlemen: in most of the cases, payments of their sales were not transferred to their accounts by them. Thus, in order to eliminate the

middlemen, it was decided to carry out sales only in the nearby cities of Kullu and Manali, on their own. Till now, this strategy has been successful and has helped SFD in earning profits.

5.5 Conclusion

There is a limited number of non-farm income generating activities present in Nagwain. In fact, weaving is on a decline as the younger generation does not want to engage in it. Moreover, for most of the enterprise-owning households which were interviewed, the non-farm enterprise (NFE) was reported as a mean to gain some additional income.

One of the primary reasons why these households did not need to rely on the non-farm enterprises as their primary source of income was because of the high returns associated with agriculture and horticulture in the region. On an average, each interviewed household owned about 5*bheegas* of land[21]. Almost half of this land was dedicated to subsistence farming and the remaining half was dedicated to farming of cash crops such as fruits and vegetables. The most commonly grown vegetables and fruits included tomatoes, peas, cauliflower, apples, apricots, and pomegranate.

The following table (Table 16: Estimate for annual income of a household from agriculture and horticulture in Nagwain) presents an estimate of the income of a household engaged in farming of cash crops. Even by taking fairly conservative estimates for returns on fruits such as apple and pomegranate[22], a household could earn a profit of about Rs 2 lacs per year. This return was much higher as compared to weaving where a person usually earned less than Rs 1 lac in a year. Moreover, weaving is much more laborious as compared to horticulture and that was stated as one of the important reasons by the residents of Nagwain for preferring horticulture over weaving.

Table 16: Estimate for annual income of a household from agriculture and horticulture in Nagwain

Season	Crop	Land (in bheega)	Net Revenue (in Rs)
Feb/March to Oct/Nov	Tomato	1.5	85,000
Sep/Oct to March	Peas	1.5	8,000
Jan to July	Apple	0.5	40,000
Jan to August/Sep	Pomegranate	0.5	1,00,000
Total			**2,30,000**

Although there is always a risk associated with farming, people favoured it over other sources of income-generation because it provided them the opportunity to secure better profits than other occupations.

The case of Nagwain highlights another facet of the relationship of non-farm enterprises in rural areas with the situation of agriculture. Even with the presence of good quality electricity supply and complimentary infrastructure facilities such as roads and credit, people reported preference for agriculture and horticulture as these ensured better profits. Another reason for this preference could be access to market: in the case of weaving, market has been captured by big co-operatives and industry

[21] 1I *bheega* is approximately equal to 0.4 acres.

[22] 1 kg of apples can get sold anywhere between Rs 25 to Rs 89-90, whereas 1 kg of pomegranate can get sold between Rs 100-200. The selling price is dependent on the quality of fruit.

owners, making it difficult for small workshop owners and individual weavers to compete. With regard to other NFEs such as furniture workshops, woodwork shops, welding etc., only limited work opportunities are available as their consumer base was primarily the local population. Moreover, with the presence of multiple enterprises offering the same kind of service, the work gets further distributed.

Based on the observations of Nagwain, it could be said that the presence of infrastructure and complimentary services on their own might not ensure proliferation of non-farm income-generating activities. The field survey highlighted that people favoured those occupations which allowed them to earn better incomes. In the case of Nagwain, it was horticulture and agriculture. Hence, in order to understand the factors which drive the uptake of non-farm enterprises in rural areas, it is also important to look into over occupational structure of the areas under consideration, and specifically look into the situation of agriculture.

The second important leaning from Nagwain is from the experience of the fruit and vegetable processing unit. The interactions with the villagers highlighted that they wanted more such 'projects' to be set up as these provided them employment opportunities. Though they were confident of running such an industry smoothly on their own, they wanted the government to provide the investment as they could not make such kind of financial investments on their own.

CHAPTER 6

CONCLUSION

Electricity can undeniably play a crucial role in achieving the development goals. At the international level, the current discourse on rural electrification rests on the objectives of reduction of poverty & impoverishment, and improvement in welfare. The relationship between electricity and development has been recognised widely in the academic literature as well, though quantitative evidence for it remains limited. One reason for this could be the way in which their relationship has been explored. Majority of the studies have focussed on the co-relation or the direction of causality between the two, with little emphasis on understanding the reasons behind that causality or the factors affecting it (Rao, 2013). It is important to realise that the relationship between electricity and development is guided by the socio-political and economic conditions of the region under consideration. Therefore, to fully comprehend the impact of electricity on the development, it is imperative to take into account the political and economic histories of the area, prevalent energy policies, institutional arrangements, and status of complimentary infrastructure (Chen, Kuo, & Chen, 2007).

