

**The Agency of Infrastructure:
A Critical Acquisition Framework for Understanding
Infrastructure Development within Inequitable Societies**

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Infrastructure development is a topic that has occupied a noble niche within development thinking since the middle of the twentieth century. However, despite over half a century of research concerning infrastructure development processes, structurally-oriented development theories continue to dominate infrastructure development research and praxis. Critically informed approaches to development, which acknowledge the integral role of place, power, and agency to infrastructure research, have yet to make a noticeable mark within infrastructure development policymaking. A review of the multidisciplinary infrastructure and development literature reveals a clear emphasis on structurally-oriented processes of infrastructure provision, and an insufficient understanding of agency-oriented, place-specific processes of infrastructure access, particularly within the context of inequitable societies. Therefore, the purpose of this research is to critically examine infrastructure development processes based on the lived experiences of marginalized populations and to integrate such experiences into the construction of infrastructure knowledge.

This dissertation is a compilation of three manuscripts and three additional chapters (the introduction, methodology, and conclusion). The first of these manuscripts, entitled *The Science and Politics of Infrastructure Research*, is a conceptual paper that critically explores the intersection of infrastructure and development literature. Herein I describe three perspectives, the technocratic, interventionist, and critical perspectives, that articulate the different ways that infrastructure is valued among multiple actors involved in the production of infrastructure knowledge. Among these perspectives, I contend that technocratic and interventionist perspectives have occupied a dominant position with respect to informing infrastructure development policy and praxis throughout the twentieth century. I question whether such dominance is the product of superior scientific rigor or the politicized process of knowledge production. Towards the goal of giving greater prominence to the critical perspective, and in effort to offer a systematic way forward from this post-development critique, I propose the Critical Acquisition Framework. The framework is designed to facilitate an agency-oriented understanding of infrastructure development processes from the perspectives of marginalized groups. Inspired by critical-social theory and capability analyses, the Critical Acquisition Framework helps to understand how marginalized groups deploy their existing capability sets to access infrastructure via multiple overlapping institutions. In addition, the framework helps to envision alternative agency-oriented scenarios of infrastructure access. In essence, the framework demonstrates how the acquisition process influences the capability sets and therefore agency and power of marginalized groups. The framework can be used to assess

whether infrastructure ‘develops’ according to emic perspectives, or whether infrastructure reifies inequitable power relations.

The research is informed by a critical methodological approach and mixed-methods research design. To investigate infrastructure access through the experiences of marginalized groups, the empirical aspect of this research is based on two instrumental case studies located in the northern highlands of Peru. The first case study and second manuscript is entitled: *Women’s Acquisition of Domestic Water Services in the District of Cajamarca, Peru*. Three impoverished women’s groups, representing rural, peri-urban, and urban locales are analysed, based on the women’s experiences of accessing water through their respective institutions of domestic water provision. Overall, the findings illustrate how marginalized groups exercise agency, as well as the limits to their agency in accessing domestic water services. Considerable variations are found in the quality of domestic water institutions that play a deciding role in women’s experiences of access. The findings also suggest that inefficient institutions may be perpetuated as such in order to maintain the powerful positions of dominant groups involved in domestic water provision. The second case study and third manuscript, is entitled *Access for Whom and to What? A Critical Acquisition Framework for Understanding Rural Experiences of Multiple Accessibilities*. This paper examines the iterative process through which vendors working within an informal market district repeatedly deploy their multiple capability sets to navigate multiple overlapping institutions that regulate comprehensive access to rural transportation and other privatized infrastructures. Three sub-processes of rural accessibility are investigated: transportation access, market access, and infrastructure access. The findings reveal the complexity of rural accessibility, and suggest that failures of infrastructure access may be attributed to inequitable institutions that regulate the acquisition process.

The instrumental case studies have been used to help inform, test, and refine the Critical Acquisition Framework. In doing so, this research has achieved its aim to integrate the experiences of marginalized populations in the construction of infrastructure development knowledge. This research offers a new way of understanding an old problem of infrastructure development. Positioning the notions of agency, power, and place as central tenets of infrastructure development analyses, not only complements the existing body of infrastructure knowledge, but can also lend to a more equitable process of infrastructure development within inequitable societies.

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1 Introduction

1.1 Introduction

The purpose of this research is to critically examine infrastructure development processes based on the lived experiences of marginalized populations, and to include such lived experiences in the construction of infrastructure knowledge. More specifically, I examine the experiences of marginalized groups¹ as they access a variety of physical infrastructure systems in the context of highly inequitable societies. Towards this end, a critical acquisition framework is developed, drawing from two case studies located in the northern Andean highlands of Peru.

In this introductory chapter, I provide an overview of the infrastructural development polemic, as it pertains to research, praxis and policymaking in contexts of high inequality. Next, I briefly describe the conceptual approach of this research, and then articulate the aim and objectives that define the scope and focus of this dissertation. An overview of the case studies and case study area follows. The chapter concludes with an outline of the forthcoming dissertation.

1.2 Infrastructure Definitions

The term 'infrastructure' is a widely contested concept, on which little consensus has been reached within the diverse and multi-disciplinary development literatures. Lee (2000) provides two pertinent definitions of infrastructure that inform the definition used in this dissertation. In the first definition, infrastructure is defined as "the underlying structure of services and amenities needed to facilitate directly productive activity" (Lee, 2000: 394). His description emphasizes infrastructure as material objects and systems, such as transportation, electrification, and telecommunication systems, and further describes infrastructure as being semi-permanent, immobile, labour intensive, costly, and having widespread economic effects.

¹ The term 'marginality' refers to the disadvantaged position of people in relation to their interactions with inequitable institutions. This interpretation is distinct from approaches which highlight shared characteristics of marginalized groups, such as socio-economic, ethnic, or gender characteristics. In this dissertation, the notion of marginality is applied to groups which are disadvantaged by inequitable institutions either directly or indirectly related to the access and acquisition of infrastructure systems.

Infrastructure is also described as a concept, derived from classical Marxism literature, in which infrastructure is understood as material products of societal relations (Lee, 2000). An important distinction is drawn between infrastructure as the material productions of social relations, and superstructure, the non-material productions of social relations, such as institutions. Within this literature, there is considerable debate on the dichotomous distinction between superstructure and infrastructure, and whether superstructure determines infrastructure and vice versa (Godelier, 1978; Lee, 2000).

Drawing upon the aforementioned definitions, infrastructure can be understood both as physical systems that are produced in the built environment, as well as human-made constructions, produced by societies and that are reflective of social relations. In this dissertation, infrastructure is therefore defined as physical objects and systems produced by social relations, which materialize in the built environment. As inequality manifests within (and between) societies along various axes of social differentiation, infrastructure can serve to reify or relieve inequitable social relations. In this sense, physical infrastructure systems become an important window by which to examine social relations and societal inequality.

It is important to note that the definition of infrastructure used in this research diverges from Lee's (2000) common assumption that infrastructure is defined by its supportive function of directly productive activity. This research discourages the restrictive evaluation of infrastructure systems that have productive functions, and includes infrastructures that serve protective, recreational, and social functions as well. Since the definitions and valuations of these functions are likely to vary across societies, places, and cultures, infrastructure is understood as a relational concept, which can only be defined by specific societal actors within place-specific contexts (Star, 1999).

1.3 Research Problem: Infrastructure Development Policy and Research in the 20th Century

The origins of the modern global era of infrastructure development emerged from the post-World War II reconstruction programmes financed by international funding agencies, founded at the Bretton Woods Conference in 1944. From this point in history, infrastructure became widely supported as a development intervention that promised to develop the Global South through the industrialization and modernization of their economies, similar to the trajectories and development experiences of the Global North (Bauer, 1984). Based on the structurally-oriented development models of the time, the logic of development agencies followed that the right combination of investment and expertise would lead to rapid industrialization, increased productivity and economic growth (Ostrom, Schroeder & Wynne, 1993). So began the wave of infrastructure financing that supported the construction of various physical infrastructure systems, such as transportation, electrification, communication, water and sanitation systems throughout the less-developed world (World Bank, 2006).

Infrastructure interventions have been expected to deliver development objectives consistent with those experienced by the West, irrespective of the complex and variegated social, political, cultural, and institutional contexts in which they have been introduced (Escobar, 2011). Despite the universal expectations of infrastructure and development processes that are employed throughout infrastructure development strategies, infrastructure interventions have had mixed effects throughout the Global South. While some countries (such as the Southeast Asian 'Tiger' countries of South Korea, Hong Kong, Taiwan, and Singapore) were quick to develop economically with the aid of infrastructure inputs, other countries plummeted into profound and irrevocable debt (Ostrom et al.1993; Payer, 1974; Thacker, 1999). As governments of indebted countries became more reliant on external finance for their national development programs, the influence of Western backed international funding agencies began to pervade national infrastructure policies. Loans that were distributed under

Structural Adjustment Programs were offered with strict conditional ties to adopt neoliberal economic reforms. Among these reforms, decentralization and privatization of infrastructure provision had a direct effect on the delivery of infrastructure services and systems (Kessides, 2004).

Structural reforms were accepted variably throughout the Global South, and were initially rejected by Latin American states, which instead adopted inward-oriented development policies such as import substitution industrialization (Hirschman, 1968). However, following the failure of these policies to enable the competitiveness of national economies in the global market, and to overcome growing inflation and mounting debt crises, many nations began to accept the neoliberal economic model beginning in the 1980s and throughout the 1990s (Gwynne & Kay, 2000).

Neoliberal reforms continue to motivate the privatization of infrastructure in Latin America today. Between 1990 and 2012, the World Bank alone loaned more than two trillion dollars (USD) towards the privatization of infrastructure, 39 per cent of which has been loaned to the Latin American and Caribbean region (PPIAF, 2013). Proponents of privatization advocated that the new model would improve the efficiency of infrastructure provision, reduce the burden on public expenditure, increase infrastructure investment, improve accountability, reduce corruption, and lead to more effective regulation (Gideon, 1998; Nellis, 2003; Kessides, 2004). The reforms were also premised on the belief that the market would serve as a most efficient means of redistributing resources and wealth, and would result in increased infrastructure access for the poor by equalizing the terms of infrastructure access through lower costs, better pricing and better service quality (Brooke & Irwin, 2002).

While privatizing infrastructure reforms have promised to deliver development objectives of increased global integration, economic growth, and poverty reduction (Andrés, Guasch, Haven, & Foster, 2008; Brooke & Irwin, 2002), the specific processes of these claims remain

largely unsubstantiated (Shah & Batley, 2009). In many states, high economic growth has been accompanied by persistent levels of inequality. Some scholars have raised alarm over growing (economic) inequality both within and between countries (Gwynne & Kay, 2000; Wade, 2004; Pieterse, 2002). Other scholars have raised concern over horizontal forms of domestic inequality, represented in class, social, or ethnic divisions, some of which are argued to be most pronounced in Latin American countries (Thorp, Caumartin, & Gray-Molina, 2006). The introduction of privatization reforms to infrastructure and development policy amidst growing intra-national inequality has elicited a growing concern that such reforms may exacerbate inequality and further marginalize certain populations (Birdsall & Nellis, 2003).

Growing public concern with infrastructure privatization amidst growing inequality has resulted in popular resistance, particularly throughout Latin America (Kessides, 2004; Andrés et al., 2008; Checchi, Florio, & Carrera, 2009). Public discontent towards privatization has arisen over tariff increases, perceived poor transparency, a loss of employment from previously state owned companies, the disproportionate returns reaped by private investors, and a failure to improve the living conditions of the poor (Estache, Gomez-Lobo & Leipziger, 2001; Kessides, 2004; Andrés, et al., 2008). Explanations offered for these acts of resistance in response to externally imposed infrastructure processes consistently focus on the illogic of the poor and the ineptness of national governments, while overlooking other actors that are central to infrastructure development policymaking and research. Failures in privatization have widely been attributed to 'unwillingness' of the poor to pay for infrastructure services, and their 'undervaluing' of infrastructure systems (Estache et al., 2001). Others allude to the ungratefulness of the poor, while dismissing their concerns over a lack of transparency and unjust process (Andres et al., 2008). Moreover, these concerns are usually diluted to misguided and ill informed 'perceptions' that need only be managed through further interventions of awareness and educational campaigns. The discounting of local perceptions has effectively

distanced local experience from another 'actual' reality perceived as more valid amongst the infrastructure research community.

Based on a review of the highly diversified and multi-disciplinary body of infrastructure research, this dissertation addresses the apparent dominance of structural models that persistently inform infrastructure policymaking, and the need for critical reflexivity in acknowledging the politicized process through which infrastructure knowledge is created. Despite more than sixty years of development theory-building, development policies remain entrenched within modernization discourses and neo-liberal ideologies of development (Simon, 2006). So too does development research remain heavily influenced by an economic perspective guided by the philosophical assumptions of positivist science (Harriss, 2002; Sumner, 2004). Infrastructure development research and policymaking are not exceptional to these research trends. Although post-development critiques have been increasingly voiced over the past two decades (Ferguson, 1990; Booth, 1993; Schuurman, 2000, Escobar, 2011) challenging the failure of current development models to integrate the particularities of power, place, and agency as key components of development analyses, these approaches have had limited influence on infrastructure research and policymaking to date. In essence, structurally-oriented notions that continue to shape infrastructure development policymaking overlook alternative notions of development, thereby systematically marginalizing segments of societies not only through the production of infrastructure systems, but also through the production of infrastructure knowledge.

1.4 Research Approach

This research endeavours to reorient debate of infrastructure development in a way that incorporates power, place, and agency as pivotal points of discussion. Towards this goal, I adopt a critical perspective towards infrastructure development processes within place-specific

environments. I further emphasize an agency-oriented approach to infrastructure development processes by examining infrastructure access from the vantage point of marginalized groups.

The research is shaped by a critical perspective, both in conceptual approach and methodological design. The critical perspective is informed by a combination of different bodies of literature on critical-social theory, inspired by key thinkers of the Frankfurt school (Calhoun, 1995; Fay, 1987; Freiburg, 1979). Despite slightly different contributions and emphases of these bodies of literature, critical-social theory aims to understand the composition and historical construction of social inequalities and the repressive ideologies under which these inequalities are reproduced, such that they may be challenged and overthrown (Fay, 1987; van Manen, 1997). A critical-social theoretical approach is used to explain the interaction between structural-oriented and agency-oriented aspects of infrastructure access.

This investigation has been guided by three key themes inherent to the acquisition process: agency, infrastructure, and institutions. Infrastructure has previously been described as physical objects and systems produced by social relations that materialize in the built environment (refer to Section 1.2). ‘Infrastructure acquisition’ refers to the process of accessing infrastructure systems. The process of accessing² infrastructure involves both the act of accessing infrastructural elements that cannot be owned, and the act of acquiring infrastructure objects that can be owned, both of which are essential in order to benefit from infrastructure systems. In dual effort to contrast the process being examined with the current emphasis on infrastructure provision, and in effort to distinguish the analysis from previous work on ‘access analysis’ found within the community based resources literature (Ribot, 1998; Ribot and Peluso, 2003), the term ‘acquisition’ has been selected to represent the agency-oriented infrastructure process, the central theme of this research.

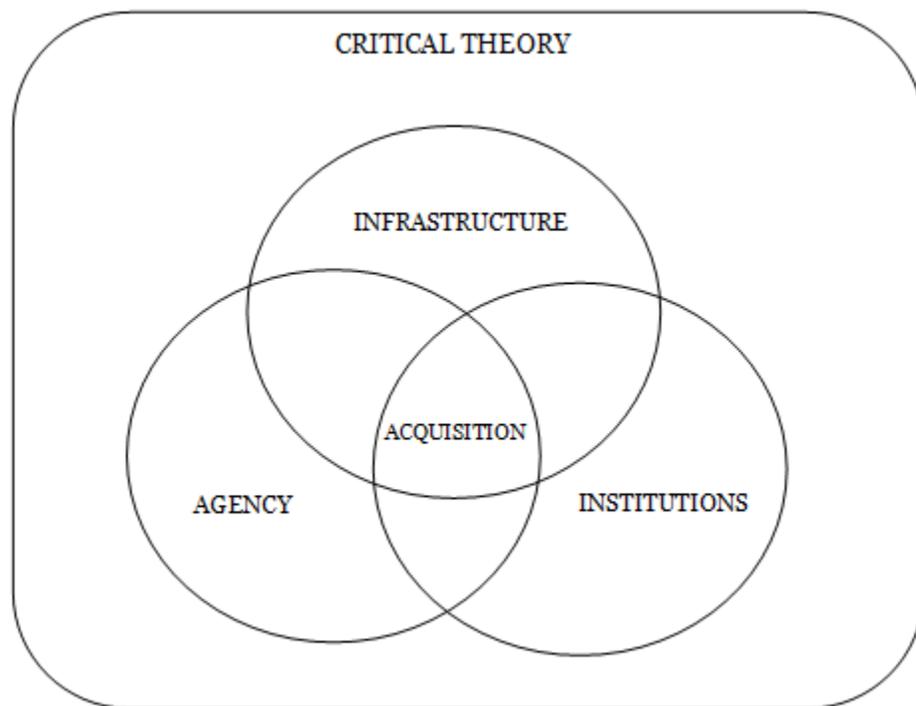
² When applied in verb form, the term ‘to access’ refers to *the act of* gaining use of infrastructure objects, systems, and institutions. When used in noun form, ‘to have access’ refers to a pre-negotiated use of infrastructure objects, systems, and institutions.

The concept of institutions that guides this research is informed by the social relations approach developed by Kabeer (1994) at the Institute of Development Studies. As part of the frameworks which stemmed from the Harvard School of Gender Analysis, the social relations approach is well suited towards examining institutions within inequitable societies. The social relations approach defines institutions as “a framework of rules for achieving certain social or economic goals” that “ensure[s] the production, reinforcement, and reproduction of social relations and thereby create and perpetuate social difference and social inequality” (March, Smith & Mukhopadhyay, 1999:102). The institutions that are considered in this research include both formal and informal types, and can take shape within four institutional realms: the state; market; community, and; family/kinship (Kabeer, 1994), which operate at multiple levels of scale. One of the tasks of the social relations approach to institutions is to challenge the portrayed ideological neutrality of institutions, and to unveil the hidden core values and assumptions that contribute to and perpetuate social difference. This notion of institutions is in stark contrast to popular definitions of institutions, such as that offered by North (1990) who describes institutions as rules that are distinct from organizations, or the ‘players of the game’.

The agency of actors is also analyzed as a key theme within the conceptual framework. Agency is explored throughout this research with respect to how it is exercised by both marginalized and dominant actors within inequitable societies. Here, the works of Amartya Sen (1992) and Anthony Giddens (1986) have been particularly informing. Agency is understood as the power of actors to act. Giddens (1986) extends this definition in describing agency as the will and capability to act, and argues that over the past two decades, agency analysis has often emphasized the will of actors, over their capabilities to act (Giddens, 2005). For this reason, considerable emphasis has been placed on the capabilities of actors to act. The notion of agency is further extended by the work of Amartya Sen (1992) who defines agency as the “ability to pursue goals that one values or has reason to value” (1992:19). Sen’s contribution is vital for respecting agency as a relational concept, and allows power to be defined from the perspectives

of marginalized groups. Together these definitions create an excellent new definition of agency: the will and capability of one to act in a way that one has reason to value. Together these themes of infrastructure, institutions, and agency help to provide new insights and a critical perspective of infrastructure acquisition (See Figure 1.1).

Figure 1.1: Conceptual Framework



While the majority of existing infrastructure research is predominantly conducted using positivist epistemological frameworks and quantitative methodological designs, this research draws from a critical methodology, and applies a mixed-methods approach. In order to address the research objectives and to counteract the limitations of mainstream approaches within infrastructure research, I advocate and demonstrate how critical and reflexive strategies of inquiry can be applied to include local forms of knowledge and how place-specific experiences can inform an enhanced understanding of infrastructure development processes.

1.5 Research Aim and Objectives

The aim of this research is to critically examine infrastructure development processes based on the lived experiences of marginalized populations and to integrate such experiences into the construction of infrastructure knowledge. To achieve this aim, I address the following objectives:

1. To conceptualize the role of human agency in infrastructure development processes.
2. To develop and apply a systematic framework for analyzing agency-oriented processes of infrastructural development.
3. To examine how marginalized groups exercise agency in accessing infrastructure systems, and to understand how access to infrastructure systems (and a lack of access) influences their agency.
4. To examine how marginalized groups access infrastructure institutions, and to understand how their ability to navigate and shape infrastructure institutions influences their agency.
5. To analyze the interrelationships between structural and agency-oriented processes of infrastructure development.
6. To integrate place-specific and marginalized perspectives in the reconstruction of infrastructure knowledge.

1.6 Case Study Area

The recent adoption of neoliberal reforms, the widespread privatization of infrastructure services (Estache et al., 2001; Checchi et al., 2009), along with persistent high levels of inequality throughout Latin America (Thorp et al., 2006) positions the region as a very suitable area to conduct case study research on infrastructure development processes within highly inequitable societies. As a latecomer to the wave of neo-liberalism that swept Latin America throughout the 1980s, Peru's economic reform began in the 1990s, following the election of Alberto Fujimori. Since this time, the country has adopted an aggressive export-oriented development strategy. Backed by a productive mining sector, Peru has emerged as one of the fastest growing

economies in the world (World Bank, 2013). However, despite high levels of economic growth, and an overall reduction in poverty, notable disparities remain within Peruvian society.

Policymakers are quick to point out that these disparities have taken a geographical character, figuring most prominently within rural areas (World Bank, 2013). Many scholars and development agencies have advocated for improvements in infrastructure provision to address poverty reduction particularly in rural highland areas, otherwise described as ‘geographically adverse’ areas (Bravo, 2002; Escobal & Torero, 2003).

Peru also presents an ideal scenario in which to examine infrastructure acquisition in the context of highly inequitable societies. Scholars have noted multiple horizontal (group-based) inequalities found within Peruvian society that surface in multiple and ever-shifting cultural, political and economic boundaries of ethnicity, gender, and income differentials (Munoz, Paredes & Thorp, 2007; Thorp et al., 2006). The prevalence of these deep rooted inequalities amidst newly privatized forms of infrastructure provision elicits questions on whether and how such differentials influence and reinforce the way marginalized groups access infrastructure systems.

Two case studies are conducted in the district of Cajamarca (see Figure 1.2), which is located in the northern Andean highlands of Peru. Each case study investigates infrastructure acquisition processes in relation to two different types of physical infrastructure systems and from the perspectives of two different marginalized groups. The first case study examines the process through which three impoverished women’s groups representing rural, peri-urban and rural locales access domestic water systems and related institutions. In the second case study I investigate the processes through which informal market vendors gain physical access to the market, via transportation infrastructure, and how their interaction with the market influences their capabilities to access additional household infrastructure services. In both case studies, the aforementioned conceptual framework has been applied (Figure 1.1), and the findings of each

case study have helped to inform and refine the development of the Critical Acquisition Framework, which is proposed in Chapter 2.

Figure 1.2: Map of Case Study Region



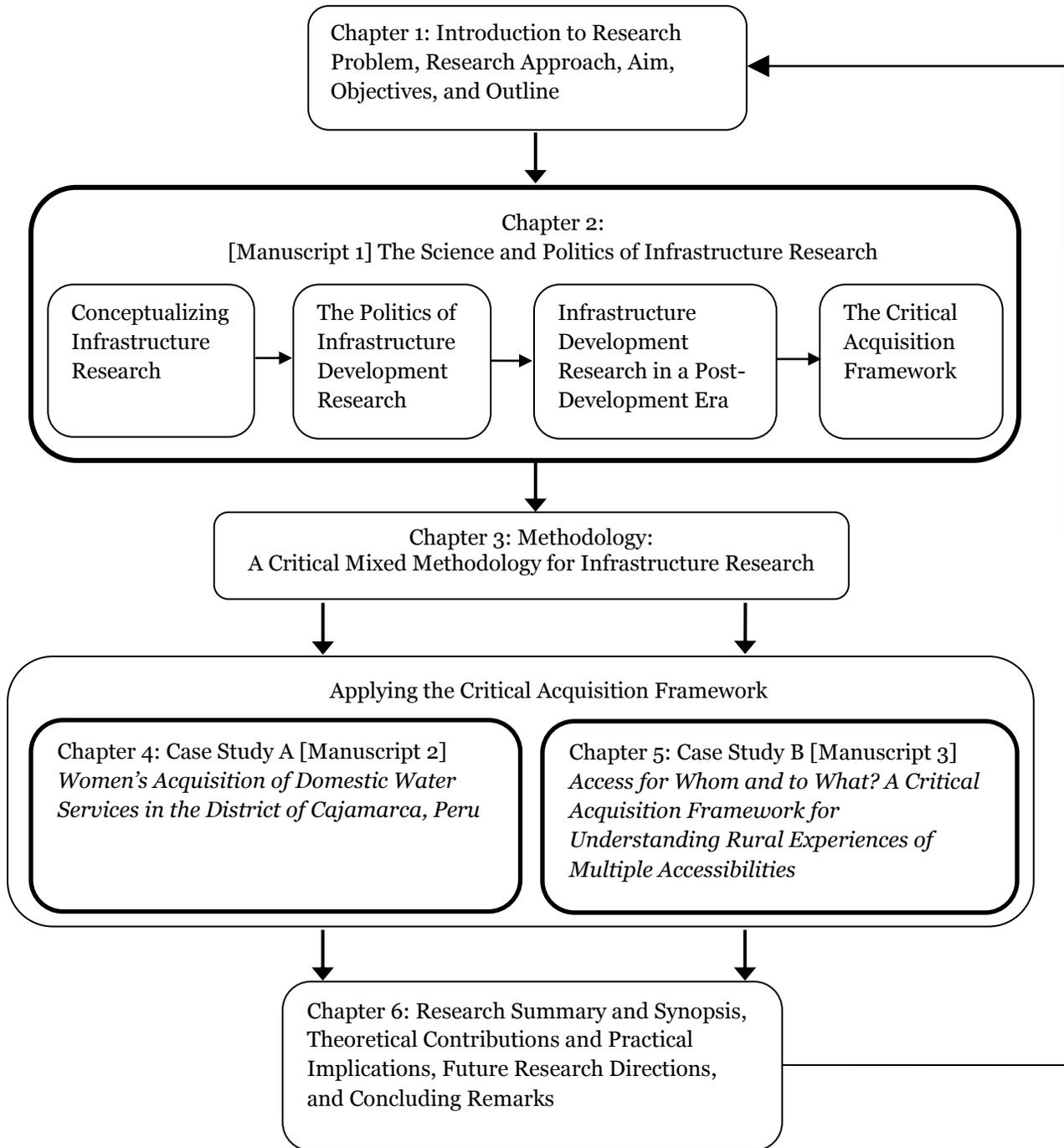
Source: Bing Maps, 2013

1.7 Dissertation Design and Outline

This dissertation is a compilation of three manuscripts that have been submitted to peer-reviewed, blind-refereed journals (See Figure 1.3). Chapter 2 is a conceptual paper that examines the intersection between critical studies and infrastructure literature. Entitled *The Science and Politics of Infrastructure Research*, it provides an original conceptualization of infrastructure research, a critique of the politics of infrastructure science, and proposes a new Critical Acquisition Framework for understanding infrastructure development processes based on the perspectives of marginalized groups. This paper is followed by Chapter 3, which outlines the research methodology employed throughout the case studies. In Chapter 4, I present another manuscript, entitled *Women's Acquisition of Domestic Water Services in the District of*

Cajamarca, Peru, which applies the aforementioned framework towards understanding the experiences of three women's groups from urban, peri-urban, and rural locales, as they acquire domestic water infrastructure systems, and in relation to the very different institutions they navigate. In Chapter 5, I present the third manuscript, entitled *Access for Whom and to What? A Critical Acquisition Framework for Understanding Rural Experiences of Multiple Accessibilities*. This paper examines the experiences of rural indigenous groups as they access transportation and electrification systems and their components, in relation to their experiences of accessing the informal market. In this paper, the concept of access is explored in detail, along with the relationship between individual capabilities and institutions that regulate access to infrastructure systems. Together the latter two papers provide a place-specific and nuanced account of how marginalized groups exercise agency within infrastructure processes, and also where and how they lack agency in gaining access to infrastructure systems. The conclusion provides a synthesis of these papers, articulates the contribution of this research to infrastructure knowledge, discusses the limitations and implications of this research, and identifies future opportunities for critically-informed infrastructure research.

Figure 1.3: Structure of Dissertation³



³ Manuscript chapters appear in boldfaced boxes.

2 The Science and Politics of Infrastructure Research

2.1 Introduction

Massive investments towards infrastructure⁴ projects throughout the developed and developing world convey great confidence in the ability of infrastructure systems to deliver development objectives. Such a connection between infrastructure and development is so overwhelmingly believed that the truncated term of ‘infrastructure development’ has become common vernacular in academic and policymaking circles. However, this article questions whether the certitude of infrastructure development knowledge has solely been the result of rigorous scientific research, or rather the outcome of a highly politicized process of knowledge creation.

Multiple perspectives within the social sciences can contribute unique insights to the complex interactions between humans and their built environments. While infrastructure development research has been largely informed by the economics literature (see Straub, 2011), other disciplinary contributions have since debuted within the post-development era of development studies (Booth, 1993; Schuurman, 2000). Research contributions influenced by the ‘critical turns’ in development studies have offered much in the way of detailed and nuanced analysis of the relationship between different types of infrastructure and social and environmental change in place-specific contexts. While each of these perspectives lends valuable and unique insights towards infrastructure knowledge, each perspective is variably adopted within praxis. Yet, to recommend that less-recognized disciplinary contributions need only to be better integrated is to overlook the politics of development discourse (Watts, 1993; Cooper & Packard, 1997). This exclusion (even if by accidental omission) of critical perspectives within infrastructure research is indicative of a politics that extends beyond the global development industry, and that pervades the very construction and application of development

⁴ This paper refers explicitly to physical infrastructure, which are defined as objects and systems which are introduced to the built environment. This definition is similar to what economists and planners refer to as ‘hard infrastructure’ (Fourie, 2006), but for the purpose of this paper, does not automatically imply an economic or productive purpose.

knowledge (Ferguson, 1990; Escobar, 2011). In other words, the exclusion of critical perspectives from infrastructure research necessitates critical analysis of the science and politics of infrastructure development research.

The politics of infrastructure research can be described as a socio-political landscape in which multiple authorities compete to inform infrastructure science and praxis. One's position in this political and perceptual landscape will largely determine one's definition of infrastructure and one's expectation of infrastructure development processes. Based on a review of the multi-disciplinary infrastructure development literature, it is suggested that although each perspective offers a significant, albeit partial contribution to infrastructure and development knowledge, current perspectives that dominate the infrastructure dialectic fall short of acknowledging the integral role of power, place and agency in social, economic, and political change. This article advocates for an inclusive dialogue and debate in infrastructure development research, for denying any one of these perspectives only limits the cognitive space to build a more representative and inclusive knowledge of infrastructure development.

The article proceeds in the following order. Based on an extensive review of the infrastructure development literature, I conceptualize three key perspectives within infrastructure development research. Next, the political constructions of infrastructure knowledge are examined, with particular emphasis on the philosophical assumptions and normative orientations of prevailing positivist approaches. A case is thus made for incorporating the notions of power, place and agency as central tenets of infrastructure development analyses. In the final section, I offer the Critical Acquisition Framework for understanding and incorporating the experiences of marginalized groups in the construction of infrastructure development knowledge, particularly within the context of inequitable societies.

2.2 Conceptualizing Infrastructure Research

The infrastructure literature is characterized by simultaneous debate and consensus. To some extent the convergence of perspectives falls along disciplinary lines, but intra-disciplinary debates do exist.⁵ Another source of disjuncture lies between the infrastructure research and praxis, a division that is increasingly ambiguous due to the commercialization of development research (Johnson, 2009). Previous attempts to conceptualize the infrastructure research have emphasized the aspects of the built environment, but have inadequately captured the connection with the social. For example, Fourie (2006) organizes infrastructure research in terms of infrastructure types, effects, and functions. For these reasons, a technical, disciplinary, or sectoral organization will not suffice. In effort to give some conceptual order to the diverse infrastructure literature, I present three conceptualizations, organized according to the various valuations of infrastructure systems. These conceptualizations are described as the technocratic, interventionist, and critical perspectives.

2.2.1 Technocratic Perspectives

The most ubiquitous conceptualization of infrastructure is the technocratic perspective, in which infrastructure is understood as objects, systems, and projects. In this view, infrastructure is regarded in terms of its material value, inherent to the infrastructure object or system. Investment and project ratios are frequently reported as measures of success. Hence the term 'infrastructure development' refers to the construction and planning involved in the physical production of the built environment, and successful infrastructure development refers to the efficient production and operation of infrastructure systems.

Researchers who follow technocratic perspectives have produced a wealth of literature and data of impressive detail concerning the supply and demand aspects of physical infrastructure systems. From a supply perspective, a number of authors have addressed the

⁵ For a good example of an intra-disciplinary debate within economics on the effects of infrastructure investment on productivity, see Aschauer (1989), Gramlich (1994); and Munnell (1992).

complexity of infrastructure provision and the sustainability of infrastructure systems. Complexity surfaces due to the various interconnected objects required to complete infrastructure systems (Prud'homme, 2005; see Table 2.1), and the interdependency of multiple infrastructure systems (Little, 2005). Concerns over sustainability of infrastructure systems stem from the continuous need to maintain, repair, and replace physical systems, especially once original financing has ended and systems reach the end of their lifecycles (Horvath & Matthews, 2004; Little, 2005). Demand aspects of infrastructure systems are usually examined in the planning phase to predict the financial sustainability of future infrastructure systems. Such assessments examine the willingness of a population to pay for infrastructure services in relation to the expected construction, operation and maintenance costs (Ostrom, Schroeder & Wynne., 1993).

Table 2.1 Multiple Components of Infrastructure Systems

SYSTEMS	OBJECTS		SERVICES
	<i>Extra-household</i>	<i>Intra-household</i>	
<i>Transportation</i>	<i>roads, highways, bridges, tunnels</i>	<i>vehicular means: automobile, bicycle, shoes, cargo – wagon</i>	<i>Gasoline, oil</i>
<i>Electrification</i>	<i>power stations, transmission and distribution lines, dams, hydropower stations, energy meter</i>	<i>in-house wiring, light switch, light bulb, electrical appliances</i>	<i>Electricity</i>
<i>Domestic Water Supply</i>	<i>dams, reservoirs, pipes, treatment plants</i>	<i>sinks, water basins, showers, toilet, pipes</i>	<i>Domestic water service</i>
<i>Telecommunication</i>	<i>communication towers, satellites, telephone lines, telephones/cellular phones</i>	<i>In-house telephone wiring & landline or cellular phone</i>	<i>Connection service (land or cellular)</i>
<i>Internet</i>	<i>network, network connective system</i>	<i>In-house wiring/cable, modems, computers</i>	<i>Internet connection service</i>
<i>Telecommunication</i>	<i>communication towers, satellites, telephone lines, telephones/cellular phones</i>	<i>In-house telephone wiring & landline or cellular phone</i>	<i>Connection service (land or cellular)</i>
<i>Internet</i>	<i>network, network connective system</i>	<i>In-house wiring/cable, modems, computers</i>	<i>Internet connection service</i>

Source: By Author - adapted from Prud'homme, 2005

Researchers who examine infrastructure systems within social environments find complexity in the array of multi-scalar actors and institutional arrangements involved in various phases of the infrastructure provision process. These phases include the design, finance, construction, operation and use of infrastructure systems (Ostrom et al., 1993). Actors involved in finance and procurement phases have been analyzed at global scales, as development agencies, governments and the third sector fund, and accept funding for infrastructure projects. Most frequently cited arrangements include those involving both the public and private sector (otherwise known as public private partnerships or PPPs), due to privatization trends of infrastructure provision, which have taken place in developing countries over the past twenty years (Banjeree, Oetzel & Ranganathan, 2006; Button, 1998; Andres, Guasch, Have & Foster, 2008)⁶. These privatization arrangements add further complexity through a range of public and private involvement in relation to management and lease contracts, concessions, and divestitures (Andres et al., 2008). Increasing attention has also been paid to the ascending role of the multi-scalar third sector (i.e. NGOs) to provide welfare-related infrastructure, especially in response to the decreasing role of the public sector in infrastructure provision and in light of neo-liberal reforms (Uphoff, 1993; Gideon, 1998).

Within technocratic perspectives, the view of the social environment is regarded only in its direct relation to infrastructure systems. This view can be problematic for a comprehensive understanding of infrastructure development, for it mystifies the process beyond infrastructure's encounter with the user, and underestimates variations in people's agency to access infrastructure. First, this view homogenizes social agents as passive recipients by assuming their willingness to use infrastructure systems. Second, in referring to social agents as users, this perspective also overlooks those who desire infrastructure use, but who are not using

⁶ Multiple variations in private participation infrastructure arrangements have been discussed by Guasch (2004), and include a range of government and private sector involvement in multiple aspects of infrastructure provision including: the ownership of physical and land assets, ownership of vehicles, investment responsibilities, service control, tariff control, and various risks.

infrastructure systems, and the causes that underlie the disjuncture. The second critique is particularly relevant to less-developed and highly inequitable regions, in which many people struggle to acquire intra-household objects and services that are necessary to complete infrastructure systems (Table 2.1). These household items and services have typically fallen within the responsibility of the consumer to acquire, often through market purchase. Without sufficient financial capabilities to acquire these infrastructure objects and services, entire infrastructure systems are rendered inaccessible and useless to some households. Electrification systems serve as an instructive example. Power generation stations, power storage, power lines, along with the institutional and operational arrangements are needed to provide electricity to households. However, additional components such as electricity meters, switches, in-house wiring, light bulbs and electrical appliances, are required at the intra-household level in order to complete the infrastructure system. Similar scenarios may be envisioned with other systems depicted in Table 2.1.

In sum, while infrastructure research that stems from the technocratic perspective has produced extensive analyses of the complexity and technical sustainability of infrastructure systems, this research is often to the neglect of the complexity and sustainability of the social environments in which infrastructure systems are introduced.

2.2.2 Interventionist Perspectives

Within the interventionist perspective, infrastructure is deemed instrumentally valuable as a development intervention, insofar as it facilitates processes that are also deemed valuable and beneficial for societies. The merits of infrastructure are repeatedly espoused by funding agencies and governments as interventions that can facilitate economic growth, reduce poverty (Andres et al., 2008; Brooke & Irwin 2003) and decrease inequality (Calderon & Serven, 2004). More specifically, infrastructure is widely adopted for its potential to facilitate specific development

objectives such as increased productivity, trade, investment, employment, and improved access to education, health and other social services (as summarized in Table 2.2).

The origins of the interventionist perspective began with the birth of the development industry itself, alongside the creation of the International Bank for Reconstruction and Development (IBRD) (also known as the World Bank) and the International Monetary Fund (IMF). Most remarkably, this perspective was realized through the post-World War II Marshall Plan (1947) in which an unprecedented sum of 13 billion USD was invested towards the reconstruction of Western Europe. The success of the Marshall Plan and other infrastructure interventions based on the experiences of the Western industrialized countries led to the export of the modernization model to less developed countries, with the expectations that similar results could be achieved with the right combination of economic inputs and technical assistance (Ostrom et al. 1993).

Proponents of the interventionist perspective suggest that the global development project will remain incomplete until each country, town, and village is provided with multiple infrastructure systems. Therefore continual funding of infrastructure projects is needed to address the (perceived) shortfall in developing countries and to meet the needs of a growing global population (World Bank, 2006). However, the theoretical basis of the interventionist perspective is fraught with theoretical challenges and empirical contradictions. Modernization theory has maintained a persistent influence in development praxis more generally, despite having been rendered obsolete in most academic circles (Booth, 1993; Portes, 1974; Schuurman, 2000). The benefits of infrastructure investments have also failed to materialize in many less-developed countries, many of which plummeted into irrevocable debt and perpetual dependency on external loans (Ostrom et al., 1993; Payer, 1974; Thacker, 1999).

The interventionist perspective has been very influential in the construction of development definitions, indicators and metrics. Development agencies have taken a leading

role in shaping development and poverty definitions since the 1970s (Misturelli & Heffernan, 2008). Since 1994, the definition of poverty has shifted to incorporate a lack of access to infrastructure services (World Bank, 1994:20). This framing of the poverty polemic is evident in current discourses, in which infrastructure is viewed, either directly or indirectly, as an ends or a means to poverty reduction (Shah and Batley, 2009).⁷ Such a philosophy is evident in the World Bank's (2006: 43) twenty-year review:

Infrastructure is essential for economic growth and without growth there can be no sustainable poverty reduction. For the poor to share in the benefits of growth, they need access to infrastructure, both to achieve better health and education and to earn higher income as farmers, workers, and small-scale entrepreneurs. The Bank's infrastructure strategy, therefore, integrates support for growth and access as complementary objectives contributing to poverty reduction.

However, the power relations exercised in constructing such definitions are seldom discussed (Sumner, 2004). That poverty is a lack of infrastructure, therefore infrastructure must be provided in order to alleviate poverty, reinforces a circular logic, which has been rhetorically powerful and highly influential in infrastructure development research. Framed in this way, infrastructure can do no harm, particularly when indicators of infrastructure development tend to refer to infrastructure inputs and project deliverables, such as investments, projects numbers, and coverage to population ratios (Andres et al., 2008). Consequently, researchers have sought how to improve the efficiency of infrastructure systems, assuming their effects (direct and indirect) to be indelibly positive (Fourie, 2006).

In summary, from the interventionist perspective, successful infrastructure development relies not only on the efficiency of infrastructure systems, but also to the reliability of infrastructure systems in delivering desirable development objectives. However, given the complexity of infrastructure systems and their new geographies of reach, it is indeed perplexing that within this perspective, the purported outcomes of infrastructure development, value, and

⁷ For example, increased access to potable domestic water may be viewed as an ends to poverty reduction, while increased productivity and employment would be viewed as a means to poverty reduction.

processes, remain uniformly positive. This assumed uniformity of infrastructure processes tends to neglect the diversity and inherent complexity of place-specific environments, and like the technocratic perspective, underestimates the heterogeneity of societies. In other words, the interventionist perspective is premised on the assumption that infrastructure is inherently good, valuable, and has a benefit to society – no matter what that society or their definitions of development.

Table 2.2 Summary of Infrastructure Development Processes⁸

Infrastructure System	Infrastructure Development Processes	Citations
Land Transportation	Quality of transportation systems on freight costs, total productive efficiency	Gulyani (2001)
	Quality of transportation systems on the facilitation of trade	Iwanow & Kirkpatrick (2009) Francois & Manchin (2013)
	Quality of transportation systems on export propensity	Rodriguez-Pose (2013)
	Road-building on social service accessibility	Bryceson, Bradbury & Bradbury (2008)
	Transportation costs on trade	Milner, Morrissey & Rudaheranwa (2000)
	Degree of openness of transportation on regional growth	Yao & Zhang (2001)
	Quality of roads on employment and income from non-farm enterprises	Corral & Reardon (2001) Gibson (2010) Khandker & Koolwal (2010)
Electrification	Electricity access on worker productivity and income growth	Kirubi, Jacobsen, Kammen & Mills (2009) Zhang, Moorman & Ayele (2011)
	Electricity access on employment propensity by gender	Grogan & Sadanand (2013)
	Grid electrification on firm profitability	Peters (2011)
	Solar electrification on productivity, education, and rural-urban connectivity	Jacobson (2007)
	Quality of electricity on employment and income from non-farm enterprises	Corral & Reardon (2001) Gibson & Olivia (2010) Khandker & Koolwal (2010)
	Investment in electrification on access to education and health care	Deiningner & Okidi (2003)
Water supply	Household water supply on employment by gender	Crow (2012)
	Improved water accessibility on social welfare gains	Hope (2006)
	Public provision on achieving Millennium Development Goals	Lobina & Hall (2008)

⁸ Sources were sampled by a systematic search of infrastructure system-specific terms from three development journals (Progress in Development Studies, World Development, and Development Policy Review), spanning from a period range of 2000 to 2013.

2.2.3 Critical Perspectives

Within the critical perspective, the value of infrastructure cannot be pre-assigned without careful consideration of the socio-political environment. Instead, the value of infrastructure systems is constantly questioned and contested, and the source of contestation lies in the fact that infrastructure is “fundamentally a relational concept” (Star, 1999:380). Therefore the value of infrastructure systems will constantly vary according to which actors are being consulted, and the degree to which infrastructure systems align with emically-defined development objectives.

In contrast with structural interpretations of infrastructure development processes, the critical perspective recognizes the integral role of people and place to infrastructure analyses. If “placelessness has become the essential feature of the modern condition” (Escobar, 2001:140), then incorporating place into infrastructure analyses can become the new way of envisioning alternative infrastructure realities. Therefore, infrastructure interventions are expected to produce variable effects when placed within different environments. The critical perspective also considers that actors are not merely affected or impacted by infrastructure objects, but may also actively navigate and negotiate, define and develop their own infrastructure systems that fit in accordance with their own definitions of development.

Research influenced by the critical perspective has recognized that infrastructure can be simultaneously beneficial and harmful for populations. Thus, while infrastructure systems or objects may be considered emancipatory for certain segments of society, to marginalized groups infrastructure may be conceptualized as symbols of power and mechanisms of control. Within this perspective, infrastructure objects are not apolitical installments, but can symbolize existing power struggles, and can be understood as the material outcomes of socio-political relationships that exist within fragmented and inequitable societies. Numerous authors have noted the political and economic motivations of infrastructure provision (hydropower dams: Bakker, 1999; MaGee & MacDonald, 2006; electricity: Humphrey, 2003; irrigation: Shiva, 2001; roads: Rigg, 2002; Butz, 2011; Nugent, 1994; Wilson, 2004). At national scales, infrastructure has also been

described as mechanisms used to assert state sovereignty in remote areas, and to integrate indigenous populations into the mainstream of national societies. Scott (2009) traces some of the earliest instances of state formation in China, Egypt, India, Greece, and Rome, to the middle of the first millennia, in which irrigation played an important role in the formation of the padi-state, and was used to increase agricultural productivity and concentrate foodstuffs, and therefore, military power in one place. More recent accounts include Yakovleva's (2011) account of oil pipeline construction in Siberia, used as a means to harness mineral resources within peripheral indigenous-inhabited areas, and O'Connors' (2011) description of Myanmar's state infrastructure program used to assert domination over ethnic minorities. Infrastructure is also argued to be a mechanism used by states to coerce indigenous populations into participating in cash-based formal economies, thereby ensuring that their economic activities are "legible, taxable, assessable, and confiscatable" (Scott, 2009:5). Withholding infrastructure has also been noted as a deliberate isolation tactic, to keep rogue populations at bay until military reinforcement can be secured (Wadley 1998). Others have noted the use of infrastructure as a political tool, leveraged to win, maintain, or reward electoral support of politicians (Humphrey, 2003). Due to their long-lasting nature, infrastructure objects can also be seen as symbolic legacies of power relations, depicting 'cartographies of power' (Anderson, 2006). Such a view has been illustrated by Biggs (2008) in his historical review of water control schemes surrounding the Mekhong River in southern Vietnam, and points to the symbolic legacies of physical infrastructure objects that prevailed through successive political regimes.

Objections to critical perspectives towards infrastructure parallel those generally directed at post-development approaches. Post-development approaches have been seen as destructive, rejectionist, and lacking a future programme (Pieterse, 1998). An overemphasis on the particularities of place-specific environments can lead to a breadth of myopic case studies, lacking theoretical cohesion, and precluding a systematic understanding that would prove useful to development practitioners and policymakers. In addition, post-development critiques

have been charged with underestimating the “diversity, complexity and adaptability” of existing development interventions (Pieterse, 1998: 347), and for overlooking the millions of people who have benefitted from development projects (Simon, 2006). These are legitimate criticisms that must be taken into account when developing a critical approach towards infrastructure research, and which are addressed by the framework proposed in the latter section of this paper. In brief, it is important to note that the critical perspective that is being advocated here acknowledges the usefulness of infrastructure for certain segments, and even large segments of societies. In fact, the critical perspective is likely to reveal that every infrastructure system will produce some benefit for some part of society. However, the critical perspective also elucidates that infrastructure systems rarely benefit all societal groups at once, and in many cases effectually reproduces societal inequalities.

2.3 The Politics of Infrastructure Development Research

Technocratic and interventionist perspectives have emerged as dominant influences in infrastructure policymaking and praxis. Similar to broader debates in development studies, these conceptualizations are largely informed by the economics discipline (McCloskey, 1998; Watts, 1993, Cooper & Packard, 1997) from which their perceived strength and acclaimed neutrality are rooted in the assumptions of positivist science (Harris, 2002; Sumner, 2004). Given the dominance of economic, positivist approaches in infrastructure development research, it is worth questioning whether the certitude of technocratic and interventionist perspectives is derived from scientific rigour or is reflective of political asymmetries in the process of knowledge production. This section highlights the limitations of the positivist paradigm for infrastructure research – namely the failure to integrate power, place and agency as key cornerstones of infrastructure development analyses.

That technocratic and interventionist perspectives have assumed dominant authoritative positions within infrastructure praxis is little surprising given the burgeoning grey literature

produced and funded by the World Bank, which has successfully pervaded the academic literature (Das, 2009). Over the past twenty years the World Bank has shifted from their traditional role of financiers of infrastructure projects, to technical advisors of infrastructure provision (Wolfowitz, 2007). This revised role of the World Bank is particularly important due to its pervasive influence on the academic literature in development studies. For example, in a review of the macro level literature of infrastructure and development (Straub, 2011), of a total of 107 sources, 22 (21%) sources were derived from the World Bank publications, 41 (38%) were derived from academic journals relating to economics, and a further 4 (4%) sources were from academic journals in development studies. In effect, development praxis is doubly influenced by the powerful position of the World Bank in funding projects that are legitimized by research that is also supported (financially and philosophically) by the World Bank (Das, 2009).

Yet some scholars of the critical school argue that the politics of development knowledge has less to do with the extent to which various perspectives inform praxis and more to do with the politicized process through which development knowledge is created in the first place (Nustad & Sending, 2000). Next I present several challenges to the rigour of positivist research and the appropriateness of its application towards understanding infrastructure within interconnected social and built environments.

2.3.1 Power, Place and Agency

It can be stated that applications of positivist science to infrastructure research are premised on the ontological assumption that there is a single and universal absolute truth, based on a unified and shared global reality that is stable and generalizable across time and place. Within the positivist epistemological assumption, the researcher is granted the authority to construct knowledge as permitted within the positivist paradigm frame of reference – the scientific method. In doing so, the research is deemed objective, apolitical, and independent of researcher bias.

From a critical ontological position, the certitude with which infrastructure knowledge has been portrayed can be challenged by the recognition that knowledge, like infrastructure, is the product of socio-political process. According to Habermas, knowledge is defined as a set of propositions that derive their certainty from the rules, standards, and procedures that are embedded in and define science. These 'frames of reference' represent certain cognitive interests that determine what is decidedly meaningful and relevant (Nustad and Sending, 2000). Relating to the case of infrastructure knowledge, Johnson (2009:3) argues that research by the World Bank is carried out under a façade of objectivity that helps to underpin the "aims and values that shape their understanding of what is useful and important". Sumner (2004) contends that these values are aligned with pro-globalization, pro-neo-liberalism, and pro-trade, to which 'pro-infrastructure' can be added. Hence, all infrastructure knowledge, achieved by positivist or interpretivist means, arguably stems from a value-laden ontology.

From the critical epistemological position, that infrastructure development knowledge is predominantly produced by way of the scientific method, is cause for concern. Positivist research frameworks tend to study infrastructure development as closed systems, in isolation from the complex natural, social, and political contexts in which they are embedded. This attempt to isolate phenomena from their complex environments relies on the assumption that these environments are benign, stable, and controllable (Cloke & Johnston, 2005). Under these assumptions of control, positivist scientists create knowledge through a series of causal explanations that together are used to formulate theories about a particular phenomena or relationship. These causal explanations often lead to obverse predictive models of how such manipulations to independent variables will cause a specified change to dependent variables, and under what conditions such changes will occur (Miller, 1983). For example, let us consider an infrastructure study in which the built and social environments are represented by two variables, the independent variable is a road and the dependent variable is household income. Over time, if the positivist scientist arrives at causal explanations that the road influences

household income in a particular way, then the theory might state “household income increases in direct relation to the construction of roads”. Following the use of precautionary measures to ensure against a reversed causality, the predictive model will then state the obverse, that ‘there is a positive correlation between the construction of roads and household income’. From a policy perspective, this causal explanation provides clear evidence for the obverse, that to increase household income, requires intervention through the construction of roads. The implication of this reductionist scientific evidence is that eventually evidence materializes as infrastructure interventions, and is introduced within a myriad of social, natural, and political variables with which the infrastructure intervention is poorly designed to contend.

From a critical methodological position, there seems to have been little scrutiny over the appropriateness of applying economic and positivist analyses for generating knowledge specific to infrastructure development processes. Limited critique has been directed to the power of the researcher in the selection of infrastructure development indicators, or to the validity of measurement tools. As Sumner (2004: 1169) argues, “given the choice to select one’s own data, the researcher may find him or herself engaged in a range of decisions that are deterministic” . When this critique is coupled with the previous point on value-laden ontologies, it may help to explain the fixation of infrastructure research on indicators such as infrastructure investments and coverage ratios (see for example: Andres et al., 2008; Brooke & Irwin, 2003) in comparison to the relatively scant attention paid to social outcomes of infrastructure development processes.

Assumptions of objectivity, control, and methodological rigour that inform development meta-narratives and calculable infrastructure interventions pose significant implications for populations living in place-specific environments (Booth, 1993). The analysis of infrastructure processes in isolation from place-specific environments, and the extrapolation of such structural models to regions with different conditions, including for example, higher levels of inequality and instability, can exacerbate problems for the most vulnerable societal groups (Ferguson, 1990).

One can argue that the positivist notion of a single objective truth has lent to the erasure of place from development discourse, for place does not matter if truth and reality do not have variation. Escobar (2001) contends that the erasure of place from the development discourse does not reflect a universal consensus, but rather the current power asymmetries that exist between the global and local in contemporary globalization literature. Critical perspectives take a cue from such asymmetries and challenge the composition of the dialectic – asking whose voices, experiences, values and realities have been included in the current conceptions of infrastructure development processes. The unfortunate answer is that after 60 years of development studies, there is still limited knowledge and far from a *systematic understanding* of how infrastructure development processes variably unfold within highly complex, place-specific environments. For this reason, reasserting place as a key cornerstone of development studies is seen as “an important arena for rethinking and reworking Eurocentric analysis” (Escobar, 2001:141).

Given the aforementioned complexity of understanding how infrastructure development processes unfold within different places, it is important to question whether positivist scientific approaches can claim the same level of rigour that might be achieved within a laboratory setting. Objectivist claims within infrastructure development research not only attempt to detach the research from the values of the researcher, but also from the person or population under observation (Ferguson, 1990). Again, referring to the example of roads and household income, the dependent variable being observed is household income. Here, the money has been detached from the hand that earns it, and the rationale for needing it. While this objectification may be advantageous in the analysis of physical phenomena such as particulate matter, for example; it seems rather limiting when the phenomena being examined takes place in a social world. Should particulate matter one day develop the agency to tell scientists why they act and react in certain ways, physical scientists might embrace such opportunities to document their responses with excitement! These structural assumptions imposed within the positivist

framework seem less necessary today than 60 years prior, when the first development models were created. Since this time, the physical space that once separated researchers from the people they study and that perpetuated development meta-narratives (Chambers, 1997), have been widely overcome with advancements in global transportation and communication technologies. Development researchers have gained much in their facilities to conduct place-specific observations, and to communicate directly with agency-yielding research participants. Given these advantages, there are few justifiable reasons not to integrate power, place and agency as central themes in infrastructure development analyses.

The purpose of the previous discussion is not to assert one perspective of infrastructure (technocratic, interventionist, or critical) over another. Rather, the argument that has been made is that each research perspective offers partial insights towards infrastructure development knowledge. Each contribution is limited by a set of ontological, epistemological and methodological assumptions that influence every aspect of research design. Just as infrastructure systems are products of a normative, value laden and socio-political relations, so too is knowledge of infrastructure phenomena the product of a highly politicized process of knowledge construction. However, the dominant application of positivist frameworks in infrastructure research has limited a comprehensive understanding of infrastructure development processes in place specific environments, in a way that acknowledges the diversity and agency of populations being studied. As a result, there are many questions left unasked and much left to learn about how and whether infrastructure produces variable effects in different locales, and how populations actively respond to and create infrastructure instalments in relation to their emically defined development needs.

2.4 Re-Conceptualizing Infrastructure Research in a Post-Development Era

Infrastructure development research within a post-development era presents an opportunity to draw from a range of ontological, epistemological, and methodological frameworks to expand the current understandings of infrastructure development processes, their meaning, and how and whether these processes unfold in global to local contexts. By now it has been established that within discussions of infrastructure development, the voices of marginalized actors have generally been poorly integrated into a dialogue that portrays these actors as powerless, infrastructure-less subjects in need of infrastructural provisions and repair. However, from critical perspectives, the source of exclusion of marginalized people lies not in their remote location or their lack of access to infrastructure systems, but in the failure to incorporate their perspectives in the creation of infrastructure knowledge. When understood as a “critical and reflexive mentality in social science” (Pieterse, 1998:356), post-development brings a collection of approaches that acknowledge multiple world views and embrace diversity and nuance, particularly as they arise in place-specific settings.

To address the current shortcomings in infrastructure research requires a re-envisioning of sorts, towards a more critically-reflexive, agency-oriented, and place-sensitive approach for understanding infrastructure and development processes: an approach I refer to as the “Critical Acquisition Framework”. The Critical Acquisition Framework is designed to facilitate a people-centred understanding of infrastructure development processes from the perspectives of marginalized groups. The framework draws from literature which has surfaced in the post-development era, and particularly critical-social theory. Critical-social theory aims to understand existing power relations within societies, and the institutional structures and oppressive ideologies that reproduce social inequalities, in order that inequitable systems may be challenged and transformed (Calhoun, 1995; Fay, 1987; Freiburg, 1979). The critical acquisition framework is premised on an actor-based concept of socio-political reality as a

launching point of inquiry. This recognizes societies as being heterogeneous composites of multiple actors; groups of social agents who converge based on shared resource interests (Long and van der Ploeg, 1989). Between actors therein lie complex patterns of power relations, as some actors are endowed with greater power to pursue their interests and activities over others. When used as an analytical tool across the spectrum of actors who may converge in the provision and acquisition of infrastructure, this framework is designed to achieve a more nuanced understanding of infrastructure from the perspectives of marginalized groups.

2.4.1 Critical Acquisition Framework:

To date, infrastructure research has been mainly concerned with the structurally-oriented processes of infrastructure provision and distribution. However, in order to appreciate infrastructure development processes in their entirety, I contend that the processes of acquisition of infrastructure experienced by marginalized groups must also be taken into account. For every infrastructure system, there is a point at which provision ends and acquisition begins. As previously mentioned, infrastructure systems are comprised of multiple infrastructure components (see Table 2.1). Many of these objects must be acquired by populations in order to benefit from infrastructure systems. For the purpose of this framework, the act of acquisition includes both the act of accessing infrastructure, and the act of acquiring objects and services needed to benefit from infrastructure. Some objects need only be acquired once (such as a car), such that people retain permanent ownership and control over infrastructure objects, or at least until objects require replacement. Other components of infrastructure systems, such as consumable resources like gasoline need to be continually acquired to power infrastructure systems.

2.4.1.1 Agency

The infrastructure acquisition process can be analyzed by examining two key components: agency and institutions. Agency is understood as the 'ability to pursue goals that one values or has reason to value' (Sen, 1992:19). Giddens' (1986) defines agency as being comprised as both

the will and the capability to act. Together these concepts create an excellent definition: agency is the will and capability of a person to act in a way that person has reason to value. More importantly, this definition allows agency and power to be emically defined according to the goals of marginalized groups, and protects against the external imposition of development objectives.

It is worthy to point out that as agency debates have emerged, many proponents have emphasized the will of action over people's capabilities to act (Giddens, 2005). While both components are important, it is argued that capability plays a decisive role in the power of actors to act. The greater one's capabilities, the more power they have to act according to their own will. In contrast, the effects of exercising a large amount of will in the absence of sufficient capability, will have limited effect. For this reason, the Critical Acquisition Framework emphasizes the role of capabilities of marginalized groups in the acquisition of infrastructure systems.⁹

2.4.1.2 Capabilities

Capabilities are conceptualized as being comprised of multiple types and contributing to multiple functionings. The spectrum of capability types have been described as physical, human, natural, social, and financial assets within livelihoods frameworks (DFID, 1999), to which Bebbington (1999) adds produced and cultural capabilities. The functionings that require capabilities may include the acquisition of capabilities (gaining access and possession to livelihood resources), transforming capabilities (such as labour into material capital), or protecting capabilities, all of which may serve productive, protective, social or recreational purposes.

⁹ However, there is plentiful opportunity for further research in examining the will and desirability of infrastructure objects and systems according to the emically-defined development objectives of marginalized groups.

Not all capabilities acquired or endowed¹⁰ by individuals may be of a positive nature, and some may have a detrimental effect towards one's desired functionings and overall agency. In the Critical Acquisition Framework, the term vulnerabilities is used to describe negative capabilities, which have debilitating effects on individual agency. For example, repressive institutions and destructive relationships can be understood as a negative form of social capital, that may "reproduce the exclusion of the poorest" (Cleaver, 2005:893). Similarly, human vulnerabilities may also take the form of illness or a physical disability. Financial vulnerabilities may exist in the form of significant financial debt, and natural vulnerabilities may present in terms of exposure to polluted water resources and soil. Within the built environment, a lack of, or deteriorating infrastructure may have a limiting or detrimental effect on one's functionings and would thus be called a 'physical vulnerability'. The provision of inappropriate infrastructure may also have a debilitating or coercive effect. It is thus important to conceive of the capabilities component of this framework as not a strictly positive model in which all agents build their capability sets from an equal platform (zero), or in which vulnerabilities are defined as an absence of capabilities (Moser, 1999). Rather, capabilities and vulnerabilities equally bear influence, posing enabling and disabling effects on the agency of actors, and their power to navigate infrastructure access through institutions.

The capabilities that are of greatest concern to the Critical Acquisition Framework are those capabilities that enable one to navigate the institutions that regulate access to infrastructure systems. Also of interest are those capabilities that influence one's agency to shape and influence institutions in relation to infrastructure. This framework is thereby useful for analyzing the processes through which marginalized groups draw from their existing set of capabilities to navigate and influence institutions that regulate access to infrastructure systems.

¹⁰ Endowments refers to the existing set of capabilities and vulnerabilities an individual may have at any point in time and prior to the time at which acquisition analyses takes place. For a more detailed discussion on endowments and entitlements within the context of the acquisition of natural resources, see Leach, Mearnes, & Scoones, 1999.

2.4.1.3 *Institutions*

A critical acquisition perspective recognizes the mechanisms of infrastructure access and inaccess as the domain of institutions, which are products of socio-political actor relations. This definition of institutions is distinct from that of North's (1990) on institutions as the 'rules of the game', which is premised on the assumption that institutions are created by politically neutral agents acting free of constraint and self-interest (Casson et al., 2010). Instead, institutions are understood as social arrangements reified to varying formalities, produced through the interaction of multiple actors within societies. These institutions can operate at multiple and overlapping spatial scales, which mediate relationships between actors, thus shaping differential access to and control over resources for each actor embedded in place-specific, culturally diverse, and politically contested environments (Leach, Mearnes, & Scoones, 1999).