Specifically with regard to non-farm income-generating activities, considerable work has been done from the livelihood diversification perspective. It is primarily concerned with exploring diverse non-farm livelihood opportunities in rural areas so that the rural populace can withstand the vulnerability associated with sole dependence on agriculture and earn better income. According to the academic literature from this stream, numerous factors come into play in the expansion of non-farm livelihood opportunities in rural areas: while socio-economic factors such as caste, class, gender, and personal wealth etc. influence the risk-taking abilities and availability of opportunities among rural population, complimentary infrastructure and services such as water, electricity, credit, market, and raw material etc. also play critical role in proliferation of these opportunities. Although the importance of these factors is being recognised in the energy-development literature, specific emphasis on understanding their role is lacking. If the causal mechanisms between energy and development are to be understood, it is necessary to include such factors into the ambit of enquiry.

This study began with four research questions. Key learnings and observations are enumerated below:

a) According to academic literature and experiences around the world, success of grid-based rural electrification programs depends on a host of factors. Some of the most important factors are pragmatic approach towards cost recovery, minimization of cost of construction and operation, and involvement of local community. Apart from these, promotion of productive uses of energy is also considered important as it can aid load development which subsequently can help in improving cost recovery. In fact, it has been a part of rural electrification programs in countries across the world.

b) Secondary data sources pertaining to electricity use for non-farm activities are sparse and scattered. Therefore, primary data gathered at the two fieldwork locations and the few pilot surveys were used to understand electricity use for non-farm income-generating activities in rural areas. It was found that the non-farm enterprises in rural areas are generally limited, and lighting is one of the most common uses of electricity in the enterprises. Commonly found enterprises included flourmill, motor-repair shop, tyre-puncture shop, wood workshop, grocery or *kiryana* shop, and barber shop etc.

c) The situation of agriculture holds a key relationship with presence of non-farm enterprises in a region. During the survey and pilot studies in Maharashtra, it was found that the business of

non-farm enterprises such as welding shops, and motor-repair shops etc. had been affected because of the drought as their primary customers were farmers. Also, in the case of Nagde, younger members from landed non-weaving households with agriculture as their primary occupations had started taking up weaving because of the distress in agriculture. Whereas, in Nagwain, people preferred agriculture and horticulture over non-farm activities such as weaving as it allowed them to earn much better income.

Another factor which was found to play an important role in the widespread presence of non-farm income-generating activities at the two fieldwork locations was the history of manufacturing and trade in that region.

d) The field surveys highlighted that electricity-related factors such as its availability, reliability, and accessibility can have an important impact non-farm enterprises. However, proliferation of these enterprises cannot happen without the availability of complimentary services and infrastructure.

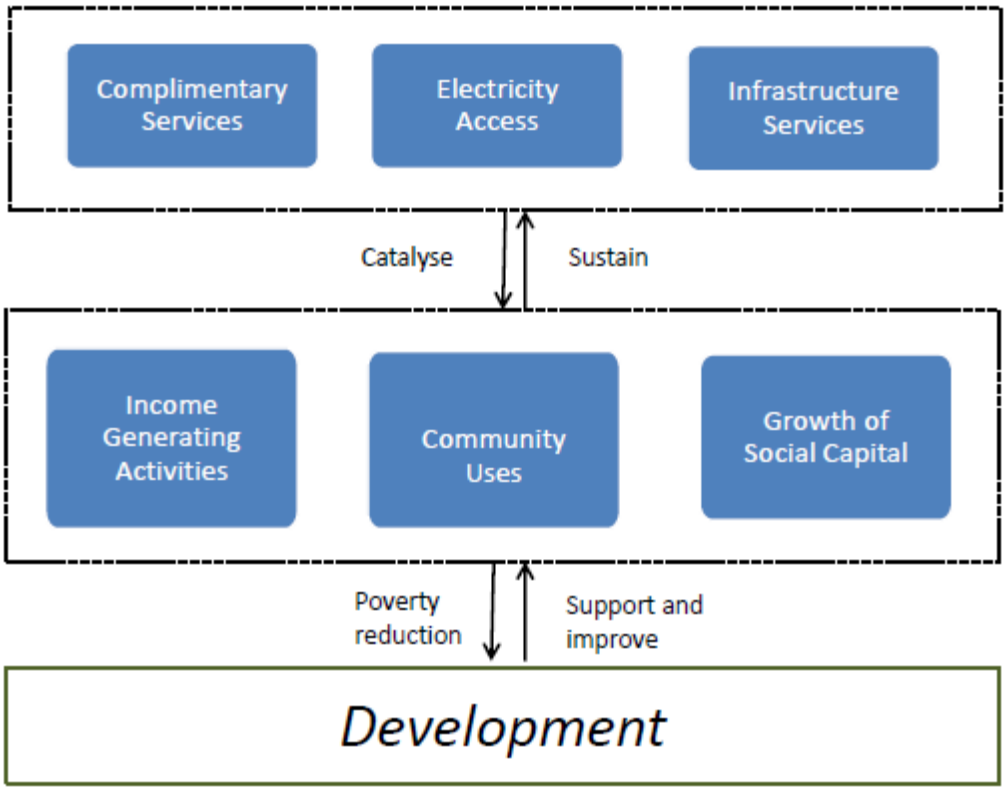
e) The survey at Nagde brought out that securing reliable electricity supply from the grid was more crucial for the enterprises with heavy motive-load than those which were dependent on electricity primarily for lighting. This was because in the former case, alternative sources of electricity such as diesel could be expensive and difficult to arrange. Whereas, in case of handlooms where the primary dependence was for lighting, the weavers had ensured reliable supply by investing in inverters.