Also termed as 'superstructure' (Godelier, 1978), institutions can be both constraining and enabling (Giddens, 1984:25). When placed in a landscape of power and inequality, it becomes apparent how institutions may facilitate access to resources for certain actors, while restricting access for other actors. Actors with greater capabilities, agency and power are more influential in designing institutions, setting the terms and defining the rules of interactions (Giddens, 1984). These institutions are central to the regulation of the infrastructure acquisition process. Thus, superstructure and infrastructure can be understood as materialized instalments introduced within the social and built environment that are produced by and at the same time reproduce inequitable power relations.

Based on the previous components, and referring to the schematic provided in Figure 2.1, the Critical Acquisition Framework is described as follows: if marginalized actors desire and possess a will to access infrastructure because it falls in line with their emically-defined development objectives (Table 2.3, Part A), their experiences of acquiring infrastructure systems might proceed in a variety of scenarios (see Table 2.3 Part B). Presuming the actor has the will to access the infrastructure system, their power to access will be mediated by the match between

their existing capabilities and the institutions that regulate access. Access to infrastructure may be regulated by one or more institutions of a formal or informal nature, and may be mutually constraining and enabling. For example, if access to transportation is regulated by market institutions alone, then an actor may only require sufficient financial capabilities in terms of cash to purchase, for example, a ticket for a transportation service. However, if access to transportation is simultaneously regulated by inequitable institutions of gender, one’s access to transportation infrastructure can be simultaneously restricted. Transportation subsidies provide an additional example, in which transportation fees established by market institutions may otherwise be too high in comparison to the financial capabilities of the poor, thereby disabling the acquisition process. At the same time, subsidies simultaneously enable the acquisition process, by reducing transportation tariffs. Table 2.3 Part B outlines multiple scenarios of infrastructure access from agent-based perspectives. Table 2.3 Part C describes the influence of more dominant societal actors in shaping the acquisition process.

Figure 2.1 The Critical Acquisition Framework

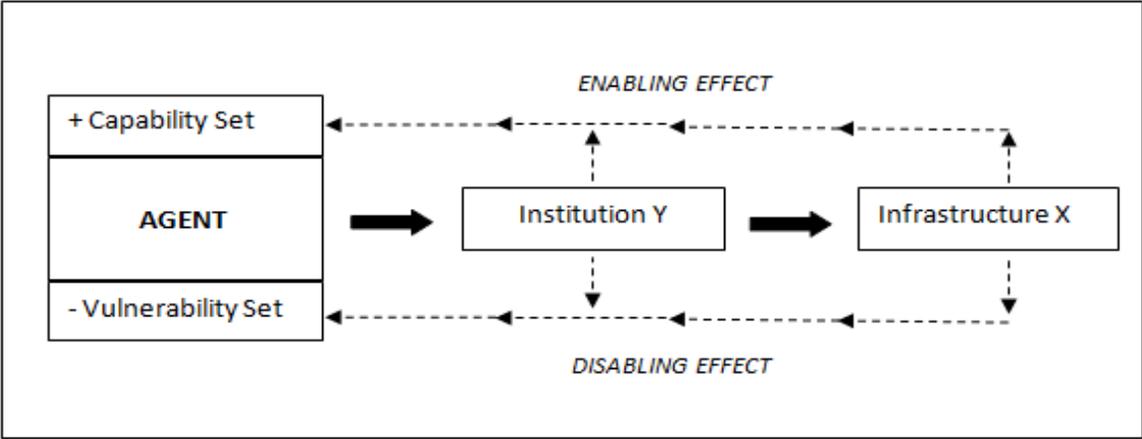


Table 2.3 The Critical Acquisition Framework

<p>Part A: Agency as the will and capability to act (Giddens, 1984).</p> <ol style="list-style-type: none">1) <i>Capabilities.</i> Access to infrastructure X is regulated by one or more institutions of a formal or informal nature. The agent's agency to access infrastructure X depends on the match of her existing capabilities to the institutions which regulate access.2) <i>Will.</i> Only the agent can determine if infrastructure X can be understood as infrastructure. This definition is dependent on whether it facilitates her functioning in a way she has reason to value.
<p>Part B: Infrastructure processes from the acquisition perspective can result in the following scenarios (or variations thereof), each which have variable effects on capabilities and agency.</p> <ol style="list-style-type: none">1) The agent has sufficient capabilities to navigate access through institution Y. The agent gains access to infrastructure X. The agent's capabilities are enhanced.2) The agent does not have sufficient capabilities to navigate access through institution Y. The agent subverts institution Y through an existing alternative institutional arrangements (usually informal), or the creation of a new informal arrangements The agent's capabilities are enhanced.3) The agent does not have sufficient capabilities to navigate access through institution Y. The agent defies institution Y through covertly accessing or pilfering infrastructure X. The agent's capabilities are enhanced.4) The agent does not have sufficient capabilities to navigate access through institution Y. The agent provides her own infrastructure. The agent's capabilities are enhanced.5) The agent does not have sufficient capabilities to navigate access through institution Y. The agent does not access infrastructure X. The agent's capabilities are unaffected, or in the case of those infrastructures which are linked to basic survival needs, the capabilities of the agent are reduced and/or her vulnerabilities increase, and the agency of the actor declines.
<p>Part C: Institutions and infrastructure are products of agency, often created by more powerful actors within a society.</p>

2.5 Discussion

The critical acquisition framework offers a new way of understanding infrastructure and institutions as the products of inequitable socio-political relations. Simply stated, the framework illustrates how institutions enable the acquisition of infrastructure for some, while disabling the process for others. This view of institutions provides an important overdue alternative to conceptions of institutions offered within development research that have exerted much effort towards institutional reform towards facilitating ‘the right’ kind of development processes (i.e. open trade). In this context, getting institutions ‘right’ refers to the efficient provision of infrastructure systems (the technocratic approach), rather than for the purpose of restoring equitable access to resources, including infrastructure. Here too, judgments of efficiency and inefficiency depend on the process in question and the perspectives from which they are launched, and it is important not to succumb to the assumption that institutions are equally beneficial or valuable to all intra-societal groups (Cleaver, 2005). This view of institutions offers insight into how inequitable institutions that perpetuate inequitable access to resources may be perceived as highly efficient from the perspective of their creators.

Integrating capabilities into the evaluation of access to infrastructure offers a new way of evaluating institutions, “according to the extent of freedom people have to promote or achieve functionings they value” (Alkire, 2005: 122). This idea was emphasized much earlier in the writings of Amartya Sen on inequality and capabilities, who argued that the key purpose of the capability approach was that “social arrangements should aim to expand marginalized people’s capabilities – their freedom to promote or achieve what they value doing and being” (Sen, 1992:5). Hence, the Critical Acquisition Framework, particularly its emphasis on capabilities, is also useful for identifying institutional inefficiencies in terms of the acquisition process and from the perspectives of marginalized groups.

2.5.1 Capabilities vs. Rights-Based Approaches in Access Analyses

The emphases on capabilities of individuals to access infrastructure in the proposed framework contrasts with other access analyses with respect to community based resource access. The focus of the latter literature on rights, rules, and institutions in the absence of capabilities, prioritizes the experiences of the rule-makers and rule-followers to the neglect of those who challenge, defy, or circumvent the rules. Within current approaches in access analyses, scenarios 2, 3, and 4, Part B of Table 2.3 would be excluded from the analysis. Furthermore, while access analysis has previously been defined as the abilities and processes through which people *benefit* from things (Ribot and Peluso, 2003). Within this definition, scenario 5, Part B of Table 2.3 would be excluded from the analysis. Finally, Ribot and Peluso's (2003) definition of access is premised on the assumption that actors converge and derive benefits from the same things. However, as indicated in Part A of Table 2.3, not all resources, including infrastructure have a similar benefit, value or use for all actors, particularly within the context of diverse, highly fragmented or inequitable societies. Overall, an emphasis on those who gain, control, regulate and maintain access over resources creates a skewed orientation towards the perspectives of powerful actors in any acquisition process.

2.5.2 Inequality

The Critical Acquisition Framework can contribute to knowledge of how people who live on the margins of societies, economies and polities exercise agency and the obstacles to this agency when navigating formal and informal institutions that control access to infrastructure. This analysis is particularly useful in the wake of privatization reforms to infrastructure services seen in many countries over the past two decades. As scepticism builds of trickle-down economics amidst high levels of inequality in developing countries, infrastructure access continues to be provided by way of the market system. The equalizing claims of privatization, that is, that consumers have an equal opportunity to pay, is quickly contradicted by analyses of people's capabilities to pay. The consequences of privatization in the face of growing economic

disparities can be devastating on the capabilities of already economically marginalized groups when basic infrastructure services are financially inaccessible (as seen in scenario 5, Part B, Table 2.3), particularly in developing areas in which social security institutions are inaccessible or non-existent.

Acts of access that do not conform to formal institutions of infrastructure provision have long been framed in a disparaging light, as free-riding or the consequence of poor regulatory enforcement (Ostrom et al., 1993), as if narrators were oblivious to the daily struggles of the poor to survive. This technocratic position, which privileges the infrastructure system over the person, points to another failure to recognize the agency of actors in acquiring infrastructure by alternative and creative means (as seen in scenario 4, Part B of Table 2.3). The intention is not to romanticize illegitimate practices of infrastructure access (theft), but to understand the rationalities and conditions in which they occur. Future research might critique the assumptions of human rationality that pervade dominant perspectives in infrastructure development research (such as rational choice theory, and assumptions of utility-maximizing behaviour, for example). Scott's (1990) examination of the moral economy of the peasant could be a useful model to apply towards understanding alternative rationalities underlying the variable processes of infrastructure access. Equally worthy of analysis is the rationale of the rule makers and perpetrators of inequitable power relations involved in the infrastructure provision process.

2.6 Conclusion

The critical acquisition approach responds to the unchallenged power asymmetries in the production of infrastructure knowledge and offers a systematic framework for integrating power, place and agency into infrastructure research. In the first section of this paper, three common conceptualizations of infrastructure research were outlined, all of which compete to be heard and inform infrastructure praxis. The dominance of technocratic and interventionist perspectives within infrastructure research and praxis have been argued to be indicative of the

politicized process of knowledge production inherent to infrastructure research. In line with post-development critiques, an argument is made for a critical, reflexive, and people-oriented approach for understanding infrastructure development processes in place-specific environments. Towards this aim, the Critical Acquisition Framework has been proposed.

The Critical Acquisition Framework offers an alternative to current structural approaches in infrastructure research and responds to calls for increasing reflexivity in development research (Jakimow, 2008). The framework combines several aspects of the critical-social theory, capabilities, and institutions literature to provide a framework for examining people's experiences of accessing infrastructure systems. The critical acquisition framework can help to illuminate the complexity of the notion of access in a way that has not yet been captured within the infrastructure literature. The framework involves an assessment of how people draw from their existing capabilities to gain access to a variety of institutions that regulate access to infrastructure and that influence the generation of further capabilities. The framework simultaneously emphasizes the role of institutions and their influence upon marginalized groups in the acquisition of capabilities, their generation of agency and power, particularly within the context of highly inequitable societies. It helps elucidate that institutions facilitate and restrict the acquisition of assets, and assets that can be acquired by individuals play a large part in their capabilities to engage in, resist, or reshape infrastructure institutions. Moreover the framework demonstrates why the qualities of institutional efficiency should be evaluated, at least in part by the extent to which such institutions facilitate access to infrastructure for marginalized groups. Hence, applying this framework is particularly useful for assessing the role and efficiency of institutions from multiple perspectives within inequitable societies.

The critical orientation of the framework and of this paper responds to legitimate critiques of the post-development literature (Pieterse, 1998). The agenda of the critical perspective to infrastructure research has been to understand the underlying politics inherent to the production of infrastructure knowledge, so as not to replicate existing power imbalances

through the production of research. Applying a socio-political concept of institutions therefore contributes to the reflexive exercise of challenging assumptions, contributing dynamism to discourse, and including multiple and marginal voices (Jakimow, 2008) such that alternative realities might be envisioned and realized. It is hoped that reflecting upon and articulating the science and politics of infrastructure research will eventually lead to a more comprehensive, dynamic and equitable understanding of infrastructure development.

3 Methodology

3.1 Introduction

This research advocates and employs a critical methodology for infrastructure research. Inspired by a critical theoretical lens, and pragmatic, participatory, advocacy and transformative worldviews, a mixed methods research design is applied to understand infrastructure development process within two case studies located in Cajamarca, Peru. The purpose of this chapter is to describe and justify the choice of methodology that guides this research. In the following I provide a rationale for my methodological approach to infrastructure research (Section 3.2). Next, I describe the philosophical foundations of this research (Section 3.3), followed by a detailed description of the methodological design, techniques and analyses as they were applied in each case study (Sections 3.4). A discussion of the ethical considerations, positionality and rigour of the research is offered in Section 3.5. The final section presents a conclusion to the methodology (Section 3.6).

3.2 The Justification of the Critical Methodology for Infrastructure Research

Despite an emergence of humanistic and critical approaches in the social sciences, positivist approaches continue to dominate within infrastructure research. As discussed in Chapter 2, this dominance reflects power asymmetries inherent to the production of infrastructure and development knowledge. In this research, a critical theoretical and methodological approach have been applied to address such imbalances of power and to promote the construction of a more inclusive and representative body of infrastructure knowledge.

Predominant methodological approaches within infrastructure research have relied on positivist methodologies that are poorly positioned to incorporate marginalized perspectives into infrastructure knowledge. Objective notions of truth and reality preclude the appreciation of multiple realities, and do not recognize variances in realities according to place, culture, or socially differentiated positions. Also problematic is the extensive authority granted to the

researcher, along with presumptions of control that are exercised in drawing causal relationships and extrapolating findings, both of which eventually inform theories in infrastructure praxis. The consequence of prevailing positivist paradigms is that they present a partial perspective and structural view of infrastructure development processes, yet inform a significant portion of infrastructure praxis. As infrastructure policies continue to operate with global reach, usually extending from the Global North to the Global South, power relations are again reinforced through infrastructure interventions and policymaking.

In order to challenge existing power relations that are produced and reified through positivist paradigms within infrastructure research, a critical theoretical and methodological approach has been proposed. Critical theory originated amongst key thinkers of the Frankfurt School in the 1920s. The main interest of critical theory is in challenging the nature of social reality, refuting the essentialism of social inequality, and addressing power asymmetries through the emancipation of knowledge (Alvesson & Skokberg, 2009). Critical research seeks to challenge existing theoretical assumptions that reflect dominant interpretations of reality through a process of deconstruction, while concomitantly seeking to counter exclusivity by reconstructing knowledge to reflect the realities of marginalized groups. When applied to infrastructure research, critical theory can assist in challenging grand narratives of infrastructure development, and assist in re-conceiving of infrastructure processes based on the lived experiences of marginalized groups.

3.3 Critical Methodology

Methodology is an over-arching term that involves every aspect of the research process. It includes philosophical worldviews about the nature of knowledge(ontology), beliefs about how knowledge can be acquired or created (epistemology), theoretical lenses that frame the scope and process of inquiry, and methodological approaches and techniques used to collect, analyze and interpret data (Guba and Lincoln, 2005). The following outlines the philosophical

assumptions, and explains how these assumptions inform the ontology, epistemology and methodology of this research.

3.3.1 Critical Ontology

Ontological assumptions involve beliefs about the nature of truth and reality (Guba and Lincoln, 2005). The critical ontological position assumes that truth is socially constructed, contested, and is produced by inequitable socio-political relations. Therefore, knowledge about truth and reality is always partial and reflective of the lived realities of more powerful groups within societies. The critical ontological position abandons the pursuit of an objective, singular, and universal truth found within positivist research paradigms, rejects the extreme cultural relativism sometimes found within humanist paradigms, and recognizes that multiple versions of reality exist (Mertens, 2012). Critical ontology requires an awareness of power issues inherent to real-world problems, but also recognizes the power relations in which social reality is embedded, which can be potentially reified throughout the research process. For this reason, knowledge accounts of social reality need to be examined for their “role in perpetuating oppressive social structures and policies” (Mertens, Bledsoe, Sullivan & Wilson, 2010: 198).

The critical ontological position shares philosophical assumptions with a transformative research approach that not only scrutinizes power asymmetries, but also strives to transform inequitable power relationships through the production of knowledge that is inclusive of marginalized groups (Mertens, 2009). In so doing, the transformative researcher addresses this power imbalance by privileging perspectives that have traditionally been excluded or denigrated on the basis of associations of gender, ethnicity, sexual orientation, economics, and geographic location among other axis on which power can be differentiated. The inclusive endeavour requires “cultural competency” on the part of the researcher (Mertens, 2012), which is defined as:

the systematic, responsive mode of inquiry that is actively cognizant, understanding, and appreciative of the cultural context in which the research takes place... (and which)

employs culturally and contextually appropriate methodology, and uses community-generated, interpretive means to arrive at the results and further use of the findings (SenGupta, Hopson & Thompson-Robinson, 2004).

3.3.2 Critical Epistemology

Epistemology refers to a set of philosophical assumptions about the nature of truth and reality, and how it can be known (Guba and Lincoln, 2005). This research stems from multiple epistemological positions including pragmatic, participatory, advocacy (Creswell and Plano Clark, 2011), and transformative (Mertens, 2009) worldviews. Each worldview fits within a critical approach due to their shared focus on social inequality, injustice and other political concerns of marginalization based in real-world contexts (Creswell & Plano Clark, 2011). However, each view diverges slightly in their assumptions of the researcher's role in constructing knowledge.

Pragmatic epistemology takes a cue from real world problems and seeks to provide feasible and appropriate solutions (Creswell, 2003). This claim allows the research question to inform methodological choices (Tashakkori & Teddlie, 2003). In this research, the 'real-world' problem being addressed is the exclusionary practices inherent to the production of infrastructure research, which are believed to be connected to another 'real-world' issue of exclusionary practices involved in the provision of infrastructure services. The evaluation of key theories of access and infrastructure development from the perspectives of marginalized groups situated in 'real-world' settings thereby aims to generate insights on how infrastructure development actually materializes (and fails to materialize) within the lived realities of marginalized groups. Generating case-specific insights can provide valuable information towards a more comprehensive understanding of infrastructure development processes and improved research and praxis.

Participatory knowledge claims aim to address social inequality by actively seeking out and including perspectives that have been excluded from the research process (Creswell, 2003;

Kindon, Pain & Kesby, 2007). The participatory researcher engages in an iterative process that first deconstructs existing knowledge and identifies perspectives and knowledges that have been excluded. Then through a collaborative process, knowledge and theories may be reconstructed based on the views, perspectives and lived experiences of marginalized groups. Under the assumptions of the participatory worldview, research subjects are understood as research participants, and are included in various phases of the research process, from the formation of research questions, the identification of variables, the analyses of data, to the interpretation and communication of results (Kindon et al., 2007). The participatory knowledge claim informed this research in two ways. The first is through my attempt to give greater traction to critical and human geographical perspectives within the imbalanced multi-disciplinary scope of infrastructure research. The second is through seeking out perspectives that have been excluded from the infrastructure dialectic.

Some authors have envisioned a more transformative and advocacy-oriented role for researchers that stretches beyond a critical role (Kobayashi, 2001). Advocacy (action-oriented, emancipatory) research recognizes that research is inevitably linked with a personal and political agenda of the researcher, and seeks “an action agenda for reform” (Creswell, 2003:9). It is normative, makes no claims of neutrality, and is undertaken with the intention of facilitating positive change for participants (Kobayashi, 2001:56). Not only does it expose dominance, suppression and inequality, but it also seeks to empower and emancipate less powerful actors within societies under study. Action agendas may take numerous forms, and have many points of entry into the public, political, and academic arenas. This research has been positioned to advocate for change in the way infrastructure research is conducted within the academic sphere, with the hopes that such changes will influence new ways of thinking of infrastructure development processes within policy and planning circles.

Finally, this research is guided by a transformative epistemology, which is concerned with issues of power and privilege that are exercised throughout the research process.

Transformative epistemology seeks to incorporate the values and culture of marginalized groups into the research process so as not to reproduce or reify inequitable power relationships in the research (Mertens, 2012). Similar to participatory approaches, which seek to relinquish part of the researchers control to the research participants (Kindon, Pain & Kesby, 2007), transformative research aims for cultural responsiveness, appropriateness of research methods and the cultural relevance of its results. Thus, transformative research requires the researcher to establish rapport, be sensitive and aware of cultural norms and power relationships within place-specific contexts, and to maintain trusting relationships within the communities they study (Mertens, 2012). This research has been transformative, in its aim to understand the values attributed to infrastructure objects by marginalized groups, and in its adoption of a flexible research design, which has been shaped to reflect culturally acceptable means of interaction. For example, the choice of domestic water infrastructure was selected through direct consultation with participants for Manuscript 2, and in Manuscript 3, transportation infrastructure was selected based on information provided through participant observation and interviews during preliminary fieldwork (Section 3.4.2).

3.4 Research Methods

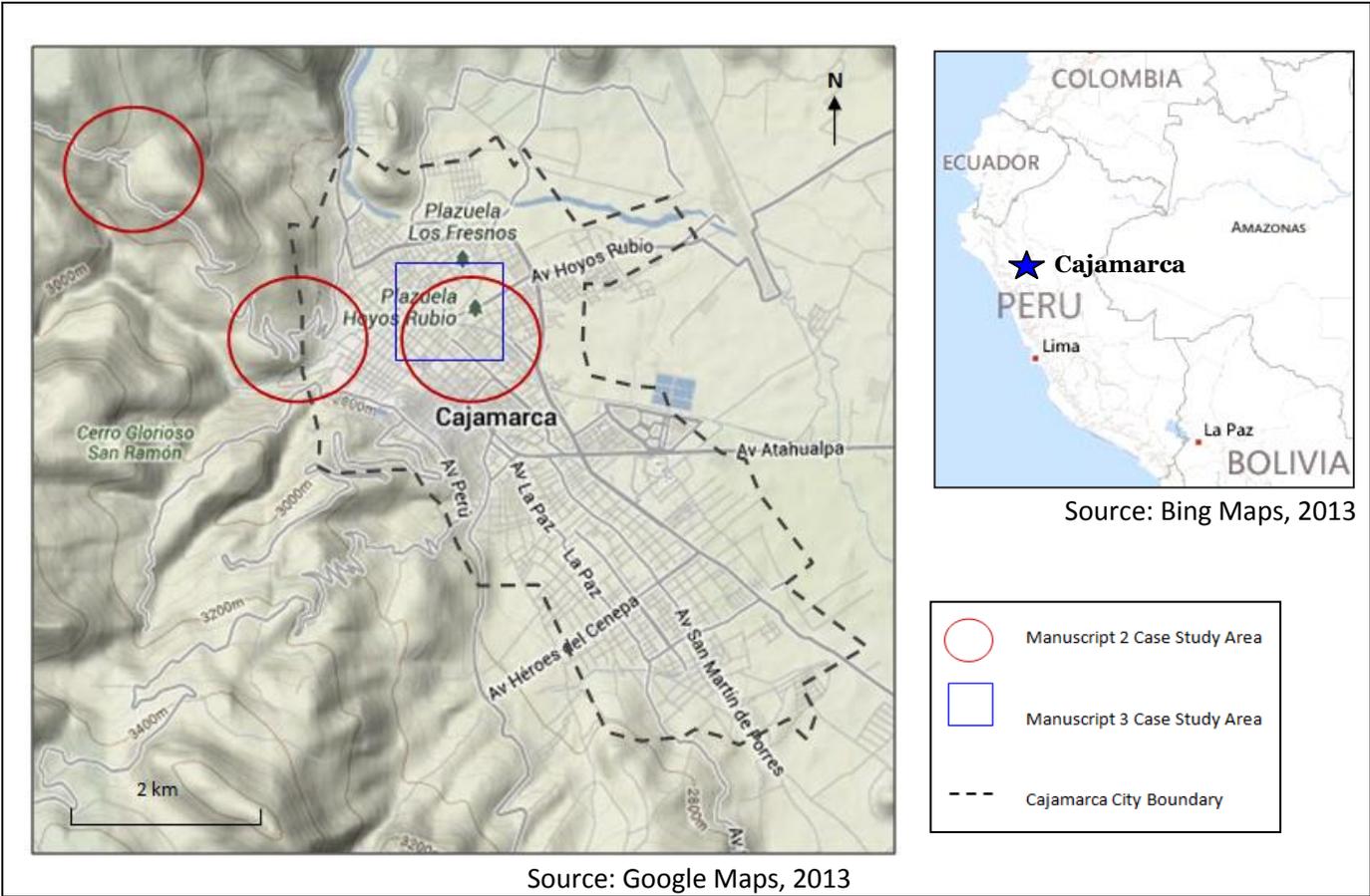
3.4.1 Case Study

This research is based on case study analyses, which examine a phenomenon within the parameters of a specific time and place (Kitchin and Tate, 2000). Case study analyses can be conducted at the individual level, amongst a set of individuals, amongst communities, organizations, social groups within communities, or can be centered on a particular event or relationship (Robson, 2011). Stake (1995) categorizes case studies into three types: intrinsic, instrumental, and collective. Intrinsic case studies aim to further understanding of a particular setting. Instrumental case studies rely on one case, while collective case studies draw from multiple cases in order to advance understanding of a particular phenomenon. Whereas

intrinsic case studies generalize within the parameters of the case, instrumental and collective case studies generalize beyond the case, to the broader social world (Cousin, 2005).

Two case study analyses were completed within the district of Cajamarca, located in the northern highlands of Peru (see Figure 3.1). The selection of Peru as a case study area was influenced by a review of the literature and secondary data, which indicated high levels of infrastructure inequality, particularly within highland regions (Bravo 2002; Escobal 2005). The choice of the northern highlands stemmed from a limited amount of research when compared to the southern highland regions. The selection of the Cajamarca district was influenced by recent struggles over multiple resources, and a high economic inequality, which parallel ethnic differentials (Muñoz, Paredes, & Thorp, 2007)

Figure 3.1: Map of Case Study Locations



Each case study focused on two different marginalized groups and examined their experiences of access in relation to two different types of infrastructure services. Manuscript 2 focused on the experiences of impoverished women's groups as they accessed domestic water systems. This case study was further divided into three sub-cases, representing three different communities of rural, peri-urban, and urban locales (See Figure 3.1). Manuscript 3 focuses on informal market vendors and their experiences of access to the Central Informal Market (See Figure 3.1). In the next section I describe my rationale and decision-making process for selecting the Cajamarca district in further detail.

3.4.2 Field work and Practicalities

Field work implies a process in which the researcher conducts research while being immersed in a natural setting. It primarily involves the collection of data within a specified geographical area. Some authors argue that the act of defining the field is a political one, and that the parameters used to define field study sites are "necessarily artificial" (Katz, 1994:67). Thus it is important to consider how field experiences are influenced by the researcher, and particularly how people and these places are represented (Cope, 2010).

This research involved two periods of field work between February 2011 and May 2011 and between November 2011 and February 2012. In the first visit, my efforts focused on establishing contacts, scoping potential case study sites, and building a working knowledge of the Spanish language. Upon the advice of a committee member, I began my search in Trujillo where the World University currently is involved with a number of urban water projects. While this could have been a worthy case to investigate, it could not satisfy my interest to learn about rural highland populations. Hence, I began to explore the Andean district of Cajamarca. Here I established a few promising contacts who later played a pivotal role in the main research. Then, upon the advice of a development consultant in Lima, I decided to explore infrastructure issues in the town of Puerto Maldonado, a city in the southern Peruvian Amazon region, which was on the verge of major changes with the impending completion of the Inter-Oceanic Highway. After

receiving local administrative clearance and the appropriate approval from the customary chief of the village of Infierno, I found it increasingly difficult to find research assistants as the tourism season picked up, despite that I was paying on par with lodge contracts. Coupled with repeated health ailments, security concerns, poor access to communication, and the onset of the hot season that had already reached 38 degrees Celsius, I made the decision to return to the northern highlands of Cajamarca. Another factor leading to this decision, and based on consultation with my committee, was the fact that there is already ample research that has examined grand scale infrastructure projects and their various effects on local populations (Personal Correspondence, 2011). Having the support of a SSHRC Doctoral Fellowship, I decided to embrace the rare opportunity to conduct independent research, focusing on local infrastructure systems and using an approach that has not yet been applied within infrastructure research or policymaking. Thus from early stages in the research process, the aim was to conduct research of a critical nature, to elucidate infrastructure issues as they are experienced by groups that are not only marginalized within their own cultural politics specific to Peru, but also groups and insights that are marginalized by infrastructure researchers more broadly. Thus I returned to Cajamarca in April 2011, and built upon my pre-established local contacts, who helped me to gain entry to conduct preliminary research with the impoverished women's groups.

The second visit to the field commenced in November 20th, 2011. Having previously selected the case study site of Cajamarca, I was prepared to begin collecting data. However, these plans were quickly thwarted by protests that began on November 24th, 2011. In collective resistance, an estimated 10,000 thousand people from the Cajamarca region gathered in the city square to protest a mining expansion project known as the Conga project.¹¹ Protests quickly spread throughout the city and region. Road blockades and the airport closure effectively halted all traffic in and out of the region, with the exception of the mining workers who were

¹¹ The Conga dispute is described in further detail in Chapter 4.

evacuated by helicopter. Transportation restrictions eventually led to a fuel and food shortage within the city. These events led to the temporary suspension of the participatory methods of data collection.

Equally unexpected to the eruption of protests, was the militant response of the newly elected national government of Ollanta Humala. After nine consecutive days of protests, the national government declared a state of emergency in the region of Cajamarca for a period of sixty days. This declaration led to the movement of military reinforcement to the city under the directive of restoring peace and order to the community. Upon the advice of a committee member, I seized the opportunity to exit the case study site and observe the situation from the coastal city of Trujillo.

The declaration of the state of emergency had direct implications for my research. In particular, the suspended civil liberty of the right to assembly posed a considerable challenge for my continuation of interviews with the women's groups (see Section 3.4.3.3.1.). In addition, the conflict led to an overall atmosphere of distrust of outsiders, that was somewhat overcome with a concerted effort in establishing rapport, distinguishing myself from foreign mining personnel, and negotiating my positionality at every opportunity (see Section 3.5.4). The contentious context of the case study site presented some key challenges for the research that were further negotiated by adjusting the research design to the socio-political context of the case study area.

3.4.3 Mixed Methods

Mixed methods research is described as research that combines qualitative and quantitative data within a single study or a series of studies (Tashakkori & Teddlie, 2003; Creswell and Plano Clark, 2011). Integrating these methods can occur at any or all phases of the research including data collection, data analysis, and interpretation. Mixed methods may be influenced by a continuum of philosophical assumptions about ontology and epistemology, but are not necessarily dictated by them (Biesta, 2010). In the following, I explain the rationale for

using mixed methods in this study, along with the benefits and challenges of the approach. Next, I provide a detailed description of the research design and specific methods through each phase of the research process in relation to each case study.

Mixed methods research is suitable for addressing complex research problems that require the simultaneous generation of depth and detail, along with the need to quantify or generalize results. This method can be useful when both method types are applied complementarily to provide a more complete explanation to the research problem, or for the purposes of improving rigour (Bryman, 2006; Creswell & Plano Clark, 2011). Mixed methods are suitable for research that focuses on specific populations, or nascent research topics, both of which may require initial exploration followed by quantitative inquiry, or detailed explanation following quantitative statistical analysis (Creswell & Plano Clark, 2011). Quantitative methods can be useful for providing insight to structures while qualitative is seen as most insightful to process (Bryman, 2006; Creswell & Plano Clark, 2011). Among the greatest advantages of using mixed methods is that it offers researchers a diverse set of tools from which they can select the most appropriate techniques (Johnson and Onwegbuzie, 2004; Bryman, 2006).

One of the challenges inherent to using a mixed methods research design is that it requires a broader set of analytical skills than might be demonstrated in a single method approach. By integrating two different types of methods, the researcher must address issues of rigour relating to both research types (see Section 3.5.5). In the following I highlight the strengths and weaknesses of each approach and identify how the combination of each type of method has been advantageous for critical research on infrastructure.

3.4.3.1 Quantitative Methods

The use of quantitative data in the context of mixed methods is appropriate for critical research for a number of reasons. Quantitative data is useful for purposes of comparability and gaining contextual information of the case study area. Quantitative methods can be an efficient way to identify key relationships that may be explained or further explored in more depth using

qualitative methods. For example, in Manuscript 3 (see Section 3.4.4.2.), determining statistical significance between experiences of infrastructure access, was less central to my research than the details of how this difference was experienced, a nuance that qualitative methods were better suited to capture.

The use of quantitative data can aid the production of a body of data focused on marginalized populations that is unlikely to exist in places where groups are under considerable pressure to assimilate. Such data may be useful for local planners and policymakers, who wish to address issues of inequality and marginalisation. This advantage became apparent in both case studies. For example, when collecting data for Manuscript 2, I learned that local government had limited knowledge of the informal institutions of domestic water provision which operated in the rural areas. Also while collecting data for Manuscript 3, I discovered that the municipal government had no data on the people working within the central informal market. However, the decision to hand over data must be weighed against the potential harm to research participants, with careful consideration of the existing historical, social, political, and cultural contexts.

The sole use of quantitative methods would be questionable for achieving critical and transformative research objectives, since quantitative methodologies often impart the authority to the researcher to make decisions on every aspect of research design. The exercise of power occurs through the formulation of questions, the choice of methods, the definition of constructs, and interpretation of data. Another concern relates to the interpretation of quantitative data, and how it is used to represent the realities of marginalized groups. When acquiring quantitative data from a segment of the population, findings based on a sample cannot be extrapolated to a broader heterogeneous society. Similarly, there are problems with extrapolating findings from a heterogeneous society to explain the realities of marginalized groups. In Manuscript 3, a sample of the informal market vendors were used to represent the total vendors within the informal market, and not to the broader city of Cajamarca, for example (see Section 3.4.4.2).

3.4.3.2 *Qualitative Methods*

In the context of mixed methods for the purpose of critical research, qualitative methods can offer in depth information that can reveal subjective experiences of how marginalized populations experience, understand and interpret their social realities (Limb & Dwyer 2001). Qualitative methods are also most suitable for a critical research approach because they “share a sensitivity to power relations...and are poised to place ‘non-dominant’ knowledges at the centre of the research agenda (Limb & Dwyer, 2001:7).

While qualitative methodologies can produce a rich collection of diverse information, undertaking qualitative methodologies is a highly intensive, time-demanding endeavour, which often needs to be managed within the scope of fieldwork practicalities (Bryman, 2012). For example, while originally I had wished to conduct a macro-ethnography of numerous actors involved in each case study, this choice of qualitative method was not feasible within the limited time of seven months that I spent in the field. Additional challenges of this approach include the need to acknowledge subjectivities of the researcher and how the researcher’s positionality influences every aspect of research design (see Section 3.5.4). Equally important considerations are of ensuring rigour and demonstrating transparency and accountability in qualitative data collection and analysis (Section 3.5.5).

3.4.4 *Mixed Methods Research Design*

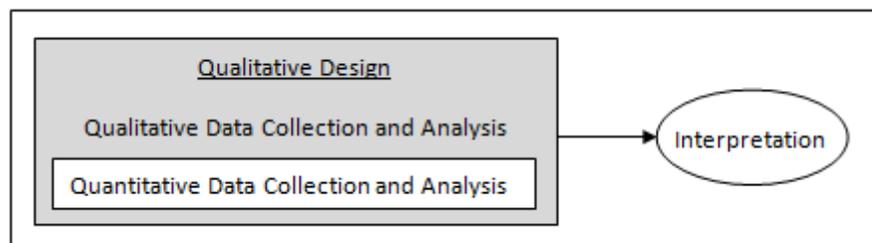
A number of decisions are encountered when designing a mixed methods research project. Creswell and Plano Clark (2011) outline four considerations for mixed methods research design. These include whether the methodology will be fixed or emergent, how to match the design with the research questions, how various strands will interact throughout the research process, whether qualitative and quantitative strands will be used sequentially or concurrently, and the point at which each methodological strand will be mixed. The research design of each case study was allowed to emerge throughout the course of field work, which permitted the flexibility needed to tailor the research in a culturally sensitive way, and in response to field practicalities.

3.4.4.1 Manuscript Two

3.4.4.1.1 Research Design

The second manuscript was designed using an embedded mixed method design (see Figure 3.2). In this strategy, I embedded quantitative methods of data collection and analysis within a qualitative methodological approach. Beginning with exploratory group interviews in the first field visit, I narrowed the sample to three comparable women’s groups who were located within rural, semi-urban, and urban locales. After several interviews with each group, I determined a need to quantify some of the differences between each group in terms of their capabilities to access to domestic water services. I then conducted informal polls within the group interviews to generate quantitative data on average daily incomes, household expenditures, and monthly water expenses. These data were analyzed using descriptive statistics, which assisted in quantifying comparisons between groups and guided the questions asked in subsequent group and individual interviews. Additional techniques of data collection included key informant interviews, secondary data, and participant observation. Analytical techniques were primarily qualitative.

Figure 3.2: Embedded Research Design



Source: Creswell & Plano Clark, 2011

3.4.4.1.2 Data Collection Techniques

Group interviews have been distinguished from focus groups for a variety of reasons, partly due to the use of focus groups in market based research. Kneale (2001) differentiates

between focus groups and in-depth groups and defines in-depth groups as “meeting several times within an informal, supportive atmosphere” (2001:136). This supportive atmosphere is essential in order to shift power relations in favour of the research participants (ibid). However, in-depth interviews also share some benefits with focus groups, such as the “added benefit of enabling research to explore how meanings and experiences are negotiated and contested between participants” (Valentine, 2001: 44).

With the permission of a local contact, and based on her consultation with the women’s groups, I was permitted to attend weekly meetings with the women’s groups. One of the challenges of conducting group interviews is how to manage intra-group politics within the interview setting, to maximize the opportunities of each participant to be heard. To address this challenge, I was attentive to the participation dynamics within each meeting, and actively sought feedback from quieter sections of the meeting circle. Another challenge encountered was in deciding what information to record from group interviews, which can be influenced by the interviewer’s search for diversity or consensus. When conducting group interviews, I attempted to create a supportive atmosphere by reassuring respondents that there was ‘no right answer’ to my questions, and I actively sought out diversity in responses with the use of probing questions. However, despite my efforts to carry out interviews inclusively, it must be acknowledged that responses that were collected from group meetings may still have been reflective of more dominant voices within the women’s groups.

Individual interviews are also a useful technique for gathering accounts of participant experiences. Interview formats may range from informal, conversational interviews, to semi-structured or highly structured. While qualitative data is often acquired through individual interviews, quantitative data may be collected as well. The advantages of using the interview technique are that researchers are able to respond to new information, adapting questions throughout the duration of the interview (MacDowell, 2010). This adaptability can allow the researcher to acquire substantial data in a short period of time. Researchers using interviews as a

technique also have the advantage of seeking and receiving clarification during the course of interviews, adding rigour to interview data.

Challenges of the interview method include a heavy reliance on the interviewing and communication skills of the interviewer and research assistants. When conducting bi-lingual research, there is a possibility of mistranslation, which can compromise the accuracy of the data recorded (Valentine, 2001). Careful consideration must also be paid to the power dynamics of designing and carrying out interviews. Determining who participates, how interviewees are selected, the framing of questions, and the collection of responses are acts that can influence the research outcomes (McDowell, 2010). Individual interviewees were selected based on their perceived knowledgeable position on some aspect of the research topic.¹² Such interviewees included presidents of water committees, and the managerial staff of the urban water organization.

Participant Observation involves observing and documenting the behaviours of research participants within their natural settings (Dowler 2001), or within the context of their everyday lived experience (Cook, 2005). A popular method in ethnographies, participant observation is commonly used within participatory research to gain insight to the emic perspectives of participants (Cook, 2005: 167). Participant observation may be conducted with varying levels of overtness or covertness, and the level of participation may vary widely (Cook, 2005). Depending on how overtly or covertly participants are observed, the researcher may need to develop rapport in order to generate more depth and detail of data that cannot always be acquired with more distant methods (Dowler, 2001). In this research, participatory observation was overt and moderately participatory, through the attendance of water committee meetings, women's group events, and home visits. Observations and their interpretations were often verified through member-checking with participants in the course of the home visit, or in subsequent interviews.

¹² I avoid the terminology of 'key informant' when referring to these interviews, since, from a critical perspective, marginalized groups would be considered 'key informants' and experts.

For example, my observation of many rural women, who walked without shoes, was confirmed as being due to their inability to purchase shoes, and not a personal preference.

Secondary data is data that has already been collected by a third party, and may include but is not limited to a census, government survey, statistics, news publications, maps, photographs, and videos (Clark, 2005). This data can provide substantial background and insight into the historical and socio-economic context of the research area. It may also serve useful for comparison with preliminary data which is collected by the researcher. Secondary data can also provide a means of comparing two case studies, or locating case studies that exhibit similar characteristics (Clark, 2005). In this research, census data provided by the National Institute of Statistics and Information was used to provide preliminary insights into the demographics, economy, and socio-economic overview of the population of Cajamarca. Online news publications were invaluable tools in gauging the political context within the case study area, and provided interesting similarities and contradictions when compared with other data. Online videos also provided grounded insights into the contentiousness of the political context of the case study, both during and following field work.¹³ One of the limitations of secondary sources was their limited representativeness, and their close affiliation with state positions on development and the environmental conflict in the case study site. As an example, media sources reported linkages between the opposition groups and local terrorist organizations. However, one woman I interviewed offered the following interpretation:

They have mentioned this as if they were terrorists. But it is impossible. How are they going to be terrorists? They don't know what a gun is. We will just go with our sticks and stones and maybe one will get hit with a stone behind their ear.

(Personal communication, December 14, 2011)

Therefore, media and census data sources were regarded as insightful but as partially informing into the state of the multiple contexts of the case study site.

¹³ In particular, videos which were posted on www.youtube.ca demonstrated the physical force used by the military against local activists.

3.4.4.1.3 Methods of Analysis

Qualitative analysis has repeatedly been described as a systematic though iterative process, which involves a blend of inductive and deductive logic through constructive and simultaneous deconstructive exercises (Crang, 2001). Qualitative analysis often begins with the act of coding, which refers to the careful combing of data to detect common themes both within and between transcripts (Jackson, 2001). Codes then are used to organize and categorize data, and may be stratified into codes of lower and higher orders. Interpretation involves the comparison of codes, combining codes to identify patterns between them, and involving multiple revisions until a satisfactory pattern is reached. Coding ensures rigour within qualitative analysis, as it is part of a systematic process, which helps to avoid the 'cherry-picking' of data, or the pre-selection of quotes which may not be representative in order to provide support for a pre-conceived theory (Jackson, 2001). One criticism of coding interpretation is that this exercise fragments and removes data from its original context, then is re-contextualized by the researcher (Crang, 2001), therefore coding is best understood as solely a means for organizing and understanding relationships within the data. Once theories and patterns have been formulated, it is important to return to the transcripts, to incorporate original narratives within writing (Crang, 2001).

Codes were in part determined by the researcher, but were also allowed to emerge during the interviews. The codes that emerged from the group interviews in the preliminary analyses included: livelihood activities, housing characteristics, land tenure arrangements, transportation issues, electricity use, markets and employment, marriage institutions, and domestic abuse. Codes that emerged in the main analysis were compared across three different women's groups, spatially defined as urban, peri-urban, and rural. The following themes emerged from group interviews: the importance of water, multiple water uses, water availability, characteristics of water systems, water shortages, length of water service, behaviour of acquiring water prior to the provision of water service, cost of water, cost of water in relation to daily wages, actors

involved in water system installation, voluntary nature of water installation, cost at the time of water system installation, quality of water service, control over each aspect of water systems, receiving information about water systems, water concerns, water barriers, water decision making, water rules of access and use, water quality and maintenance, mechanisms for voicing water concerns, and trust in water organizations.

A limited amount of quantitative data were collected through informal polling of participants to gather comparable data on the women's income, and domestic water expenses were also used in a descriptive analysis and comparison between the three groups. These statistics were compared, and incorporated within the qualitative analyses.

3.4.4.2 Manuscript Three

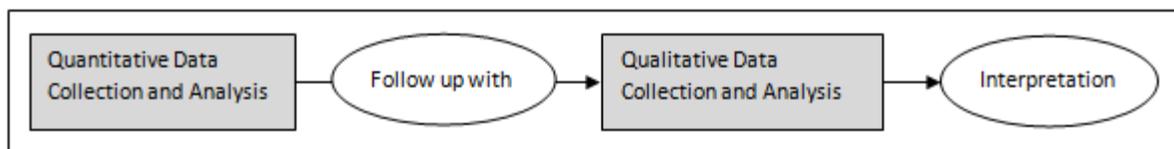
3.4.4.2.1 Research Design

In the third manuscript I used an explanatory sequential design (see Figure 3.3). This design emerged in response to the challenges of fieldwork inherent to the socio-political context of the case study site. In this design, a questionnaire interview (see Appendix 4) was used to first explore the relationships of various types of access to vendors' various capability types (physical, social, financial, human, political). A pilot study preceded the questionnaire interview, in which 15 respondents were interviewed. The pilot test was examined to determine whether the methods were capturing the data needed to address the research questions, to estimate the time required for each interview, and to decide whether this method was feasible given the socio-political context (Kitchin & Tate, 2000). Several modifications to the questionnaire were made based on limitations revealed during the pilot tests. For example, during the pilot test I learned that respondents were less willing to participate when the research assistant conducted the interview in my absence. Therefore, I made a point of conducting all interviews together with the research assistant. I also revised the questionnaire to be conducted in an apparently informal manner. The research assistant and I each memorized

half of the questions, and temporarily memorized their responses. Following each interview, we recounted the responses and recorded them into an audio recording device.

In the main (post pilot test) phase, a sample of 101 participants was interviewed among the informal vendors in the Central Marketplace in December 2011. The questionnaire included twenty-five questions (see Appendix 4). Responses were verbally recounted following each interview, and were recorded by me and the research assistant into a recording device. These records were transferred into an excel spreadsheet at the end of the day, and once 101 interviews were reached, I conducted a preliminary analysis. This analysis revealed a number of differences that were subsequently examined using 31 key interviews with informal market vendors and 10 individual interviews.

Figure 3.3: Explanatory Sequential Design



Source: Creswell & Plano Clark, 2011

3.4.4.2.2 Data Collection Techniques

A questionnaire interview is similar to a questionnaire survey, insofar as it is a method that “seeks to generate and analyze data on a specific subject from a particular sample population” (Kitchin & Tate, 2000:47). The sample is described as “a subset of the population of research interest” (ibid: 47). The choice of sample requires a number of considerations, including whether the sample is to be representative of a larger population, and of which population the sample may be representative. This study relied on a systematic sampling technique in which every sixth potential respondent was approached for an interview (Kitchin & Tate, 2000). The total sample size was determined based on the anticipated sub-group comparisons. Originally I intended to collect 160 interviews, in order to have four subgroups based on rural-urban and male-female categories. However, it quickly became apparent from the emerging questionnaire

data and personal observations that the majority of respondents were female, and that a sufficient male group would not be generated to form its own sub-group. In light of this realization, and amidst field practicalities, I stopped conducting questionnaire interviews when I reached a sample size of 101 respondents.

Individual interviews were also conducted as a follow up to the questionnaire interview, the advantages and disadvantages of which have already been discussed (Section 3.4.4.1.2). A total of 31 interviews were conducted in the market place. Again, these interviews were conducted informally, and I recorded my verbal notes following each interview, using a recording device. Convenience sampling was used in the selection of participants, and interviews were conducted in an informal manner, yet consistently centred on differences revealed in the descriptive quantitative analysis. Topics that were discussed included the problems experienced by vendors in accessing the market, and along the themes of financial, physical, and political dimensions of access. Other themes explored included their ability to sell and save money by working in the market, their experiences with the municipal police, the competition in the marketplace, and the ratio of women to men among market vendors.

Participant observation was also used in this study, the advantages and limitations of which have also been previously outlined (in Section 3.4.4.1.2). Much participant observation took place in the area of the Central marketplace, some observation occurred during interviews, as I took note of the products they were selling, their location in the market, their characteristics such as age, health, and body language. These observations sometimes became cues that were incorporated within the interview questions. Participant observation was done covertly when observing the behaviour of municipal officials within the market.

3.4.4.2.3 Methods of Analysis

Quantitative analysis of this study first involved producing a set of descriptive statistics for the sample on characteristics of gender, area of residence, daily earnings, and number of

dependents. Descriptive statistics indicated a high ratio of women to men, differences between vendors who reside in urban and rural locales, and differences appeared between some groups in relation to transportation. In particular, the political inaccess became a ubiquitous theme throughout the interviews, and the process of earning cash income, saving cash income, and infrastructure expenses warranted further qualitative investigation into financial and political access to the market.

Using statistical software, cross-tabulations were then produced with nominal data, and a comparison of means was conducted with ratio level data, in order to detect variations between rural and urban groups. Chi square and analysis of variance tests were also executed to determine significant differences between sub-group means within the sample. Statistical significance, determined by a 10 per cent probability of error was used a guide post (and not an absolute indicator of significance) to narrow key relationships for further inquiry. Key relationships detected were of the dominant presence of women working as vendors in the market, types of transportation used by place of residence, reasons given for transportation choice and place of residence, location of residence and self identification of campo or city, travel experience and place of residence, problems selling in the market and place of residence.

Qualitative analysis was conducted from my audio notes that were made following each conversational interview. Notes were transcribed and then coded within and across transcripts, and were organized by higher order themes of travel experiences, earning experiences, saving experiences, and experiences with the municipal authorities. Key themes were then compared to the quantitative data, and were used to provide insight into quantitative differences.

3.5 Ethical Considerations

Conducting social research with human participants requires numerous ethical considerations. Some of these are guided through a formal code of ethics set by the Tri-university council, and are enforced by the university. In addition to these important codes,

researchers conducting research on social phenomena are encouraged to be reflective of their own personal code of ethics (Gillam, 2004; Englund, 1994). Ethical considerations are also a stronghold of the critical research agenda, and are essential for ensuring the very power imbalances and exploitative practices it seeks to counter, are not re-produced throughout the research process.

3.5.1 University Code of Ethics

This research has been approved by the University of Waterloo Office of Research. Clearance to proceed with research was contingent on the successful application that included completion of forms and a submitted research proposal, which outlined the project aims and proposed methods. The application also required identifying potential risks to research participants, and outlining procedures for ensuring anonymity, confidentiality, and informed consent among research participants. In addition, the process required an articulation of my commitment to reciprocity, research dissemination, and the identification of people who would benefit from the research. The successful completion of this process ensured the compliance of this research with the Tri-Council Policy Statement for the Ethical Conduct for Research Involving Humans (2nd edition).

Throughout my field work, ethical codes of conduct were adhered to consistently throughout the research process. Every interview, including repeat visits with groups began with brief introductory statement of the research, an invitation to participate, and by conveying that participation was voluntary, could be stopped anytime, that their identity would be kept anonymous, and that the information shared would remain confidential. The importance of this procedure was especially apparent when conducting group interviews. As women were encouraged to participate by the gatekeeper, who also represented the charitable organization that provided food supplements, I was aware that women may come to feel pressured to participate, potentially linking their participation with the receipt of food supplements. Having recognized this potential power differential, I repeatedly informed to the women that their

participation in my research was voluntary and that a lack of participation was perfectly acceptable. In addition, codes have been used in describing research participants and sub-communities, in order to maintain the anonymity and confidentiality of research participants.

3.5.2 Personal Code of Ethics

My research was also guided by a set of personal ethics based on a value of mutual respect and reciprocity. When conducting cross-cultural research, it is important to recognize that ethical practices and signs of respect may be culturally sensitive. Throughout my field work, considerable effort was made to engage in respectful communication, which, to me, means emphasizing the role of listening and learning. In some cases research assistants were very helpful in teaching me cultural expectations. For example, the collaborative insights of research assistants were useful in phrasing the questionnaire pilot survey in a culturally sensitive manner, to refrain from using the word 'cholo' that may in certain circumstances carry a negative connotation. Respectful communication also includes respecting people's decisions once they decide not to participate (Skelton, 2001). This too was frequently exercised, and communicated to research assistants. This issue arose when interviewing a senior level manager, for whom we waited an hour to interview, only to be allowed two questions. While the research assistant appeared surprised, I quickly drew from my limited Spanish to reassure the participant that we were very grateful for the opportunity.

3.5.3 Reciprocity

Acts of reciprocity varied by participant, and careful consideration was given to the appropriateness of gifts. Women's groups were shown appreciation in every meeting as I distributed cookies at the end of each group interview. In the last meeting, each woman was given a significant gift of tupperware, yarn, and decorative hairclips. Participants of the questionnaire survey were appreciated with a small coin purse, which seemed appropriate given their presence and purpose in the market to generate cash income. These gifts were happily received by the respondents. Beyond immediate acts of reciprocity, this research will be

compiled into a report and redistributed to each community. These will be delivered personally at a future date, or possibly with the help of my local contacts.

It must also be acknowledged that while the production of this research has primarily benefitted me, the researcher, the research process also may have been a useful exercise for respondents. As Patton confirms, “as respondents think about questions, they may surprise themselves with fresh insights, previously unarticulated concerns and new ideas” (1987:140). At the close of several group meetings, some women said that our discussions had made them think in new ways. One particular memorable moment is when I asked the rural women’s group what their response would be if the city tried to formalize their water services, or if the mine offered to substitute their current water system for one supplied by water trucks. As highly probable events, this gave the women’s group the opportunity to discuss advantages and disadvantages of these changes, such that if they are met with such a proposal in the future, they will have had sufficient time to contemplate their decision.

3.5.4 Positionality

Positionality is a consideration that is linked as much to ethical conduct as it is to ensuring rigour throughout the research process. Positionality refers to the recognition of power differentials between the researcher and research participants, that can pose significant consequences for the participants and research quality. Such differences may be real or perceived, or a combination of both. The distinction of power differentials (real or perceived) may take shape in relation to race, gender, class, educational level, sexuality, age, ableness or other identities. The importance of being sensitive to these power differentials, and actively negotiating positionality is due to its potential interference with the production of quality and authentic research (Skelton, 2001). Not only is the recognition and negotiation of positionality integral for a successful field work experience, but also for maintaining rigour, transparency and accountability. As Skelton argues, “part of our honesty and integrity as researchers must be based upon considerations about ourselves, our positionalities and our identities and what role

they might play in our research” (Skelton, 2001: 89). In the following I discuss several aspects of positionality, beginning with a discussion of my self-understanding of my own positionality, my perceived positionality within the context of my case study site, how I actively sought to negotiate this positionality, and how my actual positionality sometimes placed me in a more vulnerable position relative to the research participants.

It is a curious task to identify my own personal perception of my positionality: for which characteristic ought I identify first? First I acknowledge that I am a person who has been born and who has lived most of my life within a developed country. As such, I have not had reason to question the efficiency or integrity of my own infrastructure institutions, nor have I experienced corruption at a personal level. Having grown up in a middle class home, I have not struggled to pay for infrastructure services. I have been fortunate to have accessed educational training within respected institutions, which was facilitated by public provision or publicly subsidized scholarship programs. The advantages I was afforded by virtue of being merely ‘born into’ a developed country are inalienable from my positionality. However, my positionality is also informed by close affiliations I share with friends and family who live in less-developed regions, in which formal institutions are largely unreliable, corrupt, and fail to serve the interest of broader societies. Time again, I have witnessed how defunct formal institutions demand people to seek alternative arrangements in order to meet their basic human needs. These experiences most definitely have influenced my interest to study institutional aspects of infrastructure systems within the context of developing countries.

Different aspects of our identities can arise throughout the research that may enable or constrain our research agendas (Skelton, 2001). As a female researcher, my physical presence quickly influenced who I was able to interview in the field. While this identity presented challenges for interviewing male household members, it also allowed me considerable advantage to accessing information about women’s experiences with infrastructure. At the same time, being fair skinned, and of mixed European descent, I was likely associated with the

dominant mestizo class in Peruvian society, or symbolized a historical colonial presence. As Skelton explains, “when working in post-colonial contexts...being white and born in the former colonial country can influence research relationships because we may represent a negative and exploitative past” (Skelton, 2001: 89). However, physical characteristics of one’s identity can also lead to their symbolic affiliation of the researcher to the exploitative present. For example, my identity as a person from a developed country quickly affiliated me with an American owned mine, which was the source of extreme contention at the time of field work. At that time, this particular affiliation within a conflict area held serious implications for my personal security. During the protests, I was advised to remain indoors, for concern that I might be targeted, since other perceived mine affiliates had been attacked.

Also important to consider is the positionality of local research assistants, translators, and gatekeepers (Pasquini & Olaniyan, 2004) who are the intermediaries between researchers and the researched. Not only do they have the power to mediate the messages, the phrasing of questions, the interpretation of responses, all of which are subject to the lenses of their own personal philosophies, values and beliefs. To mitigate potential drawbacks of negative positionality relations, research assistants received training prior to field work activities. Training included an overview of the research project, communication of expectations, but more importantly allowed me to explore the views of research assistants on the research topics. This training alerted me to potential interpretations that may be the result of filtered interpretations. Throughout the main field work visit, I became increasingly fluent in Spanish, such that I was able to understand participant responses, and was able to ask for clarification from the research assistants if I sensed a discrepancy between the response and the translation. I was present for every single interview and questionnaire survey, which allowed me to maintain close supervision over research assistants and participant interactions. Research assistants were also asked to first clear their own questions with me prior to asking them to the participants, since

the consequences of research assistants asking unscripted questions can significantly alter the relationship between interviewer and interviewees.¹⁴

Negotiating positionality throughout research is a process to be engaged not only during field work but also through the analysis and writing stages. It requires recognition of power differentials between researcher and research participants, careful reflection on their meaning and implications for the research, and strategies to counter the negative implications these differentials pose to the research (Skelton, 2001). Throughout field work, a concerted effort was made to negotiate various positionalities. In response to my perceived affiliation with the mine, I negotiated by conversing with anyone I came in contact with, from local merchants, taxi drivers, neighbours in order to reinforce my identity as a student. Differences in affluences were anticipated, and I attempted to negotiate this by dressing in plain clothes, and requesting my research assistants to do the same. I relied on very basic language when communicating, also for the benefit of accurate translation. When asked about life in Canada, I also tried to draw attention to inequality within my own country. The growing prevalence of societal inequality was indeed a phenomenon to which the participants could relate. When meeting with rural residents, I often drew attention to the fact that my grandfather was a farmer. I also attempted to counter the differential of educational achievement by first introducing myself as a student, rather than a researcher. I expressed my desire to learn, and avoided declaring myself with authority. Within the group interviews in the women's groups, I frequently reminded the women that they were my teachers and I was their student. This boded very well, brought about smiles and laughter, and quickly created an atmosphere of openness. This strategy also helped

¹⁴ For example, in the early stages of the research, in the southern Amazon, I interviewed a young man about household informal water infrastructure systems. At the end of our interview, my research assistant abruptly inquired how much money was paid for the participant's boat and motor. Later, when I asked the assistant about his motivations for asking this question, he expressed resentment towards the indigenous people of the area who received financial relief from the Peruvian government. Following this incident I discontinued working with the research assistant.

to distinguish me from my gatekeepers who played a more benevolent role with the women's groups.

Careful thought and planning was also involved in maintaining a very unofficial presence in the community. For this reason I chose to primarily engage with marginalized groups rather than affiliating with major or local development organizations. I rationalized this choice in that even a perceived affiliation with these official groups could potentially limit my access to marginalized groups. Similar to Dowler, I therefore,

made a conscious decision not to cross over (to extensively interview the other side), for I was concerned that I would become affiliated with official actors, and might thereby lose the trust of the groups that I was interested in (2001: 159).

Perceived and real differentials may result in a lack of trust that may quickly prevent the researcher from acquiring information. In these cases, the researcher can find themselves in a position of vulnerability. For example, arriving at the case study site in the midst of community contention made it impossible to proceed with data collection as planned. For this reason, I chose to begin data collection on the less contentious topic of transportation, and used methods that required less rapport building, such as the collection of secondary data sources, and questionnaire surveys, whilst further assessing the situation. Other vivid circumstances played a role in determining the methods that were used in the research. For example, while conducting household interviews during the preliminary phase of research, we were notified by some residents that a puma had escaped from a zoo and was roaming the area, and had already attacked several people. This incident coupled with several near dog attacks led to my decision not to continue with household interviews in the rural areas.

When conducting case study research, the researcher navigates through unknown territory, particularly when one initiates research in the absence of previous field contact. All contacts that were integral to this research were established by me over two periods of field work. And yet despite considerable effort to conduct preliminary research prior to beginning

field work, very little could have prepared me for the unexpected surprises of protests and pumas I encountered along the way. These challenges point to the importance of having flexible research designs, and managing resources according to local and personal circumstances. Not only were these challenges managed through adjustments to the research design, but also it was apparent in the management of four different research assistants, and adjusting field work according to their availabilities and positionalities. In hindsight I consider this one of the most notable successes of this research.

3.5.5 Rigour

Rigour refers to a set of criteria by which the quality of research can be evaluated. In order to demonstrate rigour throughout multiple phases of the research process, Baxter and Eyles (1997) urge researchers to be transparent in providing a 'thick' description of the researchers analytical and decision making process. From selecting a methodology, to choice of methodological techniques, participant selection, a detailed account of fieldwork relations, issues of positionality, procedures of analysis, and addressing limitations within research methods and design, all of these are elements have been discussed throughout this chapter. The following further highlights issues of rigour specific to Manuscript 2 and 3.

To date there are few criteria that are specific to the evaluation of pragmatic mixed methods research (Leech, Dillinger, Brannagan, & Tanaka, 2010). In quantitative research, rigorous criteria centres on issues of validity, generalizability, reliability, and objectivity, while in qualitative research, this criteria is focused on credibility, transferability, dependability, and confirmability. (Baxter and Eyles, 1997). Since Manuscript 2 is more closely aligned with qualitative methodology, and Manuscript 3 is more closely aligned with quantitative methodology, each case study will be evaluated according to the relevant criteria.

3.5.5.1 *Manuscript Two*

Manuscript 2 is more influenced by a qualitative strategy of inquiry, and the relevant criteria are of credibility, transferability, dependability, and confirmability. Credibility refers to how well the researcher represents the experiences of research participants (Baxter and Eyles, 1997). Credibility was enhanced through subsequent member checking with participants at the beginning of each group meeting. However, it must be noted that in a group setting some members may be less likely to speak up to disagree with the researcher's representations. Also, data collected from the group interviews were not collected on an individual basis. Therefore it is possible that answers that appeared as consensus, may have been the result of dominant voices taking precedence in group discussions. While I made consistent effort to be attuned to group power dynamics, it is possible that such power dynamics continued to influence the data, analyses and results.

Transferability refers to a thick description of the research context and research participants. While this study was not designed in a way that findings could be generalized at a grand scale, the findings can be insightful to broadening conceptual frameworks for understanding processes of infrastructure acquisition in similar contexts. The purposeful sampling of impoverished women's groups may also aid the transferability to other impoverished women's groups in similar settings. For example, the findings presented may add nuance to understanding experiences of infrastructure acquisition within places that share similarly high levels of socio-economic inequality, and among socially and politically excluded groups. For this purpose, I have offered a detailed description of the context and participants in Chapters 2, 4 and 5.

Described as "the minimization of interpretation bias" (Baxter and Eyles, 1997:51), dependability was pursued through the use of low inference descriptors (ibid), including mechanized field notes and electronic recordings I made immediately following interviews. Measures to ensure confirmability, that is "the extent to which biases, motivations, interests or

perspectives of the inquirer influence interpretations” (Baxter and Eyles, 1997: 512), have been pursued through constant critical reflection throughout the research process (England, 1994), which have been central to the key tenets of the critical approach. However, one technique that has not been employed to date is an ultimate member check in which the research is returned to the participants, and feedback is sought on the interpretation and conclusions of the research. This technique could help to discern the dependability and confirmability of the research interpretations, but have not been pursued to date due to limited finances and time.