f) It is important to acknowledge that the high wages associated with *paithani* weaving allowed the weavers to make investments in inverters so that they did not lose their working hours owing to load-shedding.

Based on the case studies undertaken for this research, it can be re-iterated that a better understanding of the relationship between electricity and non-farm income-generating opportunities would require specific examination of the condition of complimentary services & infrastructure and the socio-economic factors at play. Electricity can play a crucial role in the proliferation of non-farm activities but it is not sufficient. Access to complimentary services and infrastructure and services such as road, water, credit, market, and raw material etc. are equally necessary. Moreover, this relationship does not work in isolation in the village economy. In order to understand the factors which can lead to the proliferation of non-farm activities in a region, it is important to look into the prevalent occupational structure of the region under consideration. Understanding the situation of agriculture and the history of trade & manufacturing could provide useful insights as these can have crucial impact on the uptake of non-farm activities. Besides, it could be informative to interact with different stakeholders such as policy makers, utility personnel, local civil society organisation, bank officials, and consumers in order to understand their perspectives on promotion of non-farm income-generating activities. Though this was one of the research questions for this study, not much progress could be made because of difficulty in arranging interviews with the required stakeholders. Nonetheless, understanding their perspectives could be worthwhile in the planning and implementation of schemes aimed at promoting non-farm enterprises and thus, should be undertaken.

The schematic below encapsulates the major learnings of this study regarding the relationship between electricity access, and development:

Figure 2: Relationship between Electricity Access and Development



Access to electricity along with other inputs such as complimentary services and infrastructure catalyses the proliferation of non-farm income-generating activities. Reliable electricity access along with complimentary services can also facilitate the improvement of community services including healthcare, education, and communication. These productive uses of electricity allow improvement in growth of social capital as well. Together, all three of these can aid the sustainability of the input infrastructure and services because of increased demand, improved financial viability because of better income etc. Moreover, these productive uses can help in realizing developmental goals: by providing employment opportunities and assisting the improvement of indicators such as education and health levels, communication, and equity. It is also important to acknowledge the two-way nature of this relationship. Development leads to an increase in the demand of electricity as well (Cook, 2011).

In spite of an explicit focus in the international discourse, India's current rural electrification program, DDUGJY does not have a specific mandate for promoting productive uses of electricity. Though, the list of expected benefits includes growth in small and household enterprises, increase in agricultural yield, improvement in health, education, banking, and communication services etc. The Power For All initiative talks about providing 24/7 reliable power supply to all industrial and commercial consumers by 2019 but does not have a proper implementation framework for the same (Sreekumar & Josey, 2015). It can be observed that both these programs are working on the assumption that availability of power supply would lead to uptake and proliferation of productive uses of electricity. However, academic literature & experiences from around the world and this study present a different story. Electricity can and does play an important role in promoting income-generating activities but it requires concentrated effort. Moreover, that effort cannot be restricted to only the Power Ministry. It would require coming together of different ministries and departments so that the required complimentary ecosystem can be provided.

Finally, some recommendations and insights on policy formulation for encouraging the use of electricity for income-generation in rural India are presented below. These are based on the earlier work done at Prayas, academic literature on this topic, and the observations from this study.

a) Promotion of productive uses of electricity should be included in the mandate of rural electrification programs.

b) The definition of village electrification should be revised to include criteria for electrification of income-generating centres including shops and small industrial units. Moreover, the definition should not be limited to providing connections but should also include parameters for reliability of supply, quality of power, and affordability.

c) Ministry of Power should assess the current as well as latent demand of electricity for non-farm activities in rural areas. Taking into account the occupational status of the region under consideration, its economic history, the situation of agriculture, and schemes available for development of non-farm activities would be useful assessing the demand and designing an implementation framework.

d) The information provided by surveys such as IHDS, Economic Census, Census of MSME regarding the use of electricity for NFEs could be improved by including questions such as hours of supply, time of supply, quantum of electricity used, and use of alternative fuels. A comprehensive survey aimed at understanding the use of electricity for non-farm income-generating activities would be useful for secondary data collection. As suggested before, it could be taken up by Ministry of Power. Such surveys should inform the currently operative large scale programs like Power For All (PFA). This would not only aid in better planning of the program, but would also help to study the impacts because of the collection of baseline information on non-farm activities.

e) The experience of Nagde highlighted that alternative sources of electricity such as inverters were being used to secure reliable supply for enterprises without motive load. In such scenarios, alternatives such as Rooftop PV could be considered. It would be useful to examine the feasibility of having rooftop solar systems to address power shortages during the day. It would also be necessary to compare the cost of using solar systems with the cost of using of inverters. Such estimation should consider future availability and cost of power from the grid. This exploration should lead to possible models for viable Rooftop PV installation for these businesses. If solar PV does prove to be a viable option, government could provide financing options the Rooftop PV systems for enterprises as in Nagde, where the load is low and reliability is a concern.

f) Better planning and implementation of schemes: The experience of PMMY at Nagde highlighted some clear shortcomings with regard to its planning and subsequent implementation. Since the refinancing was being channelled through banks there, the borrowers were being charged collateral as the banks wanted to ensure recovery of the money which they were lending. This not only made borrowing money difficult for the weavers but also defeated one of the objectives of providing collateral-free loans till Rs 10 lakhs to promote entrepreneurship in the non-farm sector. Hence, planning should take into account such ground realities so that the schemes can be implemented fruitfully.

g) Requirement of integrated approach, with coming together of different ministries: There are numerous schemes[23] from different ministries to promote employment and entrepreneurship in the non-farm sector. These schemes also address the requirement of complimentary services. However, there is lack of co-ordination among different departments because of which there is multiplicity of schemes. Also, majority of these schemes do not have a clear implementation framework. Thus, apart from an integrated approach, there is a need for the roles of different ministries to be stated explicitly so that their mandates of non-farm livelihood promotion can be actually realised.

[23] Although not an exhaustive list, some of the schemes and their corresponding department are: PMEGP, SFURTI, ASPIRE from Ministry of MSME; Aajeevika and DDU GKY by Ministry of Rural Development; Skills India co-ordinated by Ministry of Skill Development and Entrepreneurship; Start Up India by Ministry of Commerce and Industry; Amended Technology Upgradation Fund Scheme (ATUFS), Cluster Development, and Integrated Skill Development Scheme by Ministry of Textiles; Make in India; Stand Up India and Pradhan Mantri Mudra Yojana by Ministry of Finance

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Appendix

Questionnaire: Page 1/3

Ques 1	**Demographic Information**	
1.1	Name of Head of Household	
1.2	Age	
1.3	Gender	
1.4	Caste	
1.5	Education	
1.6	No. of Family Members	
	(i) Adults	
	(ii) Children	

Ques 2	**Occupational Structure**		
2.1	Total no. of working members		
2.2	Household Occupations	Name of the occupation	No. of people involved
	Primary Occupation		
	Secondary Occupation		
	Tertiary Occupation		

Ques 3	**Energy Use for livelihood**	
3.1	In which year did you start this work?	
3.2	Have you always been engaged in this work?	
3.3	If not, what was your previous occupation?	
3.4	What was the occupation of your previous generation	

3.5	No. of Handlooms				
3.6	Appliance Usage				
	Appliance Name	Purpose	Wattage (n*Watt)	Hours/Day	Days/Month
3.7	Do you use alternate fuels? (Eg Kerosene Lamps, Candles, Diesel, Inverters)				
3.8	If you own an inverter, when did you buy it?				
3.9	Money spent on inverter?				
3.10	How did you arrange credit for it?				
3.11	Do you work at night or lose you working hours due to outages?				
3.12	Have you lost/damaged equipment due to fluctuations?				
3.13	Details of electricity bill				
i	Last bill amount				
ii	Consumer Category				
iii	Fixed Charge				
iv	Energy Charge				
v	Arrears, if any				
vi	% of income spent on electricity				

Ques 4	Complimentary Services and Infrastructure	
4.1	Have you received any training by govt. for your enterprise	
	If yes, when and from where?	
4.2	Where/To whom do you sell your products	
4.3	Only for weavers	
	Do you produce on your own?	
	Is there a time gap between orders?	
4.4	From where do you procure raw material?	
	Cost of raw material	
4.5	Have you availed any scheme for credit or other support services?	
	If yes, give details.	