3.5.5.2 Manuscript Three

In Manuscript 3, the relevant evaluation criteria include validity, generalizeability, reliability, objectivity. Validity is concerned with “the soundness, legitimacy and relevance of a research theory and its investigation” (Kitchin & Tate, 2000:34). The theoretical validity of this study has been assured through an extensive literature review on the topic of rural access, transportation and markets. The need for the critical approach towards understanding processes of infrastructure acquisition has also been identified within a broader review of the infrastructure and development literature, found in Manuscript 1. The criteria of construct validity is a limitation of this study, as limited justification has been offered for the specific choice of constructs used to measure various types of access. While I believe that the constructs used were apt, these could have been expanded according to different types of institutions and access under investigation. Analytical validity is strong in this case study, due to the adherence to the procedures of conducting parametric statistical tests. However, the level of significance / probability of error was set high ($p \leq 0.10$), relative to other quantitative analyses of positivist orientations in which the probability of error is lower ($p \leq .05$). In addition, differences that were descriptively distinct, yet statistically insignificant were still incorporated in the follow up analyses. However, this decision was made so as not to exclude differences and relationships that may have proved interesting in the follow up analysis.

Issues of generalizeability have been previously discussed in Manuscript 1, where I challenge the appropriateness of generalizing results and models based on Eurocentric experiences of infrastructure development to the developing world. I contend with this issue in Manuscript 3 by defining the limits to which the findings may be generalized. I indicate that the sample is representative of the informal vendor population of the Central Marketplace, and thus generalization of the results can only be extrapolated to the informal vending population within Cajamarca. However, the key findings of the paper generate new conceptual insights to the complexity of access that is relevant towards understanding rural accessibility in the context of highly inequitable societies.

The reliability of the findings in Manuscript 3 is strong due to the systematic sampling technique, and the consistency of the questionnaire survey used. A detailed description of the research area also increases the replicability of the quantitative results. However, due to the convenience sampling technique employed during the second phase of this research, the qualitative findings would be less replicable. It should be noted that replicability and consistency may be a desirable objective for positivist research, while nuance and diversity, depth and detail are more desirable goals for critical approaches used in this research.

While objectivity is not a goal or ontological assumption of critical research, it is important to restrain researcher bias, so as to obtain data that represent the views of the research participants. Considerable effort was made to record original responses and to document the accurate meanings of responses. Clarifying questions were frequently asked at the earliest indication of ambiguity, otherwise known as member checking¹⁵. Despite these efforts, misrepresentations are bound to occur.

¹⁵ Member checking is a validation technique in which the researcher shares their interpretation and analyses to be verified, disputed, and/or discussed with the research participants (Guba and Lincoln, 1994).

3.5.6 Challenges of Critical Research: Avoiding Essentialism and the Crisis of Representation.

There is an inherent contradiction and challenge endemic to critical research approaches that claim to be anti-essentialist. Anti-essentialism is the belief that human conditions are not pre-determined based on some physiological or behavioral characteristic, such as race, gender, sexual orientation, ethnicity, or socio-economic class (Kobayashi, 2001). Critical research is anti-essentialist in that it takes a “theoretical position that theorizes the nature of the human being as being irreducible to ‘essences’ that creates necessary differences between human beings” (Kobayashi, 2001:62). The importance of this anti-essentialist position is so that critical researchers do not deny diversity within groups and communities, and do not over-estimate the influence of certain identities and affiliations over others. However, as Kobayashi argues, “once we give up essentialized views, it can become very difficult to find a space from which to argue for the specific needs of oppressed groups” (2001:62).

In this research I grappled with how to focus my research on marginalized groups, without essentializing them. I reflected on whether my defining of marginalized groups would, in effect marginalize the research participants from the onset of my research design. In Manuscript 3, I addressed this challenge in the course of my preliminary visit to the field, in which rural-urban categorizations repeatedly emerged through observations and conversations carried out during preliminary field work. Additional impetus stemmed from a solid literature on cultural politics of rural-urban populations. Therefore, upon returning for the main field work, the rubric used to organize my inquiry was a spatial one.

In Manuscript 2, I came to study impoverished women’s groups through connections I established in the field with a local charitable organization. Gendered inequalities were further confirmed through literature specific to the case study area. The characteristic of ‘impoverishment’ is rationalized by the monthly distribution of food rations to the members of the group. The impoverished status was also largely confirmed over the course of fieldwork, as I

learned about the women's living conditions and daily struggles for basic needs. Again, I chose a spatial organization of these groups, which informed my selection of urban, peri-urban and rural communities, and proved very informing to the analyses. However, one categorization that I did not actively pursue was of gender. While gaining access to interview women was relatively easy, information on male gendered experiences of infrastructure were difficult to acquire, making gendered comparisons difficult. The fact that much of this research has focused on the experiences of women reflects the practicalities of the fieldwork, rather than the theoretical approach of this research.

3.6 Conclusion

The methodology chapter has outlined key aspects of a critical methodological approach, and has provided justification for its application to infrastructure research. Critical methodology is derived from critical theory, which seeks to challenge hegemony in the production of knowledge. The critical ontological premise and pragmatic, participatory, advocacy, and transformative worldviews have provided a philosophical foundation for this research. The foundation of critical methodology is premised on the belief that knowledge is the product of inequitable power relations, and its aim is the equitable reconstruction of knowledge.

The research objectives have been investigated using two case studies located in Cajamarca, Peru. Each case study centers on a different type of infrastructure, by which processes of infrastructure acquisition are examined drawing from the experiences of marginalized groups. In Manuscript 2, the processes of domestic water acquisition were examined based on the experiences of three impoverished women's groups. In Manuscript 3 the interrelated processes of transportation, market and electricity access were analysed based on the experiences of informal market vendors. Both case studies employed a mixed methods research design. Manuscript 2 relied on an embedded mixed method research design. Group interviews, individual interviews, participant observation and secondary data were the

techniques used in the process of data collection, and qualitative analyses and descriptive statistics were the analytical techniques used. In Manuscript 3 an explanatory sequential mixed methods research design was used. Questionnaire interviews, individual interviews, and participant observation techniques were employed in the process of data collection. Quantitative analyses through the use of parametric statistical tests were used, and the qualitative techniques complemented by providing detailed information on significant relationships that were detected in the quantitative analyses of the questionnaires. The use of these research designs proved very useful, and adaptable while dealing with field practicalities and locally-specific circumstances. The reliance on both quantitative and qualitative methods also allowed balance between researcher and participant control over the direction of the research.

Ethical considerations dovetail the critical orientation of this research. An astute awareness and active mitigation of power asymmetries that arise in the research process are prerequisites to exposing and counteracting oppressive power relations within real world settings and in research. Towards this end, I discussed reciprocity and positionality in detail. Finally, issues of rigour are discussed along with key limitations of conducting critical research. Multiple criteria are discussed, and their application to the research is highlighted. In essence, these criteria are also ethical considerations in which the critical researcher must engage, not only to produce quality research, but also to exercise accountability towards research participants.

4 Women's Acquisition of Domestic Water Services in the District of Cajamarca, Peru

4.1 Introduction

Water security has emerged as a topic of increasing global concern, and many researchers and development agencies have forewarned that global water supplies are on the verge of a tipping point (Hanjra & Qureshi, 2010; UN Water, 2007). However, such future-oriented crisis narratives do a disservice to populations for whom the struggle to secure water is already an everyday reality (Aldhous, 2003; Funder, Bustamante, Cossio, Huong, van Koppen, Mweemba, Nyambe, Phuong, & Skielboe, 2012). While claims that future scarcities will 'induce' conflict and competition over diminishing water resources are legitimate (Gleick, 1993), such statements risk overlooking past and current water struggles, and fail to give adequate attention to ongoing violence experienced by those systematically disadvantaged by exclusive water infrastructure policies and inequitable institutional arrangements.

The complexity of domestic water systems requires careful examination of a set of interactive relationships between natural, physical, social, and political environments. Environmental influences are place-specific and their inherent processes are dynamic. These influences intersect within four key components of water systems: water resources, water institutions, water infrastructure, and water actors. Decisions made within the socio-political environment of water systems involve a plethora of actors of various scales, many of whom share a similar desire for water resources, but who vary significantly in their capabilities to shape and define the institutions that regulate water distribution and use. The rules that regulate the distribution of water resources are reified by the instalment of water infrastructure (Loftus, 2006). Water infrastructure systems are thereby, in essence, materialized institutional instalments, established to reinforce water institutions, in a way that reconfigures the built environment. Given the inseparability of infrastructure and institutions from these political decisions, domestic water infrastructure is understood as a key entry point to understanding socio-political landscapes surrounding and integral to water systems.

This research coincides with previous writings on water governance, which emphasize the socio-political relations inherent to the production and co-production of water systems (Budds & Hinojosa, 2012). In other words, water systems are understood as being the product of inequitable socio-political relations, and also as producing and reinforcing inequitable socio-political relations across space and time (Budds & Hinojosa, 2012; Cleaver & Hamada, 2010; Loftus & MacDonald, 2001; Perrault, 2005; Swyngedouw, 2004). However, this study contrasts with prevailing approaches within water governance literature in four distinct ways. Firstly, the research focuses on socio-political complexities embedded within water systems solely for the purpose of domestic water use (Loftus 2009).¹⁶ Secondly, the research centres on the interactions between water actors, water institutions and water infrastructure. The emphasis of socio-political relations amongst the built components of water systems captures a different element of the waterscape than political-ecological approaches that highlight interactions between socio-political and natural environments (Bakker, 2003; Budds 2004; Loftus, 2009; Sosa & Zwarteveen, 2012; Swyngedouw, 2004). Thirdly, in further contrast with much other research that focuses on water provision, allocation, distribution, and management (Ahlers & Zwarteveen, 2009; Bakker, 2003), this research emphasizes the process of water acquisition. Examining processes of acquisition can increase understanding of how socially or politically marginalized people exercise agency, and the obstacles to this agency when navigating institutions of domestic water provision.

This focus addresses recent calls to understand how agency is exercised in water governance (Cleaver & Hamada 2010), while contrasting with the current emphasis on water rights (Boelens, 2009; Hoogesteger, 2012). As such, this article investigates how capabilities influence the ways actors acquire water resources, and how actors engage with their institutions of domestic water provision. Finally, the research examines processes of water acquisition based

¹⁶ The water systems examined in this article are explicitly managed for the sole purpose of domestic use activities. Evidence of solely domestic use will be elaborated further in the paper.

on the experiences of marginalized intra-societal groups, namely impoverished women (O'Reilly, Halverson, Sultana, & Laurie, 2009)¹⁷, rather than the experiences of more powerful actors (Bury, 2005, 2008; Sosa and Zwarteven, 2012).

The research is based on a case study situated in the northern highlands of Peru where recent contests over water resources demonstrate how institutions of domestic water provision produce both equitable and inequitable outcomes. Many indigenous peoples living in remote highland areas have traditionally drawn water resources directly from their natural environments (Bury, 2005), regulated only by natural fluctuations (Personal communication, 2011). However, in Peru, as in many other highland locations, over the past two decades water resources have come under increasing competition due to urban migration and the expansion of extractive industries into the highland regions (Bury, 2004; Bury, 2005; Sosa & Zwarteven, 2012). Access to domestic water systems has become increasingly complex as access is now gained and regulated by a range of modern to local institutions.

The study employs an embedded mixed-methods research design (Creswell & Plano Clark, 2011). Data were collected through 24 group interviews, 6 key informant interviews, secondary data and field observations. Drawing from empirical evidence collected between 2011 and 2012, the experiences of three groups of impoverished women¹⁸, representing urban, peri-urban, and rural locales, are compared. In particular, the experiences of these groups are examined as they access water resources through their respective institutions of domestic water provision. The analysis focuses on the capabilities of women, their experiences of accessing water for domestic purposes, and their experiences of engaging with institutions of domestic water provision.

¹⁷ The importance of analyzing cross cutting categories of gender, such as class, ethnicity, age, and social relations have been previously argued (Cleaver 1998). This study examines spatial differentiation between women's groups as a key variable of analysis, and is distinct from other studies which examine water governance in the context of gender relations (O'Reilly et al., 2009).

¹⁸ The women who participated in this study each belonged to a group which received food aid from a local non-governmental organization, and self-identified as being 'poor'.

This paper is presented in five parts. Following this introduction, the paper reviews the key discussions on institutional reform, institutions, rights and capabilities as it relates to domestic water systems within Andean environments. Next, 'the acquisition approach', which is derived from the social relations and capabilities literature (Bebbington, 1999; Giddens, 1986; Kabeer & Subrahmanian, 1999; Sen, 1992) and more recent writings in water governance (Cleaver & Hamada, 2010) is briefly explained. Then a detailed account of the case study is provided, including an overview of the political environment and major contests over water resources in the northern highlands of Peru. In the fourth and fifth sections, the methodology and findings are presented respectively. The findings suggest that women's experiences of accessing water and engaging with institutions vary across urban, peri-urban, and rural communities, and more equitable water institutions are apparent within rural and peri-urban locales. It is concluded that while capabilities (and a lack thereof) indeed play a role in the agency of actors to access domestic water resources, a deprivation of capabilities is not the deciding factor in women's access. Instead, it is argued that inefficient and inequitable institutions are purposefully created and maintained by more powerful actors in any interest of perpetuating inequitable access to water resources, thereby reinforcing inequitable socio-political relations.

4.2 Access to Domestic Water Systems in Andean Regions

Water systems research has been skewed towards productive livelihood activities, namely irrigation, rather than domestic activities¹⁹ (Harris, 2009). This emphasis is reflective of the proportionate purposes of global water use (Gleick, 1996; Moe and Rheingans, 2006). Although some have argued water scarcity issues to be more dramatic within agricultural contexts (Ahlers & Zwarteveen, 2009), given the limited ways households can adapt in the absence of quality

¹⁹ While it is acknowledged that there has been a shift away from sectoral based approaches to water systems (Cleaver 1998) towards integrated water management systems approaches, along with research on multiple use systems (Smits; van Koppen, Moriarty, Butterworth, 2010), this paper examines water systems which are designed explicitly for the purpose of domestic water use. Domestic water use refers to activities of drinking, cooking, bathing, cleaning, washing at the household level, and is not used for agricultural or commercial purposes.

domestic water systems, and the critical role these systems play in the survivability of global populations (Gleick, 1996), this paper addresses the concern that domestic water systems are worthy of greater research attention than has previously been the case (Cleaver, 1998).

Water systems have become a focal point of contest and conflict within Andean countries. At the heart of these struggles lies not only competing demands for water resources, but also contests driven by multiple value systems (Ahlers & Zwartveen, 2009) and various livelihoods (Bebbington, Humphreys Bebbington, Bury, Langan, & Muñoz, 2008). These struggles have been argued to be situated in a broader contest of cultural politics, in which Andean states seek to integrate indigenous peoples into the very polities, economies, and societies that marginalize them (Boelens & Gelles, 2005; Boelens, Getches, & Guevara-Gil, 2010).

There is a long history of water reform in the Andean region. What we would now call 'neoliberalizing' processes have been documented as early as the nineteenth century (Boelens, Bustamante, & de Vos, 2007). More recent neoliberal reforms have instigated processes of water marketization, privatization and institutional decentralization (Bakker, 2003), all of which have been implemented to varying degrees and produced diverse results (Boelens & Zwartveen, 2005; Cremers, Ooijevaar, & Boelens, 2005; Perrault, 2005). However, within the rural Andean highlands, another type of reform has also been taking place. Despite historical records of coercive water practices, states and development agencies continue to extend coverage of modernized and 'improved' water systems to rural areas under the guise of 'development and poverty-reduction'. However, for some authors, this extension of modern domestic systems to indigenous communities is not seen as reflecting a benign and benevolent intervention strategy, but rather, a continuation of the historical agenda to assimilate indigenous peoples under state control (Scott, 2004).

The introduction of modernized water projects to rural areas is often based on the assumption that there is a void of adequate water infrastructure and governance in rural areas.

Modernized water systems are promoted as technologically advanced and institutionally superior when compared to their rural counterparts. These reforms have been made under the persuasions of improved management, more efficient service delivery, greater local participation, and are considered to be more democratic, less corrupt, and to reflect a more sustainable style of governance. (Bakker 2003; Ahlers & Zwartveen, 2009).

However, the unequivocal promotion of modernized domestic water systems by states and development agencies begs the question of how rural, indigenous populations have survived in the absence of modernized domestic water systems? While some groups have long drawn water directly from natural water sources such as springs, rivers and lakes, others have relied on local water collectives for domestic water services. Local water collectives are comprised of a group of users, who assume responsibility for infrastructure construction, maintenance, and the establishment of norms and rules to regulate water management (Beccar, Boelens, & Hoogendam, 2002). Such organizations have persisted for centuries, but have been neglected and undermined by state and development agencies (Beccar, Boelens & Hoogendam, 2002; Cremers et al., 2005). These collectives have often operated autonomously, and this independence has allowed local water collectives to devise diverse rules to guide water system management in tune with local community needs. However, such diversity is often viewed by state-endorsed water management bodies as being irrational, unmanageable, and a threat to state control (Boelens, 2009).

Among local water collectives located within the Andean region, the distinction between formal and informal institutions remains unclear due to the fact that many of these collectives operate within a 'legal plurality' in which select aspects of modernized (formalized) systems continue to be adopted, while various components of local (informal) systems are maintained (Boelens, 2009). On the one hand this meshing of official and local institutions has been described as a coercive form of domination, while on the other hand this has been described as a deliberate strategy of local communities to adapt to state co-optation (Boelens, 2009). Therefore,

while there is a tendency to speak of institutions in terms of dichotomous descriptors of the formal and informal, or the official and unofficial, water institutions range in their level of formalization/informalization, and often involve multiple overlapping institutions of varying formality (Boelens, Bustamante, de Vos, 2007; Cleaver & Hamada, 2010).

Water rights, defined as “the authorised demands to use” (Beccar, et al., 2002:3) apply to each aspect of water systems, including water resources, technology, infrastructure, and overall distribution and rulemaking (Boelens & Zwartveen, 2005). Rights are shaped by rules, and rules are coterminous with the institutions that stipulate who, how, and where water may be accessed, used, and the obligations that must be fulfilled in order to maintain such rights. However, rights-based discussions provide limited insight to water acquisition, as these discussions center on legitimised and authorized patterns of water use. As Beccar et al (2002) argue: discussions of water rights can only take place when “water use is certified by an authority with legitimacy and power of enforcement and recognized by users and non-users alike.”(Beccar et al., 2002: 3). Several authors have noted that accessing resources is seldom as straightforward as being guaranteed rights (Ahlers & Zwartveen, 2009; Ribot & Peluso, 2003; Sikor & Lund, 2009). Actors may subvert the rules, and water resources may therefore be accessed in ways that do not conform to existing formal or informal rights or institutions. Informal institutions may not be legitimized by more dominant authorities, nor may they be embraced by dominant institutions (Boelens, 2009). Moreover, rights-based approaches do not account for the constant reworking and negotiating of institutions (Ahlers & Zwartveen, 2009), and undermine the process through which institutions are ‘actively created’ (Cleaver & Hamada, 2010). Therefore, an over-emphasis on the rights afforded by institutional components of water systems can obfuscate the agency of water actors.

This study examines how marginalized actors draw from their existing capabilities to access water through domestic water institutions. Capabilities are defined as the resources that enable one to act (Sen, 1992), and are understood as a key component to people’s agency and

power (Giddens, 1986). Capabilities, therefore, are directly related to the power of water actors to access water, and to create, challenge and re-shape the rules that govern the use and control of water resources (Bebbington, 1999). In examining how various actors navigate institutions, it becomes possible to elucidate how institutions shape inequitable social relations, and how inequitable social relations constitute inequitable institutions (Kabeer, & Subrahmanian, 1999). Understanding water systems from the vantage point of marginalized actors' experiences of water acquisition can reveal how and why water is acquired successfully or unsuccessfully, and can offer valuable insights towards the reforms needed to ensure greater institutional justice and equity in the governance of water systems.

4.3 Domestic Water Systems in Cajamarca, Peru

The research took place in the northern Andean highlands of Peru, in the region, sub-region, and district, in and surrounding the capital city of Cajamarca.²⁰ The region of Cajamarca was chosen as a case study because it is a site of ongoing struggles for the control and acquisition of multiple resources. A powerful outsider presence brought by successive waves of globalization has been an ongoing occurrence in Cajamarca since prior to the Spanish Colonial Era.²¹ More recently, incursions of international investors have transformed the political and ecological landscape of these mountains, their resources, and local livelihoods (Bury, 2004, 2005, 2008).

Despite recurrent narratives of economic success, accumulated wealth has not trickled equitably throughout Cajamarquino society. Economic inequality is profound, and socio-political and economic disparities parallel ethnic differentials apparent throughout the country (Muñoz, Paredes & Thorp, 2007). As a hub of gold, silver, and copper mineral production,

²⁰ Much of the city lies at the base of the inter-Andean valley with an average elevation of 2720 metres above sea level (MASL), while the outskirts of the region are inhabited by rural highlanders at much higher elevations reaching 4300 MASL.

²¹ Cajamarca is the historical site of the Spanish Inquisition, and it was here that Francisco Pizarro captured and killed the Incan ruler Atahualpa after deceptively receiving a room filled with gold as ransom to spare Atahualpa's life.

Cajamarca has arisen as the second most economically productive region of the country over the past twenty years (Sosa & Zwarteven, 2012). However, 55.8% of the population remains involved in agriculture, while only 1.5% of the population is involved in mining (Instituto Nacional de Estadística e Informática [INEI], 2009). In comparison to the other 23 regions, Cajamarca ranks as the fifth lowest on the Human Development Index (UNDP, 2007). This inequality is made visually apparent at the frequent sight of shoeless women traversing the city's paved streets and sidewalks, weaving between an increasing number of four-wheeled luxury vehicles (Field observations, 2011).

Within this context of inequality, multiple actors of differentiated positions of power have converged in a contest for water resources. Among the most powerful actors is Minera Yanacocha (MYSA), or the Yanacocha mine, a joint venture owned by Newmont Mining Corporation, the Buenaventura Mining Company, and the International Finance Corporation of the World Bank. MYSA has operated in the region since 1993, and has been the focal point of community resistance. The first expressions of protest against mining activity occurred in 2001, due to growing environmental concerns and a perceived lack of responsibility of MYSA following a hazardous spill of 330 pounds of mercury on the road linking the communities of Choropampa, Magdalena, & San Juan (Herz, Vina & Sohl, 2007). Protests also erupted throughout the region in 2004 over a contested exploration of Quilish mountain, a key freshwater source for Cajamarca and surrounding communities, from mining activities (Herz et al., 2007). A similar contest has recently surfaced in wide scale protests voicing opposition to the Conga project, an expansion of one of MYSA's existing mining operations, which would extend the mine's operations for an additional 19 years. Even more contentious than the possibility of extending the lifespan of the mine lies in the details of the project Conga. This project includes plans to drain four natural lakes, two of which would be used as tailings ponds, while the other two would be drained and excavated for gold resources. Since these lakes are located at the headwaters of the water supply for Cajamarca, the mine has proposed to build three artificial

reservoirs in their place, which are expected to provide more than twice the original water storage volume of the natural headwaters (MYSA, 2011).

Community concerns over project Conga and its implications for water supplies culminated in protests, which paralyzed the region for eleven days between November and December of 2011. Approximately ten thousand residents gathered daily in the Plaza des Armas, chanting slogans such as “Without gold there is life, and without water there is death” (Personal observations, 2011). Protesters obstructed airport runways, and blockaded roads, including major corridors linking the jungle and the coast. With the exception of traders in the informal market, most business activity was suspended, sometimes forcibly by protesters. Soon thereafter, the city experienced a shortage of food and fuel (Personal observations, 2011). Mining workers were evacuated to more secure locations while groups of protesters assembled at the proposed project site, determined to protect the headwater basins (El Comercio, November 24, 2011).

Protests continued until December 5th, when the then-recently elected national president Ollanta Umala declared a state of emergency for 60 days, directing swathes of military personnel to the city while suspending several constitutional rights, including the right to assembly²². These orders came from the same president who had just one year earlier based his campaign on promises to ensure the rights of indigenous people and protect their interests against mining development (Personal communication, 2010). Following the end of the state of emergency on December 16, 2011, tensions continued following the national government’s approval of the Conga project and the commencement of construction on the artificial reservoirs in July 2012. Protests then resumed, and second and third states of emergency were declared, resulting in violent confrontations (The Guardian, July 5, 2012). The current government is increasingly facing international criticism for its criminalization of protest (Human Rights Watch, September 20, 2012), and harsh treatment of protesters, including the violent arrest of

²² Rights to travel across the country and to avoid home trespassing were also temporarily suspended.

local activist and former priest Marco Arana (Cajamarcaenvideo, July 4, 2012). Although the Conga project was formally suspended on August 21, 2012, construction continues (GRUFIDES, 2012) and the first reservoir Chailhuagon is now complete (El Comercio, July 10, 2013).

4.3.1 The Socio-political Landscape of Domestic Water Use

While multiple actors of differentiated positions of power have converged in a contest over water resources, their needs for water are diverse. MYSA requires water for extraction purposes, general operations, and domestic use in worker camps (Personal Communication, 2012). Gold is extracted from ore using cyanide heap-leaching methods, which poses additional risk to the integrity of water resources. Government at the national level hold multiple roles in their facilitation and regulation of mining activities, but their primary interest remains the collection of \$3 billion USD in taxes and royalties from the project (MYSA, 2011). However, governments of various levels do not agree on the future of mining development in Cajamarca. While the national government has given its approval of the project, the Sub-regional president remains in opposition, and has successfully mobilized thousands of Cajamarquinos towards this end (Personal observations, 2011; 2012). Multiple civil society groups such as the Environmental Defense Front, and GRUFIDES have actively sought to have the project Conga declared unviable. These actors are among a highly divided community of Cajamarquinos – people of Cajamarca who engage in this struggle based on multiple and sometimes conflicting identities and affiliations. Residents, mine workers, farmers, city dwellers, migrants, landlords: all of which relate to the Conga project and water issues in multiple ways.

There are two actors within this heterogeneous group of Cajamarquinos, which have remained absent from academic and public discussion. Limited discussion has surfaced on the role of women in this contest, many of whom require water for domestic duties, consumption, hygiene and childcare purposes. The second actor (which has remained stunningly absent from popular conversations) is the local organizations that are responsible for the distribution of domestic water services in the Cajamarca region. These unexamined groups led the researcher

to question the institutional arrangements between the water organizations and MYSA, and the relationship between the water organizations and communities – particularly with respect to impoverished women’s groups. However, initial inquiries into the former relationship quickly ended after a local activist, Marco Arana Zegarra publicly denounced a covert agreement between the urban water organization, Services Enterprises Water and Sewerage Cajamarca (SEDACAJ) and MYSA (Arana, September 19, 2011). The agreement signed by MYSA and SEDACAJ on August 20, 2002 maintains the confidentiality of all technical information related to data, plans, programs, costs and SEDACAJ operations, by agreeing not to release information to a third party without first consulting each other (SEDACAJ, 2002). The day following Arana’s revelation, there was an assassination attempt on the activist’s life (Arana, September 19, 2011; Personal Communication). Further documentation indicates that since 2002, SEDACAJ and MYSA have established a cooperative agreement in which Yanacocha has financed the monitoring of quality and quantity of water in Rio Porcone and Rio Grande and their tributaries. This finance was issued from MYSA to the municipality, and was arranged to be transferred to SEDACAJ (SEDACAJ, 2002). Given the aforementioned events, the researcher exercised discretion in the choice to focus on the relationship between the women’s groups and their organizations and institutions of domestic water provision.

4.4 Methods and Research Design

Primary data for this research were collected by the author over the course of two field visits totalling 7 months duration between February 2011 and March 2012. With the assistance of a local NGO, 9 women’s groups were identified, and permission was granted to attend weekly meetings as an observer. Some of these groups have long existed (up to 25 years) while others have been recently formed with the assistance of the NGO. Women gather to exchange news, and also work collectively on an activity such as knitting, sewing, or embroidery of textiles. Groups are coordinated with a local director and two assistants, who visit each group on a weekly basis to discuss domestic issues such as child rearing, health, sanitation, education, and

community issues. Food aid is distributed once a month, and is conditional on weekly attendance. Rations include one kilogram of rice and a two litre bottle of cooking oil.

To facilitate a more detailed study, three groups were selected from the total of nine groups being aided by the NGO. Each of the three groups were chosen based on the willingness of the groups to participate in the research, and due to their geographical representation of urban, peri-urban and rural locales. Group names are withheld in order to respect the anonymity of research participants. Access to group meetings was permitted by the group coordinator following her consultations with the groups. The assistants to the coordinator also helped to coordinate logistics for transportation and meeting times. Qualitative and quantitative data were collected, through a total of 24 group interviews, each comprising of 18-25 women in each group.²³ Group interviews were carried out by the primary researcher with the assistance of local translators. Interviews were designed as semi-structured interviews, to maintain consistency between the information being asked of each group and for purposes of comparability. Open ended responses were thoroughly documented by the researcher to account for similarities and diversities of responses. The researcher also sought quantitative data through informal verbal polls, from which majority responses were documented. Despite the interview style of data collection, much flexibility was offered to groups so that conversations flowed naturally, comfortably and in a spirit of good humour, thereby maintaining an atmosphere of camaraderie, rapport and mutual respect.

Additional methods and sources of information were sought to inform and corroborate issues identified within group meetings. Five key informant interviews were carried out with representatives of local water organizations in each community, and secondary sources and

²³ A total of 24 group interviews were conducted over the course of two field visits between 2011 and 2012. In the first field visit, 11 interviews were conducted with seven different groups. In the second field visit, a total of 13 interviews were completed with the three groups included in this study. Over the course of both field visits, a total of seven interviews were held with the urban group, six interviews were held with the peri-urban group, and six interviews were held with the rural group.

field observations provided insight to contextualize water issues. Data were recorded in handwritten form, and were later analyzed using thematic coding techniques.

4.5 Findings

The results are organized as follows. The first section proceeds with a description of women's livelihoods including the activities for which they require water resources. This is followed by a description of the distinct institutions and organizations of domestic water provision for each community. Third, a detailed explanation of the processes through which women acquire water resources is offered. Fourth, it is discussed how women access and engage with organizations and institutions of domestic water provision.

4.5.1 Livelihoods Within Impoverished Women's Groups

The existing livelihood strategies and resource portfolios of the women within each group are described in Table 4.1. Listed in order of popularity, the most frequent activities are located at the top of each column. Women of the urban community engage in productive livelihood activities such as market vending and housecleaning, while a few survive through activities such as scavenging trash in the overnight hours. Women of the peri-urban community make textiles – mostly through knitting and embroidery, and sell these handicrafts and other products in the local market. Others generate income through washing clothes. Few have land and work in agriculture. For the women residing in the rural community, the most frequent productive activities involve agriculture, the growing of maize, alfalfa, beans, rocoto peppers, potatoes, herbs and berries. Animal husbandry is also popular and involves the raising of pigs, sheep, cattle, and guinea pigs. Approximately half of the women vend produce in the market. Few currently but others in the past have worked as housecleaners in the city, recounting long hours and less than minimum wages. Husbands are not always present or active contributors to households, and indeed there are a high number of single mothers within the peri-urban group. Others indicate that their husbands occasionally find temporary work in construction, as taxi

drivers, some work on the farm, while others remain unemployed. Few women have husbands who find casual employment in mining.

Table 4.1: Livelihood Activities and Assets of Women’s Groups

	Urban	Peri-urban	Rural
<i>Productive Activities:</i>	Market vending Housecleaning Scavenging Trash	Making textiles Market vending Washing clothes Agriculture	Agriculture Animal husbandry Market vending Housecleaning
<i>Water Use for Domestic Activities:</i>	Drinking Cooking Bathing children Cleaning dishes Washing clothes Personal hygiene	Drinking Cooking Bathing children Cleaning dishes Washing clothes Personal hygiene Watering household plants	Drinking Cooking Bathing children Cleaning dishes Washing clothes Personal hygiene
<i>Capabilities²⁴:</i>	High financial Moderate literacy Low natural	Moderate financial Moderate-low natural Low literacy	High natural Low financial Low literacy

Existing asset portfolios of the women vary individually, but some similar characteristics can be drawn from each group. These descriptions are momentary snapshots that were assessed through interviews at the time of data collection, but are nonetheless informing to the analysis. Women of the urban group showed a higher accumulation of assets, namely in terms of levels of income generation. However, they also noted that daily expenses of rent and utilities were comparatively high, leaving little to no savings. The urban group also had higher levels of literacy in comparison to other groups. The urban group had very little in terms of natural resources, thus their acquisition of water and rental property was highly contingent on their

²⁴ Capabilities included are those that could be assessed within a group setting. Some discussions revealed the importance of physical health for some women who were incapacitated due to injury or illness, and were therefore unable to complete their productive activities. Likewise, social assets were difficult to assess at the group level. Considerations of physical assets have been restricted to consider water infrastructure by the primary researcher.

production of financial income. Women in the peri-urban group reported possessing comparatively moderate financial assets, low levels of literacy, and moderate natural assets in terms of land. Finally, the women of the rural areas possessed very little in the way of financial assets, and had very low literacy levels, yet every women had previously acquired land through mechanisms of market purchase, marriage, or inheritance.

Domestic activities were similar across each group. Many of these activities centered on the management of the household, or the raising of children, and were performed in addition to income generating activities. When asked about which were the activities for which water was used, women unanimously replied for domestic duties, listed in order of importance in Table 4.1. It is important to highlight that while the women share similar water needs for domestic activities, their capability portfolios vary considerably. These capabilities are key to understanding how women interact with their respective organizations and institutions of domestic water provision and to acquire water resources.

4.5.2 Organizations and Institutions of Domestic Water Provision

In each community, water is provided through local water organizations. These organizations are responsible for the construction, maintenance, and delivery of quality domestic water services. While each organization demonstrated unique characteristics in the institutions that guide their operations (see Table 4.2), differences are more pronounced between the urban organization in comparison to the rural and peri-urban organizations.

In the urban community, water was historically provided through the municipal government, until October 14, 1990, when the assets of this municipal department were transferred to the newly created state-owned corporation, SEDACAJ (SEDACAJ, 2012). The proportion of SEDACJ shareholders reflects the proportion of its users. Ninety-three per cent is owned by the municipality of Cajamarca, three per cent is owned by the municipality Contumaza, and four per cent is owned by the municipality of San Miguel (KI 5, 2012).

SEDACAJ currently provides water and drainage services to over 35,000 households. Water is treated in two treatment plants – San Apolonia and Milagro, and there are plans underway to construct a third treatment plant by 2015 (KI 5, 2012).

Table 4.2: Characteristics of Local Water Organizations

Urban - SEDACAJ	Peri-urban	Rural
State owned 'corporation'	Locally elected water committee	Locally elected water committee
Elaborate organizational structure of employees	Consists of a president, treasurer and two presenters	Consists of a president and treasurer
Community has had piped water for 70 years	Employ maintenance worker	Community labour
	Rely on community labour	Elections every 1-2 years or when deemed necessary
	Elections every 1-2 years	20 years in existence
	18-20 years in existence	

SEDACAJ is comprised of an elaborate organizational structure of paid employees working under the direction of general managers in the finance and administration, engineering, operations, and commercial departments. These managers respond to the general manager, who responds to the board of directors, who ultimately respond to its shareholders – the municipalities. In addition, SEDACAJ is recognized by and obliged to conform to the regulations set by the National Superintendence of Sanitation Services (SUNASS)²⁵. Hence this water organization is connected to a broader network of institutional arrangements at the national level that regulate their provision of water services (KI 5, 2012). Among SEDACAJ's current concerns is replacing deteriorating tubes and infrastructure and the construction of another water treatment plant, to ensure water services can reach a rapidly growing population (KI 5, 2012).

Information on the peri-urban and rural water committees was sought through interviews and observation. Prior to the installation of the domestic water system (i.e. the pipes, pumps and

²⁵ SUNASS is ``a decentralized public body assigned to the Presidency of the Council of Ministers, whose function is regulate and monitor the provision of sanitation services impartially and objectively in the interests of the State, investor and user`` (SUNASS, 2012).

valves that distribute water to individual households), women retrieved water directly from streams and rivers. They recalled having to calculate their daily water needs in order to retrieve enough buckets of water to carry out their domestic duties. Several women recounted occasions in which their clothes floated downstream while washing them in the river. They confirmed that life is better now that they have domestic water in their houses.

Peri-urban and rural water services are administered through locally elected water committees, which originated 18-20 years ago and operate autonomously and independently of SEDACAJ. Similar to local irrigation collectives (Beccar et al., 2002) these committees are characterized by uncomplicated bureaucratic structures, comprising only of a president and treasurer, and in the case of the peri-urban community, two presenters. Both communities relied on community labour for the regular maintenance of water infrastructure, such as cleaning the pipes and water tanks or notifying the committee of water leaks. During the installation phase, the rural committee relied on community labour, and was aided through contracted services of an external engineer. The peri-urban community received assistance through SEDACAJ in the purchasing of equipment, relied on community labour to install the piped network, and employs one person to repair pipes and other components of the system.

Water committees retrieve water directly from natural sources. These water systems are not intertwined with or regulated by any institutions at higher scales. However, these communities rely on laboratory services conducted by the Ministry of Health to periodically monitor water quality, and to advise on water treatment. SEDACAJ does not regularly assist peri-urban or rural communities in any aspect of their water provision (KI1, 2011; KI4, 2012; KI5, 2012).

The women expressed several concerns relating to the quality of infrastructure provision. The peri-urban community raised concerns over the slow progress in extending piped water to new residences, amidst a growing population. The committee of the rural community voiced

their need to secure additional natural water sources. An additional water source has been located, but requires the expensive services of an engineer to help design the distribution system modifications.

Most notable of the peri-urban and rural water committees is that their democratic decision making structures operate through consensus, and their leadership is selected through an election process every 1-2 years. Attendance at monthly – bi-monthly meetings is mandatory, and absence can result in a fine. In these meetings, spending is accounted for, decisions are voted upon, and issues are discussed (KI 1, 2011; KI 4, 2012; Personal Communication, 2012).

4.5.3 Women’s Capabilities to Access Domestic Water Services

According to the recollection of women in the urban group, water has been available in the city of Cajamarca for approximately seventy years. Prior to the advent of household-level piped water, several communal water pumps were stationed in every neighbourhood. At this time, the cost of water was 1 centimos, the equivalent of 1/100th of a *nuevo sole*. Since this time, the cost of water is determined on a pay per use and subsidized tariff structure, and on average has increased to 32.35 soles per month. In comparison to the average wage of the women in the urban group, this amounts to 735% of their daily wages.^{26 27}

In the peri-urban group, water has been available for approximately nineteen years, at which time the monthly cost of one *nuevo sole* was paid to the water committee. This cost has since increased to three soles for the supply of domestic water, and a total of five soles for those who have drainage services. On average, women of the peri-urban group pay 3.13 soles per

²⁶ Averages have been calculated using the women’s declared income, since many women were unaware of their husbands’ income, and/or their husbands’ income was inconsistent due to casual labour contracts. In addition, there were numerous single mothers in the peri-urban and urban groups. All women of the urban group were regularly engaged in some form of income generating activity with the exception of those that were immobile or injured.

²⁷ The calculated cost increases do not account for inflation, which is difficult to determine due to multiple changes of currency types which occurred throughout the past seventy years.

month, which amounts to between 143% and 225% of their daily wages. Prior to the construction of water infrastructure, water was retrieved and carried on foot by women from a spring.

Table 4.3: Women’s Financial Capability to Pay for Water

	Urban	Peri-urban	Rural
Monthly cost of water at time of installation	1 cent (1/100 soles)	1 soles per month	1 soles per month
Monthly cost per household in 2012			
<i>Average</i>	32.35 soles	3.13 soles	0.95 soles
<i>Range</i>	10-100 soles	3-5 soles	0-1 soles
<i>N</i>	14	15	19
Daily earnings*			
<i>Average</i>	a) N/A b) 4.4 soles	a) 2.19 (N=12) b) 1.39 (N=19)	a) 2.79 (N=6) b) 0.88 (N=19)
<i>Range</i>	0-10 soles	0-5.5 soles	0- 4.38
<i>N</i>	14		
Cost of water as a percentage of women’s daily earnings	735%	143% - 225%	34% - 108%

* a= total respondents with income; b = total respondents

Women in the rural group pay the least amount for their water services, and this price has remained constant for the past twenty years, since pipes were first constructed in the community. On average, women of the rural group generate 0.88 – 2.79 soles in daily income and their monthly water expense accounts for 34% - 108% of their daily income.

In the urban group, the price of domestic water has exponentially increased by 3235% over the last 70 years. Indeed much of this difference can be attributed to rapid inflation rates prior to 1990. However, domestic water costs most within the urban community, both in absolute terms, and relative to the daily income of women. Women from the urban group must work more than seven days to pay their monthly water expense, while those in the peri-urban must work between 1.5 to 2 days. Those living in the rural community work 1/3 to 1 full day to pay their monthly water expenses. In comparison to the urban community, women of the rural and peri-

urban communities demonstrate a higher financial capability to financially access domestic water services.

While access to domestic water services is solely regulated by one's ability to pay in the urban community, access within the peri-urban and rural communities are dependent on both one's ability to pay and the labour they contribute to the construction and maintenance of water systems. While the cost of water has remained stable for the peri-urban and rural communities over the past twenty years, urban water prices have consistently risen, and in addition to coping with the needs of growing urban population, SEDACAJ struggles to maintain existing water infrastructure (KI 5, 2012). Therefore, the human capital (community labour) requirement utilized by the rural and peri-urban communities to maintain water infrastructure systems, is not subject to inflation, and therefore may contribute to greater stability in water system 'costs'. In effect, it can be argued that these rural and peri-urban water infrastructure systems may be more sustainable than the urban systems managed by SEDACAJ. In addition, it is noteworthy that peri-urban and rural communities operate autonomous systems that are independent from the urban, due to their elevated altitude and short physical proximity to natural resources of springs and lakes in the countryside.

4.5.4 Women's Concerns About Water

Just as women's concerns over water affordability vary, so too do their concerns vary about the quantity and quality of their domestic water supplies. The urban group voiced primary concerns over quality issues such as concerns about contamination, and many attributed these issues to local mining activity. Residents recounted occasions where water retrieved within their homes had been of a dark blue-green colour, and indicated they were so alarmed by its appearance that they refused to use it. However, both participants had not contacted SEDACAJ, for they believed their complaints would be disregarded (GI 4, 2012; GI 12, 2012). Of secondary concern to the urban group was the matter of water quantity, even though water rationing had

been enforced by SEDACAJ throughout the city since July of 2011. Of tertiary concern was the affordability of water services.

The women from the rural and peri-urban groups voiced a primary concern about the depleting supply of water and annual rainfall. Within their domestic water institutions, there is no regulation over the quantity of water that can be used by residents; a monthly fee grants unlimited access. However there are regulations and disciplinary consequences for using piped water for non-domestic purposes. Using water for agricultural purposes is prohibited, though an attractive option in the absence of irrigation networks, and the sole dependence on rain-fed agriculture. Field observations throughout 2011 and 2012 suggested that water was not used extensively for agricultural purposes, as both groups cited crop failures as a result of a rainfall shortage²⁸. Water used for construction purposes (the creation of adobe and cement) requires a permit to be purchased in advance, and failure to obtain a permit can result in a fine, or suspension of water services.

Peri-urban and rural groups explain the diminished availability of water resources as being a consequence of less annual rainfall combined with growing populations. River levels were repeatedly reported through personal testimonials to have significantly decreased from previous years. When prompted whether they had concerns over the quality of water, women of both groups replied that when the water was dirty, someone from the community was responsible to clean the pipes and tank. In addition the women were aware of representative from the laboratory of the Ministry of Health, who periodically tests the water quality, but have no information on the results of the analysis. However, when further prompted about the inherent water quality, but without alluding to contamination, they were slightly confused over the idea that the water they use to clean, could, in itself be dirty.

²⁸ Maize crops were particularly noted as having failed due to insufficient rainfall. While some harvest was produced, it was not deemed fit for human consumption, but was usable as animal feed instead (Personal Communication, 2011, 2012).

4.5.5 Women's Engagement with Institutions of Domestic Water Provision

Finally, the nature and quality of relations between women and their institutions of domestic water provision are discussed. The nature and direction of these relationships bears insights into how women not only access water, but also how they engage and participate in the institutions that regulate their access to water resources.

In the peri-urban and rural communities, water committees regularly communicate with community members through meetings on a monthly to bi-monthly basis. Residents gather in their local stadium or soccer field, and listen to the presentation regarding activities, expenses, and issues brought up by the water committee. Time is then allotted for community members to ask questions, receive answers, and vote on key decisions. Questions and comments tend to be voiced by men, while women rarely vocalize their concerns during community water meetings. Despite the somewhat passive participation in the water committee meetings, most women of these groups have confidence that water committees are responsive to their concerns.²⁹ Women also expressed a high level of trust that their water committees are working in their interest, and believed their committees were effective in providing domestic water services.

The relationship between the urban women and SEDACAJ tells of a very different experience. The only form of communication received by SEDACAJ is through printed flyers that are included with monthly bills. In previous years, SEDACAJ communicated with the community on matters of water quantity and quality through various media platforms, such as television and radio commercials, newspaper notices, and a detailed website. However, SEDACAJ claims to no longer have the financial resources to publicize information about water in these media types (KI 6, 2012).

²⁹ One exception to this statement involved a single mother living in the rural community who had been away from her home at the time the water pipes were installed in her community. As a result, she does not have a piped water source to her home, and in the absence of community labour and pooled resources, she cannot afford to have the pipes installed.

Experiences had by the women of the urban group inform current perceptions that their concerns will be dismissed, appeased, or ignored. Drains have overflowed, flooding some of the women's homes, and in these times, they do not feel their concerns were heeded as serious matters. One woman stated, "we are afraid of asking (about the water)...because when we call they just pass us around. Sometimes it is hard to talk to the manager" (GI 12, 2012). While another referring to SEDACAJ, concluded, "They don't care" (GI 12, 2012). As a result, the women of the urban group generally hold very little confidence in their water organization to deliver effective and efficient water services, and they have little trust in the information received from SEDACAJ.

Due to the gravity of the concerns of the urban group, the research examined the relationship between SEDACAJ and the urban group in depth. During a meeting with the urban group, the primary researcher offered to relay questions of the women to SEDACAJ officials, and retrieve answers on their behalf. Women wanted to know why their water was discoloured, and more generally about the monitoring and treatment of the water. They asked: How do they examine it? What do they put in it? What elements are in the water? How often do they treat the water? How often do they check the water? Who is responsible for testing the water? and, Why is the water so expensive (GI-8, 2012)?

Two meetings were held with two managers at SEDACAJ on February 2, 2012. One was held with the Manager of Operations, and the second was held with the Manager of Quality Control. In response to the women's questions the following responses were given.³⁰ As previously mentioned, SEDACAJ is a state-owned corporation owned by three municipalities. All water testing for all three municipalities takes place in Cajamarca. All water provided in Cajamarca is processed through one of two treatment plants, San Apolonia (SEDACAJ office) and the Milagro plant (KI 5, 2012). Water is tested by SEDACAJ laboratories every day, every

³⁰ While it is beyond the scope of this paper to scrutinize their monitoring procedures, it is possible to elaborate on the methods and frequency of communication between SEDACAJ and the community.

three hours, and is sampled from three points: in the pre-treatment phase, the post-treatment phase, and randomly in the houses of its users (KI 6, 2012).

The results of these tests are provided to the Ministry of Environmental Health and the SUNASS institutions. Results are primarily made available to the public on the SEDACAJ website (www.sedacaj.com). Other means of reporting with the public include face to face explanation during random household testing, and an outreach program with university and high-schools. However the release of water quality test results is limited to the SEDACAJ website. Two years prior, results were published in the newspaper, however the manager noted a lack of sufficient financial resources to continue publishing the data in this way (KI 6. 2012).

Having previously consulted the SEDACAJ website, the researcher asked why the results of water quality published on the website reported levels only for the years 2005 – 2007. The manager answered that the results were produced, but not yet uploaded to the website. In response to the question about which substances were tested for, the manager replied that tests were conducted for metals, turbidity, and pH. The researcher asked if tests were conducted for cyanuro (cyanide), to which the manager responded affirmatively. Regarding the absence of cyanide test results on the SEDACAJ website, the manager stated that the results had been produced but had not yet been uploaded to the website. Following this exchange, the manager proceeded to print the most recent graphic reports of cyanide test results for the years 2005-2011 (see Figures 4.1 & 4.2). When presenting Figure 4.1 and Figure 4.2, the manager explained that levels shown in both diagrams indicated that there was no cyanide in the water. The appearance of these graphs are remarkably different than from other graphs provided, showing levels of Aluminum in raw and treated water (see Figures 4.3 & 4.4).

While it is beyond the scope of this paper to determine the quality of the information provided in these graphs, or the rigour of monitoring procedures, it is apparent through comparing Figures 4.1 & 4.2 with Figures 4.3 & 4.4, that there is an absence of data in Figures 4.1

& 4.2 regarding levels of cyanide in raw and treated water. Upon reporting the data provided by SEDACAJ to the urban women's group, women carefully examined the charts, and asked for explanation. The primary researcher then conveyed the information as it was presented by SEDACAJ officials, and then proceeded to ask for their opinions about the information that had been shared.

The initial and consistent reaction throughout the women's group was of scepticism and distrust. Women replied that "they (SEDACAJ) always lies to them", and that even though they are aware of the commercials that used to be on television that said that the water is clean, "they know that the water that they drink is dirty". The women did not trust the information provided because it contrasted with their personal observations of receiving discoloured water in their homes. Several explained that the source of their distrust was due to a broader distrust in the community, "in Peru, people don't always say the truth...people often feel that they are being lied to". Others explained the source of their distrust and apathy are due to corruptive practices, one replied, "because everything is about money and corruption". Another said that even though "SEDACAJ gives them information, they don't give them honest information. As a result, they just stay quiet." Another suggested corruption was apparent, "...there are people who tell the truth, but they don't say anything because other people who are more powerful want them to shut up...with money you can make anybody quiet" (GI 12, 2012).

To summarize, by examining the means through which people engage and communicate with their local water organizations, it is clear that the rural and peri-urban communities have a more democratic, less bureaucratic structure, and that these communities uphold a high level of trust and confidence in their local organizations and institutions. In contrast, there is a unidirectional path of communication between the urban organization, typically shared via print and website, to which women have little access. In addition, the urban group has little confidence that information provided by SEDACAJ is honest or accurate. There is an overall

Figure 4.1: Information Provided by SEDACAJ Regarding Cyanide Levels Present in Pre-Treated Water

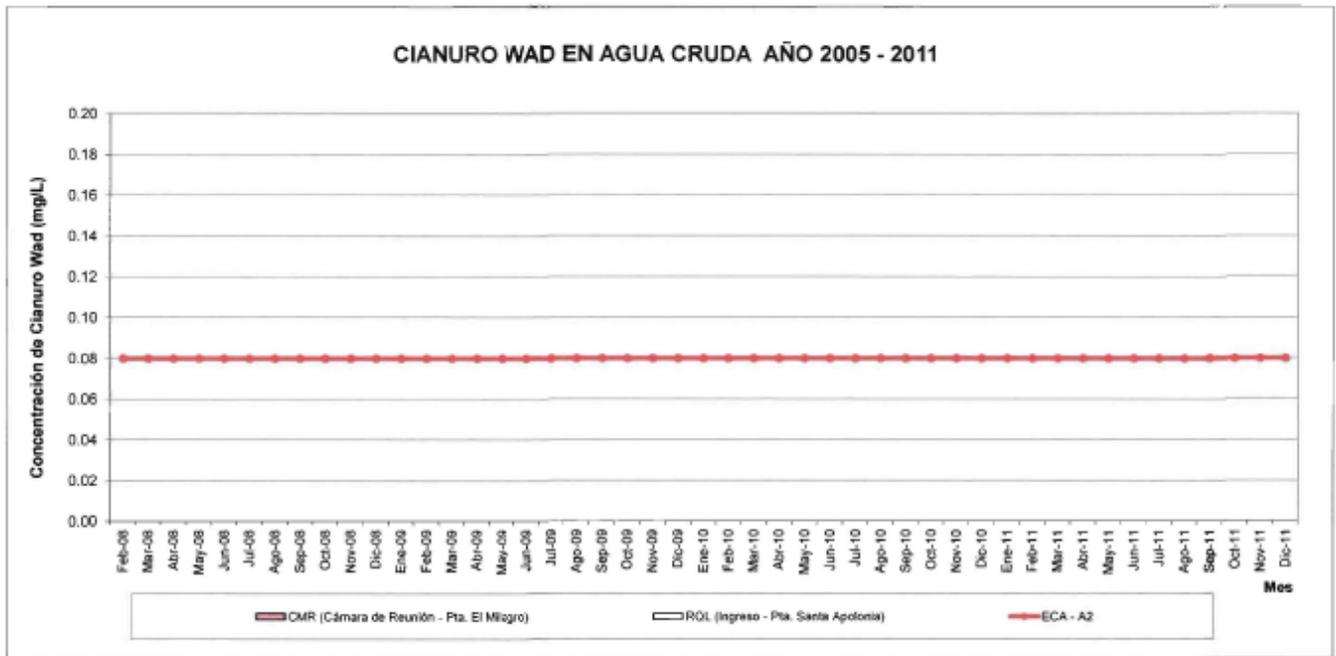


Figure 4.2 Information Provided by SEDACAJ Regarding Cyanide Levels Present in Post-Treated Water

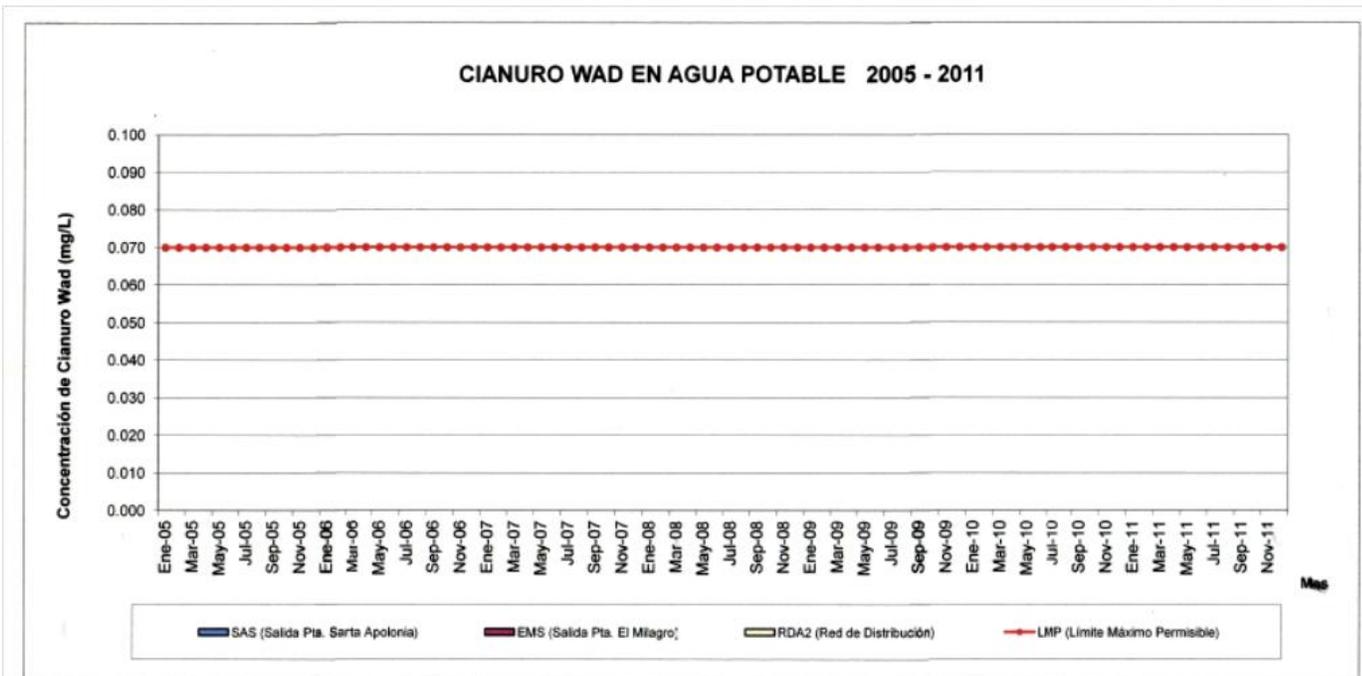


Figure 4.3: Information Provided by SEDACAJ Regarding Aluminum Levels Present in Pre-Treated Water

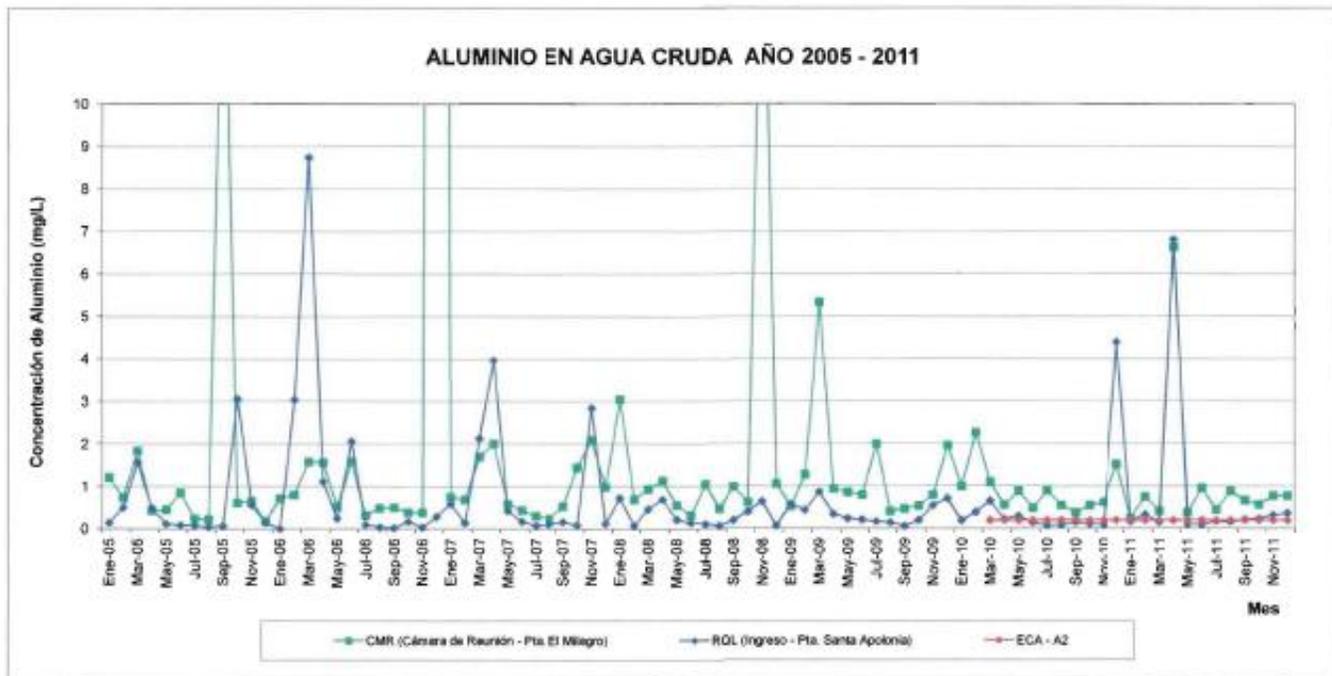
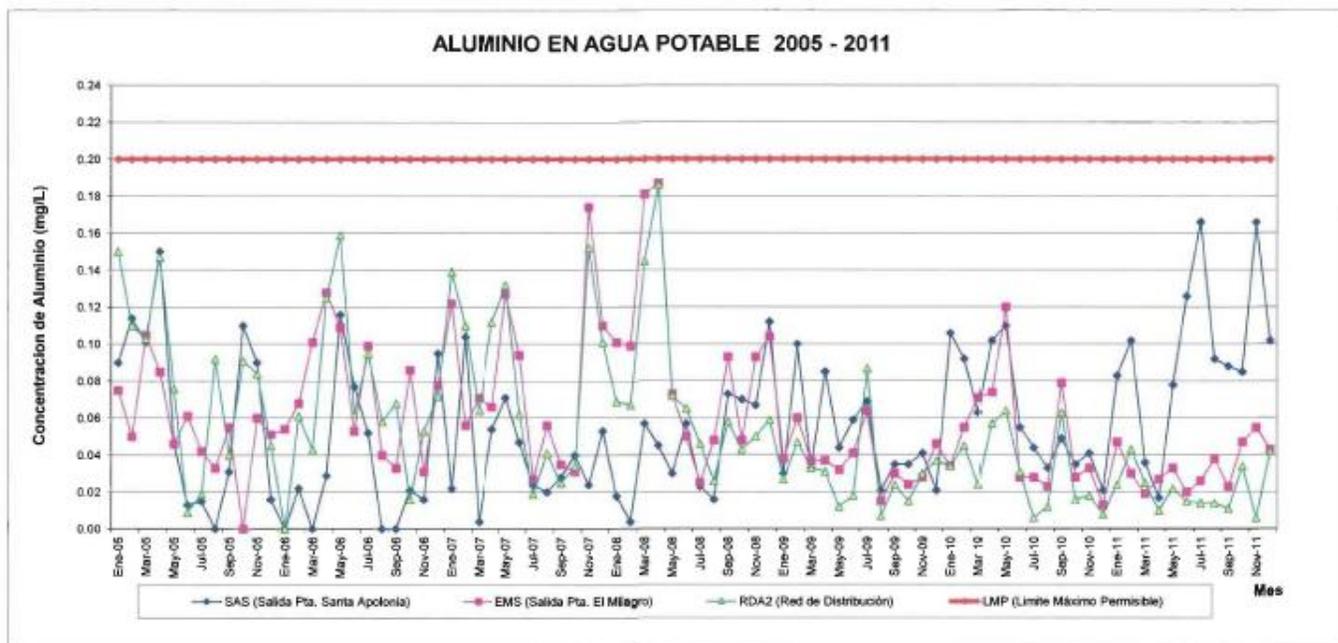


Figure 4.4: Information Provided by SEDACAJ Regarding Aluminum Levels Present in Post-Treated Water



negative relationship between the women and their organization of water provision in the form of distrust that has garnered a sceptical and disempowered position for many of the women.

4.6 Discussion

In all three communities, access to domestic water systems is regulated by institutions, established and managed by organizations that require the exchange of financial resources for the natural resource of water. While members of the urban group have the most financial resources to acquire water, when compared to other livelihood expenses and relatively high water tariffs, their financial access to water is least among all three groups. Water is most easily accessed and most affordable among the rural group due to their ready access to natural water resources and the stable price of water tariffs. One reason for this affordability links to the investment of human capital and high social obligations that the rural and peri-urban water users share towards their respective domestic water systems. In addition, more sophisticated infrastructure technology is apparent in each component of the urban water system, from water treatment facilities, to monitoring and maintenance expertise and labour. The urban water system requires heavy financial inputs, when compared to volunteer committees found within peri-urban and rural locales. This finding provides insight to the sustainability of formal vs. informal water systems, and challenges the frequently touted superiority of modernized, formalized water institutions.

A potential limitation not addressed in this case study is that rural and peri-urban water systems are located at higher elevations and upstream of the city of Cajamarca. As such, the rural and peri-urban communities of higher elevations are in closer proximity to the natural resource, bearing a higher natural capability, though directly vulnerable to fluctuations in the natural environment. With limited technical expertise and physical equipment to monitor water quality, these communities arguably have less capability to detect and cope with the

contamination of water sources (Bury, 2004). Another limitation which has not been explored in this paper is the relationships between each community and their demands on a similar water source. For example, it is not assessed how overuse by highland rural communities may contribute to issues of water scarcity in the lower urban centers. Exploring these inter-linkages between multiple domestic water organizations and their institutions is a worthy topic for future research.

Women's capabilities to engage and participate in decision-making of domestic water organizations were higher in peri-urban and rural communities, than in the urban community. The passive participation of women in water organizations may likely have been influenced by informal institutions shaping gender relations. However, these relations were not the focus of this study. While peri-urban and rural communities may have less awareness of the potential for water sources to become contaminated, capabilities to engage with water organizations are also dependent on perceived trust and social capital between communities and organizations of domestic water provision, and on the broader reputation of formal institutions in Peru. In part this can be attributed to a uni-directional path of communication of SEDACAJ to its users, their use of highly technical knowledge, and their communication of pertinent water information through an internet website, to which marginalized segments of Peruvian society have little access. However, it is important to consider this lack of trust not merely a deficiency on the part of women's capabilities, but rather the accrual of a negative social capital (Cleaver, 2005).

In examining water systems within contexts of high inequality, it becomes clear that accumulated gains in capabilities for one actor may result in another's loss, thereby placing power relations between multiple actors within perpetual contest. Therefore, not only may one's capability set be understood as lacking key capabilities, but it may also be laden with multiple vulnerabilities (negative capitals). As capability sets may contribute to one's overall political agency, so too may their vulnerabilities be a hindrance to it. Extending beyond the social (Cleaver, 2005), these liabilities may also fall within physical domains in terms of inadequate or

inappropriate water infrastructure, natural domains such as contaminated water supplies, or human domains such as inaccurate information or illness.

This point of vulnerabilities, particularly of the human domain, reinforces the significance of critical research on domestic water systems. As Cajamarquinos chant “Water for life!” in their protests for clean water, the importance of clean, uncontaminated water could not be clearer. As a most basic human need, the consumption of clean water is essential for the human capacity of agents to live, let alone act or participate in politicized systems of resource access. In absence of clean water one’s livelihood becomes severely, and possibly fatally, compromised. Unlike the numerous studies that emphasize the role of irrigation systems for productive livelihood activities, compromised domestic water systems leave little room for adaptation. This presents a situation in which inequality reaches tipping point, in where vital livelihood resources are contested, resulting in more than simply ‘winners’ and ‘losers’ and renegotiations of political agency, but distinguishing between the sick and the well, the living and the dead.

Yet it is important to recognize that capability is only partial to the definition of agency, which also includes a certain willingness to act (Giddens, 1986). One must not overlook the possibility that persistent forms of negative social capital are due to a lack of organizational will for efficiency. To suggest that institutional inefficiency results from a lack of capacity overlooks that perpetual inefficiency may be intentionally created, in order to maintain positions of privilege for more powerful actors of water systems. In this study, among all water provision organizations, SEDACAJ appears to have the most capability to monitor and communicate water quality with its users. Based on the researcher’s experience in acquiring information from this organization, and the covert document previously discussed (SEDACAJ, 2002), it is suggested that from the perspective of SEDACAJ and MYSA, an inefficient public reporting strategy may be considered highly successful towards an objective of distancing these actors from public scrutiny.

While MYSA's use of water resources is purported not to affect the quality of water services to the people in or surrounding the city of Cajamarca, the compromise of any component of the domestic water system can affect the integrity of the system as a whole. MYSA has applied much effort towards reassuring the population that the quantity and quality of their water supplies are not and will not be compromised by current and future mining activities. It is beyond the scope of this paper to examine the accuracy or inaccuracy of their claims. However, often overlooked in their role to provide safe domestic water to the city of Cajamarca is not MYSA, but the urban institution of SEDACAJ. Given the lack of information distributed to the public about the quality of their drinking water, alleged covert agreements between MYSA and SEDACAJ not to disclose water information, and MYSA's financial support to SEDACAJ's water quality monitoring program, it can be concluded that despite the sophisticated levels of expertise present in SEDACAJ, the integrity of the urban institution is already questioned by many locals. Therefore, contrary to calls for boosting capability among excluded actors (Meinzen Dick & Zwarteveen, 1998), increasing access to institutions of domestic water provision will bear little effect unless institutions themselves are equitable.

While local collective institutions in the rural and peri-urban communities do not seem to suffer from the same inefficiencies of negative social capital, their direct reliance on natural water sources and limited capabilities to monitor and mitigate contaminated water, places these communities in a highly vulnerable position. While governments of the national level have not directly denied these communities access to domestic water supplies, the failure to protect water resources would indirectly restrict access for these groups, should the quality or quantity of their water resources become compromised. This scenario, should it unfold, will provide a clear example of how socio-political mechanisms of water systems play directly into matters of water scarcity and security.

4.7 Conclusion

This paper has endeavoured to understand the experiences of marginalized societal groups in their acquisition of domestic water, systems, and institutions. Rather than attempt to create political space for marginalized actors, this study has sought to understand the process by which their exclusion is produced (Mollinga, 2007). The acquisition approach has been applied with the intent of providing a more grounded portrayal of the water acquisition process, to acknowledge the power and lack of power of certain actors to command access over water resources amidst constraints produced by inequitable socio-political relations (Cleaver & Hamada, 2010).

Analyses of the relationship between individual capabilities, and socially constructed institutions seems a natural progression to address recent concerns over universalizing discourses of modernized and privatized water systems, which advocate the equality of users to purchase water resources while failing to advocate for equal water rights (Ahlers and Zwarteveen, 2009). For this reason, an emphasis has been placed on understanding capabilities above a rights-based approach. Understanding agency as being comprised of will and capability, this study demonstrates the value of capability analysis towards a more nuanced understanding of agency and its limits. However, a sole emphasis on capabilities is insufficient, and must be considered in relation to institutions. As demonstrated in the case study, institutions may vary widely in their terms of access, which may be more suitable to the capability sets of certain actors over others. The importance of analyzing both components is illustrated by the fact that although the urban group exhibited the highest financial capabilities, the group did not experience the greatest financial access to domestic water services. Similarly, had each group demonstrated equal capabilities, their access would still not have been equal, due to the variation in regulating terms of water institutions. Thus, it is concluded that capabilities of access must be examined in tandem with the institutions that regulate access.

The inclusion of institutions as part of the acquisition framework is particularly important for understanding the production and re-production of inequitable water accessibilities. Institutions that regulate water infrastructure may not only prevent certain actors from accumulating added capabilities (such as water), but may lead to the accumulation of vulnerabilities as well. To attribute this accrual of vulnerabilities to the inability of individual actors would be grossly misguided. Instead, it is argued that inequitable processes and outcomes of water acquisition are actively constructed, as they are the product of inequitable socio-political relations. Therefore, poor institutional efficiency and transparency are less likely to be the product of poor institutional capacity, and instead may be intentionally created in order to preserve power and positions of privilege among more powerful actors, thus perpetuating inequitable relations. This holds significant implications for reiterative calls to build capacities and capabilities of marginalized groups in effort to improve their access to water resources (Meinzen Dick and Zwarteveen, 1998). This study concludes that, insofar as institutions of domestic water provision remain inequitable, increasing capabilities of marginalized actors will produce limited effect in improving access to water resources for marginalized groups. Addressing inequitable access to domestic water resources must therefore begin with an examination of the equitability of domestic water institutions.

5 Access for Whom and to What? A Critical Acquisition Framework for Understanding Rural Experiences of Multiple Accessibilities

5.1 Introduction

The notion that transportation facilitates accessibility for rural populations to livelihood resources located within urban locales is a well practiced, highly documented and largely uncontested position (Barrios 2008; Jacoby, 2000; World Bank, 1994). Proponents of this idea share the fundamental logic that transportation from rural areas to urban centres promotes greater integration into market economies and encourages a diversification of livelihood activities, thereby reducing vulnerabilities of rural poor populations (Escobal, 2005). Geographic distance is presumed to be a key barrier to market participation, and transportation is therefore considered to be the missing link in the neo-classical solution to rural poverty. Reducing remoteness and increasing connectivity can putatively close the physical gap that hinders the rural poor's ability to engage in, and derive benefit from, market participation.

However, several key assumptions inherent to these arguments are frequently overlooked, such as the vulnerability of rural populations in comparison to urban populations, the apolitical definition of access embedded within transportation and livelihoods research, and a poor recognition of other institutions that concomitantly regulate access to market participation. In the following sections, the first and second assumptions are briefly discussed in order to demonstrate the necessity for a socially-critical, capabilities-driven approach of accessibility. The third assumption provides the key problem to be addressed in this paper. This research is broadly concerned with understanding the processes through which infrastructure influences access to institutions, and how institutions influence access to infrastructure services. Specifically, this research aims to understand such processes through rural highlanders' experiences of accessing transportation, markets, and privatized infrastructure services. Towards this aim, a critical acquisition framework is developed and applied to a case study located in the city of Cajamarca in the northern highlands of Peru. Mixed-methods are applied to compare the experiences of transportation, market and infrastructure accessibilities amongst rural and urban residing vendors who work within Cajamarca's central informal market.

5.1.1 Rural Livelihoods and the Market Imperative

Due to the limited coverage of physical and social infrastructure systems, rural localities have been described as being 'geographically adverse' (Escobal and Torero, 2003; Limão and Venables, 2001). People who live within rural localities are considered disadvantaged due to their physical distance from urban centres. This distance, when coupled with inadequate transportation, is seen as a key deterrent that hinders the capacity of rural households to participate in market-based activities, thereby forcing them to maintain livelihoods based on subsistence agriculture (Escobal & Torero, 2003).

Since heavy reliance on the natural environment leaves rural populations exposed to natural shocks and hazards, increasing the accessibility of rural populations to urban market centres presents an attractive alternative by which households may diversify their livelihood activities (Ellis, 2000)³¹. As livelihoods expand to include non-agricultural activities, household income can be derived from a wider scope of income sources. In turn, expanded capability to generate cash income can complement financial and other social, natural, physical, financial and human assets (Ellis, 2000). These assets have a direct relationship to vulnerability, for as the broader set of livelihood assets increase, vulnerability usually tends to decrease (Moser, 1998). Livelihood diversification is therefore understood as a risk-adverse strategy that can be adopted in anticipation of, or in response to, shocks and stresses of a temporary, seasonal, or ongoing nature (Ellis, 2000).

The framing of rural livelihoods within vulnerability contexts (DFID, 1999) establishes a convincing platform to promote urban market participation for rural populations. However, while diversification generally refers to creating a broader base of asset sources, the term is frequently "invoked in the rural development context to imply diversification away from farming as the pre-dominant or primary means of rural survival." (Ellis,2000, p.14, emphasis

³¹ Rural livelihood diversification is defined as "the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living." (Ellis,2001: 15).

added). While the diversification of livelihoods can improve the resilience of rural households to respond to the risks of agricultural subsistence, the significant vulnerabilities inherent to un-diversified livelihoods that are heavily reliant on market institutions remain grossly underestimated.

Moser (1998:3) emphasizes that environmental shocks and stresses can be of an ecological, social, political, or economic nature; and that ongoing environmental stresses or perpetual decline of economic systems may be equally hazardous to livelihoods as extreme natural shocks or disasters. A broad understanding of the environmental uncertainty helps to locate the apparent vulnerabilities of urban populations, due to an over reliance on market institutions. As urban populations rely heavily on market institutions to invest human labour and generate cash income, market institutions are also the primary means through which food, shelter, and many infrastructure services are provided. Therefore stresses and shocks within economic systems may place urban populations in positions of greater vulnerability, when compared with their rural counterparts.

5.1.2 Apolitical Understandings of Access in Rural Transportation

The market imperative within neo-classical development strategies and rural transportation policies not only fails to address the vulnerabilities of an unbalanced, 'overly-diversified' livelihood, but it also dilutes the socio-political complexities of intra-societal relations. Accessibility arguments within rural transportation research are widely based on the conception of rural and urban populations operating as a single homogenous and harmonious entity, in which all people participate in societies, economies and politics on equal terms. Consequently, accessibility is prematurely attributed as having universal positive value prior to consideration of who is gaining access, and the valuation of resources (natural, financial, human and social) for which access might be sought. Numerous authors have advocated for increased accessibility for rural populations as being an essential requirement for greater social inclusion and justice (Farrington and Farrington, 2005; Farrington 2007; Hine and Mitchell, 2003; Preston

and Rajé, 2007). However, this argument rests on the assumption that a) rural populations desire and are capable of being integrated into urban life, and b) that integration to urban life would benefit the livelihoods of rural populations. Moreover, an equally worthy consideration might be whether increased accessibility may conversely contribute to social exclusion, and greater intra-societal injustice. While Farrington and Farrington (2005) substantially advance the discussion of accessibility to consider issues of social exclusion, their definition of accessibility as, “the ability of people to reach and engage in opportunities and activities” (2005:2), is insufficient for the purpose of critical-social analysis; for their interpretation of societies echoes a homogenous idyll, rather than of a socially fragmented reality. Dependent on one’s societal position, opportunities for access vary widely, and dependent on one’s livelihood, the definitions of valuable activities and resources will also vary. A critical-social approach to accessibility requires a less prescriptive definition that serves numerous intra-societal groups, regardless of their socio-political position to influence the definition of ‘desirable’ opportunities and activities. In this paper, therefore, ‘to access’ refers to the capabilities of people to engage in activities that they have reason to value, whereas ‘to have access’ refers to the compatibility between one’s existing capabilities and the institutions that regulate the acquisition process.

As many discussions of and interventions related to market accessibility take place within discursive and physical spaces that are presumed to be politically benign, there is a need to re-introduce socio-political complexity into the concept of accessibility. A critical-social scientific approach³² to accessibility is one that a) seeks deeper understanding of socio-political relations and institutions among multiple actors of differential capabilities, b) recognizes institutions (and infrastructure) as a product of socio-political relations, which simultaneously

³² Numerous interpretations of critical-social science and critical-social theory have been produced by thinkers influenced by the Frankfurt school (Calhoun, 1995; Fay, 1987; Freiburg, 1979). In this paper, critical-social science is understood as a quest to understand power relations within societies. It is concerned with systems of social relations, the historical creation of social systems, and the social actors which comprise and shape such systems (Freigberg, 1979). Within its humanist variant, critical-social science “seeks a theory which will simultaneously explain the social world, criticize it, and empower its audience to overthrow it” (Fay. 1987:23).

constrain and enable the process of acquisition for different actors in different ways, and c) is cognizant and transparent of power relations exercised throughout the research process, affecting one's valuations of accessibility. By examining the socio-political complexities inherent to both the case study and the research process, the critical-social approach can achieve a more nuanced understanding, grounded in everyday realities, from which more effective rural transportation policies can be designed.

In the following sections, the meaning of access as it is currently conceptualized in transportation, geography, and development research is explored. Then a distinction between multiple access types and processes is articulated. Next, the critical-social approach is elaborated upon, drawing from the capabilities (Bebbington, 1999; Sen, 1992), livelihoods (Ellis, 2000), and structuration (Giddens, 1986) literatures to form a 'critical acquisition framework' of accessibility. The discussion is further framed using two key questions that arise from critical-social science literature: Access for whom?; and Access to what?. The first question addresses the socio-political dimensions of accessibility, while the second question yields a level of critical reflexivity on the valuation of resources and access patterns. While each section bears a relevance to accessibility issues relating to multiple types of infrastructure systems and their related institutions, these queries are addressed in relation to rural roads.

5.2 Rural Accessibility

To date there has been little overlap between the transportation and critical-social science literatures. Transportation geography has generally been concerned with optimising efficiencies within transportation systems, much of which has focused on topics of spatiality, form, design, implementation and the operation of transportation networks. (Shaw, Knowles, & Doherty, 2008). Accessibility research in transportation geography has generally aimed to understand how people can better access transportation networks and services.

Contributions from the broader field of development geography have also added place-specific and cultural nuances, improving knowledge of social and political dimensions of accessibility, such as how social factors can influence physical access of certain groups within specific cultural contexts (Porter, 2011). Others have contributed insights to socio-political dimensions of transportation access, such as Unruh & Shalaby's (2012) account of the Taliban's regulation of roadways through road blockades in Afghanistan.

Within the context of rural highland areas, discussions of rural accessibility largely centre on the topic of road transport and road infrastructure in relation to economic development and poverty reduction (Lebo & Schelling, 2001; Van de Walle, 2001; World Bank, 1994). More specific inquiries have examined the role of roads in facilitating physical access to markets (Gannon and Liu, 1997; Jacoby, 2000;) and social services for rural populations (Devotka, Dudycha, & Andrey, 2012; Vasconcellos, 1997). Within research on rural market accessibility, roads are frequently poised as enabling infrastructures that stimulate market development, (Mu and van de Walle, 2011; Olsson, 2009), improve market efficiencies through a reduction in transport costs (Jacoby & Minten, 2009), and foster labour specialization and livelihood diversification (Gannon & Liu, 1997).

At the same time, more critical interpretations of roads have been offered within the broader geography and development literatures. This stream of research has emphasized the various social, economic, and environmental effects of roads, and their findings have been quite diverse. Within critical accounts, roads are one of many infrastructure objects, designed to colonize and civilize rural populations (Colombijn, 2002; Rigg, 2002; Scott, 2009; Wilson, 2004), and which symbolize relations of coercion and control. Disguised as development strategy, roads became a key component of national development plans, and were often built with the purpose of integrating rural, highland, and indigenous populations into the mainstream of society, economy, and the polity by making their economic activities "legible, taxable, assessable, and confiscatable" (Scott, 2009:5). However, other critical research finds that

depending on the social-political situation, roads have facilitated protective and coercive functions, and isolation has been both advantageous and problematic for rural populations depending on their socio-political realities. For example, Nugent's (1994) historical account of roads in the rural community of Chachapoyas, Peru demonstrates how the value ascribed to roads, and to infrastructure in general, is dependent on place and temporally specific socio-political relations, and ascriptions of value vary according to whom is being asked. Just as 'autonomy' and 'isolation' can be seen as value-laden terms that "have to do with how rural people experience, imagine, and represent their relationships with state, market and wider society" (Wilson, 2004: 529), so too can accessibility be understood from a critical perspective. This research attempts to follow in the tracks of Wilson's (2004) socio-political analysis, yet departs from her political economy approach, to launch an agency-oriented, capabilities-driven framework aimed to analyze rural accessibilities.

5.3 A Critical Acquisition Framework for Understanding Rural Accessibilities

Within discussions of infrastructure development, the voices of rural actors have generally been poorly consulted, and poorly integrated into a dialogue that portrays these actors as powerless, infrastructure-less subjects in need of infrastructural provisions and repair. From critical perspectives, the source of marginalization of rural people lies not in their remote location or their distant proximity to markets, but in the failure to incorporate their perspectives in the creation of accessibility knowledge and policymaking. Critical-social science aims to understand existing power relations within societies, and the institutional structures and oppressive ideologies that reproduce social inequalities, in order that inequitable systems may be challenged and transformed (Calhoun, 1995; Fay, 1987; Freiburg, 1979; van Manen 1997). The approach requires analysis of the actors for whom access is sought in relation to the livelihood resources for which access is desired, an identification of the institutions that regulate the

acquisition³³ of resources, and an examination of the capabilities actors have to navigate such institutions.

Access for whom? The critical acquisition approach uses actor-based concept of socio-political reality as a launching point of inquiry. This recognizes societies as being a heterogeneous composite of multiple actors; groups of social agents who converge based on shared resource interests (Long and van der Ploeg, 1989). Between actors therein lie complex patterns of power relations, as some actors are endowed with greater capabilities to pursue their livelihood resource interests over others. Amidst the spectrum of actors who may converge at the interstices of rural accessibility, this research is designed to achieve a more nuanced understanding of accessibility from the perspectives of rural highlanders.

Access to what? It is commonly accepted rather than questioned that rural populations unanimously desire greater access to markets, and aspire for deeper market integration, or consider themselves to be geographically disadvantaged. A critical approach recognizes that livelihoods are supported by a variety of resource types (natural, social, human, physical, and economic) (DFID, 1999; Ellis, 2000; Scoones, 1998), and recognition of this variety can therefore aid a more comprehensive understanding of accessibility in a way that can be based on marginalized actor perspectives. Depending on the livelihood activities in which one engages or wishes to engage, actors evaluate livelihood resource types differently. Defining assets based on emic perspectives provides a platform from which to analyze acquisition processes via relevant institutions and in relation to existing capabilities.

³³ In this research, the term of 'acquisition' refers to the process of gaining and establishing possession, control or use of livelihood resources, particularly in reference to infrastructure resources but also including resources which are required to gain access to infrastructure systems. When used in verb tense, the term 'access' refers to the act of gaining possession, control or use of livelihood resources. When used in noun form, access refers to previously established rights of possession, control or use of livelihood resources.

Capabilities. Significant parallels between livelihoods (Ellis, 2000) and capabilities (Sen, 1992) approaches have been previously drawn in Bebbington's work on capitals and capabilities (1999). More specifically, Ellis' (2000) description of livelihood assets is comparable to Sen's (1992) concept of capabilities. In the former, assets are transformed into livelihood activities, while in the latter, capabilities are transformed into a set of functionings, and reflect "a person's freedom to choose for possible livings"(Sen, 1992: 40). Since livelihoods frameworks have suffered from prescriptive and uncritical applications by automatically framing rural livelihoods within vulnerability contexts (Scoones, 1998), this limitation positions Sen's (1992) concept of capabilities as being more suitable for the purpose of critical analyses. Capabilities are understood as resources that one values or has reasons to value (Sen, 1992:40), and the capabilities approach is designed so that value is attributed to resources only insofar as they are deemed useful from emic perspectives. However, one limitation of the capabilities approach is that it was first proposed to elaborate on financial capabilities, while the livelihoods framework lends itself to a broader conception of capabilities. Therefore, by combining these approaches (Bebbington, 1999) it is possible to analyze multiple capabilities types, such as physical, social, financial, political, and human capabilities, as determined from the perspectives of marginalized actors.

The extent to which capabilities factor in the navigation and negotiation of institutions renders it of key importance to acquisition analysis. First, it is necessary to contextualize capabilities within Giddens' (1986; 2005) definition of agency. Defined as both the will and the capability to act, agency is comprised of a person's will and capability, and this combination represents an agent's power. However, as agency debates have emerged, many proponents have emphasized the will and intentions of action over people's capabilities to act. Giddens (2005) finds this to be misguided, for capabilities are the aspect that directly relates to an agent's power. The greater one's capabilities, the more power they have to act according to their own will. Thus, capabilities, are directly related to the power of actors to act, whether the act is of

engaging in livelihood activities, accessing livelihood resources, transforming resources into other functionings, or navigating or shaping institutions.

Institutions. A critical acquisition approach also recognizes the mechanisms of access and inaccess as the domain of institutions, which are products of socio-political actor relations. Actors with greater capabilities, agency, and power are more influential in designing institutions, setting the terms, and defining the rules of human interactions (Giddens, 1986). These institutions and their infrastructures are central to the regulation of the acquisition process, and can be both constraining and enabling (Giddens, 1986:25). Each institution has its acceptable currencies, and these requirements are not restricted to the transfer of financial capabilities. How successfully one navigates various institutions is largely dependent upon the compatibility between the institution in question and one's existing capabilities.

Now that the critical acquisition framework has been outlined, it is important to discuss the main institution being examined in this study, the market institution. However, it is important to note that expressions of the market in singular form are inept for the purpose of critical-social analysis.³⁴ Since institutions are understood as the rules and regulations that structure human exchange, the market institution must be understood as a set of multiple institutions (Dorward, 2003). These institutions range from the formal to informal (Casson et al. 2010), and often intersect, overlap, reinforce or contradict (Young, 2002) in the regulation of market accessibility. Formal manifestations tend to be written in the form of contracts, laws, policies, and regulations, and are legally enforceable. Informal institutions include verbal agreements, along with norms such as reciprocal arrangements, which may be exercised along gender or ethnic affiliations (Lyon & Porter, 2009; Olsen & Morgan, 2010). While institutions

³⁴ Due to the multiple meanings of 'the market', *market locale* will refer to the location where goods and services are exchanged, and as a key destination of rural transport. *Market institution* will refer to the set of rules which regulate these transactions and interactions.

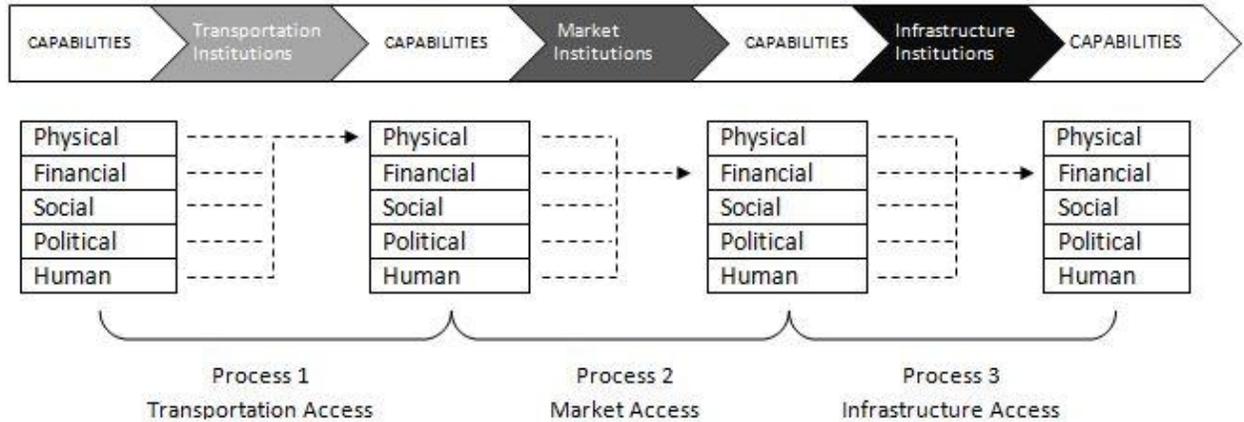
interact within and between multiple scales of analyses (Young, 2002), this study focuses on the horizontal interplay of multiple market-related institutions at the local scale.

5.4 Rural Transportation, Market and Infrastructure Accessibility: Re-visited

While multiple dimensions of transportation accessibility have been thoroughly studied, the process through which rural people gain access to markets is not solely of a physical nature. Therefore, given the ambiguous connotation that the term 'rural accessibility' has engendered, it is important to observe three distinct, though connected, processes: 1) access to transportation, 2) access to markets and 3) access to infrastructure (see Figure 5.1). While market accessibility entails, in part, people being physically capable of reaching the market locale, market accessibility also requires a broader set of capabilities in order to access, engage in and derive benefit from market activities. In other words, the latter is inclusive of the former, but the former does not automatically lead to the latter.

As neo-liberal development strategies and structural adjustment programs swept the less-developed world throughout the 1980s and 1990s, and particularly across Latin America, so began a widespread trend of the privatisation of many infrastructure services (Fay & Morrison, 2007). This has led to not only an increased provision of infrastructure systems through market institutions, but also an increased role of market institutions in the way people acquire infrastructure services (Estache, 2001). Hence, markets are integral to both the provision and acquisition of infrastructure, and participating in domestic markets, so as to derive benefit and generate cash income is important not only to support the diversified activities of rural households, but also for meeting their infrastructure needs.

Figure 5.1: Three Interconnected Processes of Rural Accessibility



Each process of rural accessibility begins with an assessment of existing capabilities. Each type of accessibility is regulated, facilitated or inhibited by multiple institutions simultaneously at play. Transportation access requires the transformation of multiple capabilities in order for one to navigate physical, financial, social, political, and human institutions that regulate transportation access. Access to market institutions located within market locales similarly require a range of capabilities to be transformed through multiple institutions in order for one to fully engage and derive benefit from market activities. While access to infrastructure also requires a range of capabilities to navigate institutions, this research emphasized the acquisition of financial resources used to gain access to privatized transportation and electricity infrastructure.

In summary, the critical acquisition approach combines several aspects of the livelihoods, capabilities, and critical-social literatures in order to provide an alternative conceptual framework for examining marginalized people’s experiences of accessing transportation, markets and privatised infrastructure services. It aids the examination of how people draw from their existing range of capabilities to gain access through a variety of institutions that regulate access to the generation of further capabilities. This framework helps to illuminate the

complexity of acquisition processes in a way that has not yet been captured within the transportation, access, or livelihoods literatures.

5.5 Rural Accessibility in the Northern Peruvian Highlands

Consistent with political economic transitions experienced throughout much of Latin America in the 1980s, Peru's neoliberal moment began in the 1990s, under the rule of Alberto Fujimori (1990-2001). Internal pressures of economic stagnation and rampant inflation, coupled with growing pressures from external funding agencies, led to a series of neoliberal reforms considered to be the most extreme on the continent (Laurie and Bonnett, 2002). In meeting the requirements for structural adjustment, Peru underwent substantial austerity measures to reduce the size of the public sector and its control of infrastructure services. Neo-liberal policies, including infrastructure privatization reforms, which were introduced during Fujimori's term, have been the mainstay of subsequent governments (Ioris, 2012). The transfer of ownership of infrastructure from state-owned enterprises to the private sector resulted in the de-regulation of infrastructure provision, and a removal of many governmental infrastructure subsidies. In effect, everyday access to infrastructure services, such as transportation, electricity, and telecommunications, has become almost exclusively available through de-regulated market institutions and user pay arrangements (Calderón & Servén, 2004).

Under the current government of Ollanta Humala, a new national plan was developed for the years 2011-2016. With an emphasis on 'growth with social inclusion', the plan aims to provide equal access to basic services, and to reduce extreme rural poverty (Swiss Economic Cooperation and Development, 2013). However, the continuance of neoliberal solutions to poverty supposes a virtuous cycle, in which rural populations gain physical access to the market with improved transportation, and successful market participation allows rural populations to gain access to transportation and other infrastructure services. The importance attributed to

rural accessibility and rural poverty reduction in Peru necessitates this investigation of how well rural populations currently navigate processes of infrastructure acquisition.

5.5.1 Rural Accessibility in Cajamarca, Peru

The region and capital city of Cajamarca is located within the northern highlands of the Peruvian Andes (see Figure 5.2). Over the past two decades, the population has substantially increased in the region (9.2%), and sub-region (37%), and proportionally higher growth rates have occurred in urban centres when compared to rural areas (Instituto Nacional de Estadística e Informática [INEI], 2009)³⁵. The migration of rural highlanders to urban centres is attributed to an expanding mining sector, increased international and domestic trade, that have left an impression on the capital's markets, infrastructures, and local livelihoods. Despite patterns of rural to urban migration and increased market integration by rural highlanders into urban domestic markets, poverty remains markedly high and socio-economic inequality is characterized by ethnic divisions (Muñoz, Paredes & Thorp, 2007).

Consistent with demographic patterns throughout the Andean highlands, indigenous people populate the rural highlands surrounding the city of Cajamarca. Commonly referred to as campesinos, many indigenous people reside at higher altitudes, where they have remained engaged in agricultural activities, despite varying degrees of market integration (Personal Communication, 2012). Within rural indigenous households, agricultural activities may include agriculture, animal husbandry, and other forms of on-farm labour. Non-agricultural activities include vending, housecleaning, construction, transportation sector, mining, and other forms of formal labour (Personal Observations, 2012). The regional Census report indicates that mining is a sector in which only 1.5% of the local population is officially employed, compared to 55.8% who work in agriculture (INEI, 2009:135). However, it should be noted that detailed secondary

³⁵ Over this same time period, there has been a shift in the proportions from rural to urban migration at the sub-regional level. In 1993, the populations were 44% urban and 56% rural, and by 2007, these proportions reversed, with 55% urban, and 45% rural (INEI, 2009: 21).

regime (Thorp, Caumartin, and Gray-Mollina, 2006. In effect, indigenous identity became more associated with the peasantry class, than ethno-linguistic affiliations.

As trends towards infrastructure privatisation have required greater market integration among rural indigenous people to acquire basic infrastructure needs such as transportation, communication, electricity, education, and healthcare, little is known about rural highlanders' experiences of acquiring infrastructure services, and their experiences of integrating with markets. Given the trends of inflation along with rising costs of infrastructure services (Personal Communication, 2012), it is reasonable to expect that access to privatized elements of infrastructure systems will continue to require deeper participation with market institutions in the future. This paper addresses this knowledge gap by examining the experiences of rural highland people as they access and engage with market institutions, in order to meet their infrastructure needs.

5.6 Methods

In this research, the market had triple significance: as a primary destination of rural transport, as a key economic institution through which people generate cash income in order to meet their infrastructure needs, and the site of data collection for this study. Cajamarca's central market is located in the centre of Cajamarca city, in the south-eastern quadrant (see Figure 5.2). Several characteristics of Cajamarca's central market distinguish it as quasi-informal, falling in between the spectrum of formality and informality (Olsen & Morgan, 2010). Indeed, this conception of quasi-formality applies to the central market, where vendors are obligated to pay a municipal market tax, yet many sell in spaces that are perceived as illegitimate by the local municipal authorities (Personal Communication, 2011). Given the informality of much market activity, official statistics were difficult to obtain, and for this reason, the majority of the findings rely on primary data sources.

This study followed a mixed-methodology research design. Methods of data collection included questionnaire surveys, informal and key informant interviews, observation and secondary data sources. Initial analysis of data relied on parametric statistical tests, including cross-tabulation, chi-square, independent sample T-test, and analysis of variance. The quantitative analysis was used to indicate key differences within the sample, while qualitative analysis, such as informal and key informant interviews (KIs), observations, and secondary data sources were used to lend insight to explain and contextualize statistically-determined differences.

Data were collected between December 2011 and February 2012, and were comprised of questionnaire surveys, informal and key-informant interviews, and direct observation. The questionnaire survey was preceded by a pilot study (N=15).³⁶ A sample of 101 vendors responded to the questionnaire survey (N=101), which represents 8.7% of the total estimated vendor population (N=1160).³⁷ The estimate reflects the population on a weekday, and varies from a weekend, when the market hosts a higher influx of vendors, many of whom reside outside the Cajamarca sub-region (Personal Communication, 2011). Following a preliminary assessment of the survey data, thirty-one informal interviews were conducted with market vendors and ten semi-structured key informant interviews were conducted with municipal government officials including a senior police official, as well as with market and transportation authorities. All questionnaires and interviews were conducted in Spanish, with the assistance of (one of) two local male translators. It should also be noted that data were collected following a period of significant local unrest³⁸. Therefore the researcher strived to maintain a highly

³⁶ The pilot study results were used to modify the questionnaire template, but were not included in the main survey results.

³⁷ In the absence of statistics of the vendor population within the Central market (Key Informant Interview 38, 2012), the total estimated vendor population was calculated based on a visual headcount within the Central market over the period of two weekdays. The count is modest in estimation, and included vendors who were stationary, so as to avoid counting vendors twice.

³⁸ Protests related to mining in the region commenced on November 24, 2011 and persisted for 11 days before a state of emergency was declared by national president. Key areas of concern among protesters involved the expansion of a local gold mine, known as Project Conga.

informal and neutral presence, exercising political sensitivity to an atmosphere of distrust between local residents, foreigners, and local officials.

5.7 Results

Survey participants were systematically sampled by interviewing every sixth available vendor. The distribution of total respondents was 83% women and 17% men. Due to the systematic sampling technique (Collins, 2010), this distribution is believed to accurately represent the higher female proportion found within the vendor population in the Central market, and not due to participant selection bias.

Another significant split in the sample was an even distribution between people who self-identified as having rural livelihoods and those with urban livelihoods. The terminology used in asking about the ethnicity of respondents was the topic of much debate with local research assistants. Due to a multitude of interpretations surrounding the term *campesino*, some of which could be considered derogatory, it was decided to phrase the question so that respondents could identify as being 'from the fields' (*del campo*) and 'from the city' (*de la ciudad*). This phrasing allowed respondents to self-identify, and the results show a relatively even distribution of 43 per cent of respondents who identified as being from the city, and 50 per cent who identified as being from the fields³⁹. The self-identification variable was cross-referenced with another variable in which respondents were asked about their location of residence. Within the sample, 54 per cent of respondents reside in the city of Cajamarca, while 33 per cent live in the rural countryside, and 13 per cent live in the city outskirts, or the neighbouring town of Baños del Inca, and have been classified as peri-urban. For the purpose of eliminating ambiguity between the rural and urban groups, those residing in peri-urban locations were removed from the analysis.

³⁹ The remaining 7 per cent did not respond to this question.

There is a discrepancy between those who self-identify as being from a rural location, and those who maintain residence in rural areas. For example, of the 51 respondents who indicated they were 'from the fields', only 31 (61%) indicated having a rural residence. However, all 38 (100%) respondents who identified as being 'from the city' reported having urban residence. This discrepancy may be due to the persistence of rural identities, despite migration to the city. While the notable complexity of rural-urban identification is beyond the scope of this research to resolve, it suggests residence, rather than self-identification of a rural vs. urban identity, as a more useful construct for the purpose of analyzing transportation and market access.

Market products and the composition of vendor livelihoods are diverse. Products sold in the market varied widely from meats and vegetables, to textiles, condiments, cleaning supplies, and hardware. Among the vendors surveyed, 12% produce the products they sell, 7% rely on a combination of production and the sale of purchased goods, and 79% sell goods obtained by suppliers, sometimes acquired by pre-purchase or loan. Some vendors are highly dependent on their participation in the market as a source of livelihood, while others participate on a casual basis (Personal Communication, 2012).

5.7.1 Experiences of Transportation Access

In this sub-section, the experiences of physical access to the Central Market are reported for the total vendor sample, followed by a comparison of these experiences for vendors who are rural vs. urban residents. Participants were asked about the mode of transportation most frequently used to arrive at the market (see Table 5.1). Walking was the most popular transportation mode (41%), followed by combis⁴⁰ (35%). The most frequently cited reasons for participants' choice of transportation mode were: it was inexpensive, the distance to the market was near, that the mode was the only choice available. The average cost of (one-way) transportation to the market was 0.85 nuevo soles (NS) (\$0.33 CAD), which ranged from 0 NS (walking) to 6 NS (\$2.33 CAD) for taxi transport. These costs range from 0 to 34 % of the

⁴⁰ *Combis* can be described as small buses, suitable for the transport of approximately 12-15 passengers.

average daily earnings of vendors. Average time to travel to the market was 30 minutes, while the average time to return home was 33 minutes. Approximately one-third of vendors self-transport their goods to the market every day (37%), while nearly half (49%) rely on the supplier to transport the goods, and 11% reported alternative arrangements⁴¹. The experience of travelling to the market was said to be easy for 50% and difficult for 43%.⁴²

Comparing the responses of rural and urban sub-populations, the most popular transportation modes for both rural and urban residents were combi and walking (see Table 5.1). Reasons offered among rural respondents for their chosen transportation mode were: it was the only choice available, it was an inexpensive option, or due to the far distance of their homes from the market. Contrarily, the urban respondents chose their transportation mode due to the close proximity of their home to the markets, or the transportation mode being an inexpensive and fast option. On average, the rural residents pay .51 NS (0.20 CAD) more than urban residents for transport fare, and rural residents need thirty minutes more to reach the market and to return home.⁴³

Among the rural group, 67% characterized their experience of physically accessing the market to be difficult, and 27% found it easy⁴⁴. Conversely, 29% of the urban group found physically accessing the market to be difficult, and while 68% found it easy.⁴⁵ Reasons given for difficult experiences ranged from poor availability, load restrictions, and household obligations, to physical distance, poor weather conditions, human fatigue, personal safety, and the burden of

⁴¹ Alternative arrangements include renting storage from a local shop or parking lot to store equipment or unsold products at day's end.

⁴² Seven per cent of the sample provided other responses.

⁴³ A slight increase in time to return home in comparison to the time needed to reach the market can be attributed to the topographical location of the market in the heart of the city which lies at the lower elevations of an inter-mountain valley. For those respondents who reside in the rural areas and some urban areas, travel to the market involves a descent, and returning home to the elevated countryside involves an ascent, which can range from 2720 to 4300 metres above sea level.

⁴⁴ It must be acknowledged that in interviewing people already at the market, the sample may reflect a bias in interviewing those who had already successfully gained physical access to the market.

⁴⁵ Six per cent of the sample reported other responses.

transporting children. Reasons for positive travel experiences included a short distance, habit, lack of choice, good transport availability, and no burden of transporting goods. However, in follow-up interviews, respondents were asked to compare the difficulty in their experiences of travelling to the market, in comparison with their experience of selling and earning money within the market, from which there was consistent indication that although physical access was burdensome, it was not a significant barrier to market engagement (KIs, 2011-2012).⁴⁶

5.7.2 Experiences of Market Access

From the perspectives of rural and urban vendors alike, access to the market was highly restricted by formal financial institutions such as bank loans, but the effect of these restrictions were countered by informal financial institutions such as family-based loans, and the fact that little financial capability is required to begin selling in the market. Among the total sample, 13% had received a loan from a bank or micro-credit agency, but 73% had not. Many of the latter expressed an unwillingness to receive a loan, for fear of losing their limited collateral (e.g. house, equipment). Some lamented their ineligibility to receive a loan, due to the absence of land title, utility bills, or pay stubs. Sixty-three per cent reported having used their personal savings to start their business. Some recounted having sold previous agricultural assets such as livestock; others recalled having worked as housekeepers to accrue savings. Differences between rural and urban groups were statistically insignificant in terms of obtaining a financial loan or relying on personal savings to start one's business. Follow-up interviews confirmed that the ease of gaining entry to the market was aided through informal arrangements made with suppliers, which allowed new vendors to borrow goods on loan and to repay suppliers at day's end. While some suppliers charged higher prices as a form of insurance for their loaned goods, this did not appear to be a consistent practice (KIs 22-26, 2012).

⁴⁶ Key informant interviews which support this statement include interviews numbered: 2,3,5,6,8-15,17-21,23,28,30, and 31.

Table 5.1: Survey Statistics on Transportation and Market Access

Variable	Rural Residence N=33 (%)	Urban Residence N=56 (%)	Statistical Significance	Test
Experiences of Transportation Access				
Mode of Transport			.019*	Chi-square
Walking	21	50		
Combi	52	27		
Bus	6	9		
Moto Taxi	3	13		
Transport Choice			.004*	Chi-square
Inexpensive	21	25		
Distance Far	15	5		
Only available	36	5		
Fast	6	11		
Distance Near	0	28		
Goods Transport			.727	Chi-square
Self	42	36		
Supplier	45	50		
Cost one way (NS)	1.17	0.66	.087	ANOVA
Travel time to market (minutes)	45.88	16.81	.000*	ANOVA
Travel time to home (minutes)	49.13	18.53	.000*	ANOVA
Travel Experience			.000*	Chi-square
Easy	27	68		
Difficult	67	29		
Experiences of Market Access				
Financial Capital (loan) Received			.424**	Chi-square
Yes	12	16		
No	79	70		
Personal Savings			.114**	Chi-square
Yes	55	70		
No	39	16		
Social Capital Received			.283**	Chi-square
Yes	58	48		
No	36	38		
Barriers to Selling			.496**	Chi-square
No problems	15	25		
Municipality relocate	67	59		
Lack of money	3	2		
Higher taxes	0	4		
Weather	6	0		
Experiences of Market Participation				
Gaining money			.557	Chi-square
Easy	15	29		
Difficult	54	48		
Biggest Problem Earning			.028	Chi-square
Security	12	13		
Lack of capital	6	11		
Transportation	18	2		
Competition	39	50		
Daily Earnings (<i>Nuevo Soles</i>)	15.20	20.13	.262	ANOVA

* A statistically significant relationship with $p < 0.10$.

** A relationship that was not determined statistically significant, but which was deemed significant through qualitative analyses based on key informant interviews.

The use of social capabilities (relationship) through social institutions (familial arrangements) facilitated access to the market in multiple ways.⁴⁷ Forty-eight per cent of respondents reported that social capabilities had helped establish their business, while 38% did not.⁴⁸ Among those who used social capital (N=49), this took multiple forms, from personal financial loans (33%) human labour (27%) expertise (18%) a space in the market (2%), or physical equipment (2%). There were no significant differences between rural and urban groups.

Although little was asked in the questionnaire survey about human capabilities used to access the market, topics of health and education consistently surfaced through observations and informal interviews. A recurrent view among urban-residing vendors pointed to a lack of education among the rural people as holding these vendors back in terms of market success. Rural vendors were perceived as: being unable to detect counterfeit currency (KI: 7, 28, 29, 2012), less knowledgeable about selling (KI: 21, 2012), and less capable of identifying high quality goods (KI: 28, 2012). However, rural residents did not confirm these views, and the data was insufficient to comment further on health capabilities and institutions.

A combination of formal and informal political institutions restricted the access of many vendors, who were not endowed with sufficient political capabilities to challenge municipal officials' restrictions on where goods could be sold. When asked in open format if anything prevented the vendors from selling in the market, 21% reported that there were no problems, while 62% indicated that the municipal police prevented vendors from selling in the market. While an interview with the Chief of Police (KI: 32, 2012) suggested that vendors who violated market laws were given just verbal warnings about selling in an illegitimate location, both verbal and physically abusive treatment was consistently confirmed by respondents and

⁴⁷ Here social capital refers to 'horizontal linkages' based on relations of trust and shared values. Political capital refers to 'vertical linkages' which are based on relations of power and authority (Bebbington, 1999). Due to clear differences in the types of relations, and the centrality of socio-political relations to this paper, the social and political types of access will be discussed separately.

⁴⁸ Fourteen per cent of respondents provided an alternative response.

through the personal observations of the researcher (KIs: 21, 29, 2012; Personal Observations, 2012). In addition, municipal authorities regularly confiscated the goods of offending vendors who were perceived to be selling in illegitimate spaces. Vendors were required to pay a fine in order to recover their goods, some citing up to 2,000 (\$727 CAD) NS in damages. However, there were no statistically significant differences detected between rural and urban respondents, which suggest that political access is not experienced differently by urban and rural residents.

5.7.2.1 Experiences of Market Engagement

Assuming that the primary purpose of accessing the market is to invest and transform various capabilities so as to generate financial capability, the following findings are key to understanding processes of market engagement. Daily income was assessed at the individual level, since during the pilot study, women were often unaware of the incomes of their husbands (Personal Communication, 2012). This may warrant further investigation elsewhere on issues of power and control over household finances in the case study area, however, these issues are not investigated in this paper. The daily income of vendors ranged from 2 to 80 NS (\$0.78 to \$29.09 CAD) and averaged 17.60 NS (\$6.40 CAD), nearly 5 NS below the minimum wage of 22.5 NS per day. On average, two people supported each household, and the average number of dependents was 4.5.

Respondents were asked about their experience of gaining cash income in the market (see Table 5.1). Fifty per cent of respondents claimed that it had become increasingly difficult to earn money, while 23% reported that to earn money was relatively easy.⁴⁹ Respondents were then asked to choose among a list of responses that were randomly presented. Listed in descending order, the most frequent responses regarding the experience of gaining cash income in the market selected were: high competition (43%), lack of capital (13%), security concerns (11%), people (8%), transportation (7%), and laws (5%). There were no statistically significant

⁴⁹ Twenty-seven per cent of the sample either did not respond to the question or offered ambiguous responses which could not be categorized.

differences in responses of urban and rural groups (see Table 5.1), but again the descriptive statistics are informative. Nearly half of the rural (54%) and urban (48%) vendors described their experience of selling and earning money in the market as being difficult. Fifty per cent of urban respondents ranked competition as the greatest barrier towards earning in the market, while 39% of rural respondents also marked competition as the foremost barrier, even above transportation (18%). Finally, rural respondents earned approximately five NS less (\$1.94CAD) than urban respondents on a daily basis.

5.7.3 Experiences of Transforming Cash Income into Access to Infrastructure Services

In order to understand how vendors transform their cash earnings in order to gain financial access to formalized, privatized infrastructure systems, the proportion of daily earnings spent on transportation and electricity systems is examined (see Table 5.2). The analysis was also extended to assess the acquisition of a key electrical appliance, the refrigerator. Once again, respondents as a whole earned an average daily income of 17.60 NS (\$6.40 CAD), with the average daily income for rural vendors being 15.20 NS (\$5.53 CAD), while urban vendors earn 20.13 NS (\$7.32 CAD). On average, the total sample spent 33 per cent of their daily earnings on transportation expenses, and 9 per cent of daily earnings (26 NS monthly) were spent on electricity expenses. A significant difference was found in transportation expenses of the two groups, with rural respondents spending three times as much on transportation expenses as compared to their urban counterparts, while urban residents had a slightly higher electricity expense.

The acquisition of a refrigerator has been examined as an indicator of vendors' capabilities to financially acquire objects needed to fully benefit from electricity services. Ranging in price from 899 to 1,999 NS (\$349-776 CAD) (Personal Observations, 2012), refrigerators were owned by 12% of the overall sample, while 83% declared they were without.⁵⁰ Many explained that despite their wishes to acquire a refrigerator, it was unlikely to happen anytime soon. Some had

⁵⁰ The remaining five per cent of respondents did not respond to this question.

forgone the idea of ever buying such an appliance, a necessary sacrifice in effort to pay for their children’s education expenses. Others claimed their small earnings did not allow for such purchases (Personal Communication, 2012).

Table 5.2: Transforming Financial Capabilities into Acquisition of Infrastructure Services

Variable	Mean	Rural	Urban	Significance	Test
Daily Earnings (in NS)	17.60	15.20	20.13	.262**	ANOVA
Transportation expense as proportion of daily earnings (%)	33%	31%	10%	0.016*	ANOVA
Electricity expense as proportion of daily earnings (%)	9%	8%	11%	0.538**	ANOVA
Infrastructure Expense as proportion of daily earnings (%)	33%	43%	24%	0.186**	ANOVA
Refrigerator owned				.606**	Chi-square
Yes		7	16		
No		89	77		

* Indicates statistical significance of $p < 0.10$.

** Indicates a lack of statistical significance, yet was suggested as significant through qualitative analyses based on key informant interviews.

Further analysis sought to determine whether a correlation could be found between the three processes of access (transportation, market and infrastructure access). A significant relationship was established between the time to travel to the market, experiences with the municipal police, and daily earnings. Using a factorial ANOVA, a significant relationship was confirmed. People who were generally not bothered by the municipal police had, on average, higher daily earnings (18.27 NS) compared to those who reported being hindered (15.24 NS).

Those who were bothered by the municipal police also showed a longer commute time to the market (34 minutes) in comparison to those who did not have problems with the police (21 minutes).

In summary, the research has investigated three distinct sub-processes of rural accessibility, and the experiences of rural and urban vendors have been compared. The findings demonstrate that multiple dimensions of accessibility, which involve multiple institutions and require an array of capability types, may co-exist or conflict, influencing the ability of vendors to gain comprehensive access to transportation, markets, and privatized infrastructure services.

5.8 Discussion

The findings confirm the complexity embedded within multiple processes of rural accessibility that simultaneously enable and constrain rural highlanders' comprehensive access to transportation, markets, and infrastructure services. The process of rural accessibility has been divided into three sub-processes, involving access to transportation, access to the market, and access to infrastructure services. Each process is regulated by multiple institutions that require a range of capability types in order for individuals to navigate the acquisition process. While the critical acquisition framework allows for analyses of any combination of institutions and capabilities involved, the findings of this research have highlighted the interrelationship between political access to the market, financial capabilities, and financial access to infrastructure services.

Transportation access to the market is indeed more expensive, time consuming and laborious for the rural vendors when compared to urban vendors. In this respect the results are not extraordinary. However, as has been argued throughout this paper, transportation access is an important part, but insufficiently accounts for market accessibility. Based on these findings, the extent to which transportation interventions such as expanded coverage or subsidization programs might improve physical access to markets will bear limited effect insofar as political

dimensions of market accessibility are counter-effective. Physical accessibility to the market is hindered by a political inaccessibility that stems from inequitable relations between the municipal authorities and market vendors. While vendors may experience varying levels of difficulty in gaining physical access to the market, their capabilities to retain access to a physical space and to retain ownership of their goods are over-powered by municipal authorities. The confiscation of goods by municipal authorities is an act that significantly compromises financial capabilities of vendors at an individual level. Despite the similarity of actions taken by municipal police against urban and rural vendors, these acts bear a differential impact on the two groups. On average, rural vendors earn five NS less than urban vendors, while their daily transportation expenditure is three-fold higher for rural vendors in comparison to urban vendors. Compromising vendors' ability to sell by confiscating their goods has a more severe effect on the financial capabilities of rural vendors, their access to the market, and their financial capabilities to access transportation and other privatized infrastructure services.

The relative ease of financial access to the market has, over the years, created a saturated situation, in which vendors not only struggle to find a physical space to sell their goods, but also in which they struggle to receive an advantageous price for their products. Similar findings have been cited by Lyons and Brown (2010) in their research of the infiltration of Chinese markets in Sub-Saharan Africa, in which increased competition has "eroded prices and profits" for local populations (p. 776). In Cajamarca, the increased vendor population may be attributable to many factors, such as increased inward city migration from the rural highlands (INEI, 2009: 21), along with improved transportation routes between Cajamarca and the coastal region that facilitate transportation access for non-local vendors (Key Informant Interviews: 19, 25, 26, 27, 34). Comparable findings have been reported in northern Guatemala, where improved road infrastructure has facilitated access for larger scale commercial farmers to a previously remote region (Shriar, 2009). In Cajamarca, the social-political composition of the market has changed to

include individuals better endowed with financial capabilities, granting them a powerful advantage in navigating the market institutions.

The influence of high competition in the market points to an important and added element of market accessibility, which is not only the ability to access the market, but also the ability to derive benefit from market participation. Political constraints imposed by municipal authorities, along with a heightened level of competition in the marketplace, press vendors to sell products at a reduced cost, and require vendors to work longer hours in order to meet modest household expenses (Personal Communication, 2012). In parallel to increased competition that forces vendors to sell their products at reduced prices, the cost of supplies are consistently increasing, along with transportation fares, household expenses, and other infrastructure costs. For example, over the course of fieldwork, the price for one kilogram of rice, an important dietary staple, had increased by 50% from 2 to 3 NS. These forces combine in a constant squeeze of vendors, many of whom find it difficult, often impossible to save, let alone break a cycle of perpetual hand to mouth subsistence. In effect, while rural highlanders gain physical access to the marketplace with relative ease, constraints on their market engagement affords limited benefits to facilitate access to privatized infrastructure services.

The meagre income earned in the ever competitive marketplace leaves little financial capabilities to pay for infrastructure services or related goods. This finding is most apparent in the daily observation of vendors who travel to, from and within the market without shoes (Personal Observations and Communications, 2011 - 2012). Furthermore, analysis of the ownership of electrical appliances confirmed that income earned through market participation were insufficient to purchase appliances needed to fully benefit from electricity infrastructure systems. The limited income earned in the market imposed a situation in which vendors sacrificed one infrastructure need for another.

5.9 Discourses of Inclusivity and Markets of Exclusivity

As local development discourses and existing rural transportation infrastructure promote the integration of rural highlanders into the mainstream of Peruvian society, economy, and polity; rural experiences reveal a different dynamic. The summary of discussion is hereby framed, once again, in reference to two key questions presented earlier in this paper.

Access for whom? Neo-liberal development policies portray the free market as a highly inclusive system. Within the context of market institutions found within the Central marketplace examined here, each vendor is purportedly free to exercise their freedom to participate in the market through the selling of goods and services, and to purchase infrastructural services and goods (such as shoes and electrical appliances). However, as the results of this research suggest, since vendors are differentially endowed with capitals and capabilities of multiple types, comprehensive access to navigate and benefit from market institutions will remain inequitable. In short, the very competitiveness embedded within the rules of the free market ensures that not everyone will win, benefit, or will be able to afford refrigerators. In effect, the rural highlanders are marginalized by the very market institution in which they are encouraged to participate. The inequity of the free market system appears less problematic when assessing the effects from the position of developed country contexts, in which institutions of social security are adequately implemented and usually provide for a basic level of human needs. However, in place-specific environments such as Peru, where such institutions of social security are poorly developed, the consequences of not 'winning' can be a vital matter for those who have already been pushed to the margins of the polity, economy and society.

The high competition inherent to the Central marketplace included in this study conjures questions of whether it is possible for there to be too much accessibility to markets or any other institution. While the free market is often presumed to harbour the free-flow of unlimited and unrestricted cash resources, the saturated competition within Cajamarca's central marketplace

reveals the instability of market institutions, and of livelihoods that rely on market institutions as a sole providing mechanism of basic needs (Moser, 1998). Similar arguments have been made in relation to the promulgation of infrastructure services, such as irrigation, which have been found to create too much access to limited water resources, resulting in inequitable distribution, and eventual resource exhaustion (Shiva, 2002).

The findings also conjure an additional question: is the partial integration of rural highlanders into market economies the result of rural highlanders exercising their agency? Given the limited financial capabilities some rural highlanders have to navigate market institutions in comparison to the high natural capabilities they are endowed with to engage in subsistence agriculture, it is possible that their partial integration into market institutions while maintaining agricultural livelihoods is a risk adverse, resilience-maximizing strategy (Ruben & Bastiaensen, 2000). Conversely, it may also illustrate the limits of agency of rural highlanders insofar as their limited capabilities to navigate and derive benefit from the market forces them to retain greater security through maintaining rural residences, agriculture activities, and rural livelihoods.

Access to What? Rural areas, despite being portrayed as impoverished spaces, are highly endowed with natural and mineral resources, producing much of the world's food, and harbouring substantial water resources, fossil fuels and renewable resources (Woods, 2011). Yet with the exception of functional arguments, the value of land and other natural resources that are highly available in rural spaces are seldom overtly recognized within mainstream development discourses. Emic perspectives of rural accessibility warrant a re-evaluation of the notion of 'geographical disadvantage' (Escobal & Torero, 2003; Escobal, 2005; Limao & Venables, 2001), as resources of high value sit within close proximity to rural spaces. In a relative sense, rural spaces may indeed be remote from the perspectives of urban populations. However, by consulting rural perspectives, it is not difficult to envision that urban spaces and their

populations may be comparatively disadvantaged, due to their inaccess to land, and their reliance on inequitable economic institutions to provide for their basic household needs.

The implications of the critical acquisition framework and these findings are significant on multiple levels. First, the findings indicate a need to revisit discourses of inclusivity implied by rural transportation policy amidst highly inequitable societies. For if reducing vulnerability is a goal of such interventions, then it is worthwhile to equally consider whether vulnerabilities of rural populations may be exacerbated by deeper integration into market institutions. Second, for development policymakers who take genuine interest in reducing poverty, the critical acquisition framework can be useful for examining multiple other processes of accessibility. When adapted, the framework can be applied to understand how rural highlanders draw from existing capabilities to navigate multiple other types of institutions such as land tenure, legal systems, education, health institutions and more.

In closing, this research has argued for a renewed focus on intra-societal power relations for understanding rural accessibility processes. The critical acquisition framework provides for an enhanced understanding of place-specific socio-political realities inherent to rural accessibilities, and can offer new insights for more effective and culturally appropriate rural development strategies. This research has demonstrated the importance of acknowledging the integral role of socio-political relations inherent to multiple accessibilities involved in a comprehensive notion of rural accessibility. An emphasis of rural experiences of multiple accessibilities can help to understand how processes of accessibility unfold amidst place-specific everyday realities, and can further assist policymakers in understanding how rural (or other defined) populations navigate transportation, markets, and other infrastructure institutions.

6 Conclusion

6.1 Introduction

The aim of this research has been to critically examine infrastructure development processes based on the lived experiences of marginalized populations and to integrate such experiences into the construction of infrastructure knowledge. To achieve this aim, I have examined the research problem through a critical-social theoretical lens to produce three manuscripts. Each of these manuscripts addressed the topic of infrastructure access in different ways. In Manuscript 1 (Chapter 2) I provided an overview of the infrastructure development research, argued that the critical perspective be given greater prominence, and towards this end I proposed the Critical Acquisition Framework. The framework was then tested and applied in two separate case studies to produce Manuscripts 2 and 3 (Chapters 4 and 5). This chapter presents a summary of these manuscripts, followed by a synopsis of the findings in relation to the key themes indicated in the conceptual schematic (Figure 1.1), and the objectives of this dissertation. Next, the contributions and challenges of the research are discussed, followed by an overview of future research directions and closing remarks.

6.2 Research Summary

6.2.1 Manuscript One

The Science and Politics of Infrastructure Research is a conceptual paper that examines the state of existing infrastructure development literature through a critical lens. I outlined three ways infrastructure has been conceptualized within development studies, and identified existing weaknesses that lent to the justification of my research approach. I argued that multiple perspectives inform the current state of knowledge on infrastructure development. I questioned whether the dominance of technocratic and interventionist perspectives in infrastructure research and praxis has been the result of a more rigorous scientific process, or the product of a politicized process of knowledge construction. The key weaknesses identified within these approaches are their failure to incorporate issues of power, place and agency as central components of infrastructure development research. As a result, infrastructure interventions

that are informed by existing research are often introduced with little consideration to the existing socio-political contexts in which they are placed. While critical perspectives within infrastructure research have adopted these themes well, the absence of a systematic framework by which to undertake a critical analysis of infrastructure processes hinders the advancement of the critical perspective. Towards this end, this paper scrutinizes the normative orientations of prevailing positivist approaches within infrastructure research, and advocates for a critical-social theoretical approach for understanding infrastructure development processes based on the experiences of marginalized groups. The key contribution of this paper and of this dissertation is the Critical Acquisition Framework, which can aid researchers in understanding the nature of infrastructure development processes within the context of inequitable societies.

6.2.2 Manuscript Two

In *Women's Acquisition of Domestic Water Services in Cajamarca, Peru*, I applied the Critical Acquisition Framework, and examined the experiences of three marginalized women's groups representing urban, peri-urban, and rural locales, as they accessed domestic water infrastructure systems. The research illustrated how access to domestic water systems is regulated by various institutions, and how organizations representing more dominant societal actors shape institutions that regulate access to infrastructure and other livelihood resources. In examining the acquisition processes of the three different women's groups, I found that capabilities are less significant than the quality of institutions that regulate access to infrastructure services. Formal institutions were also suggested to be more inaccessible and less efficient than informal institutions in the provision and acquisition of domestic water services. The findings also demonstrated how examining capabilities in relation to institutions of domestic water provision can deepen understanding of how marginalized groups exercise agency, and also of the limits to this agency when navigating institutions that regulate access to infrastructure systems. Together these findings provide insight into how inequitable socio-political relations are produced and reproduced through domestic water systems, and through infrastructure systems in general.

6.2.3 Manuscript Three

The third manuscript, entitled *Access for Whom and to What? A Critical Acquisition Framework for Understanding Rural Experiences of Multiple Accessibilities*, argues that notions of rural accessibility tend to oversimplify the complexity of access, while neglecting place-specific socio-political realities, and exaggerating the homogeneity of polities, economies and societies. The paper explores the multiple dimensions of infrastructure accessibility processes, and investigates individual experiences of acquisition from the perspectives of informal market vendors in the Central Marketplace of Cajamarca, Peru. The findings demonstrate the interaction between three distinct and related processes and multiple dimensions of rural accessibility: transportation access, market access, and infrastructure access. These processes were compared between two sub-groups of rural and urban residents. The findings demonstrate how each accessibility process is regulated by multiple institutions that require a range of capability types in order for individuals to navigate a comprehensive access to livelihood resources. Most notable of these interactions is in the influence of informal political institutions that restrict access, which constrain the generation of financial capabilities within the market institution, and are argued to have a more severe effect on the capabilities of rural residents to access infrastructure services and transportation. Although the framework depicted in Figure 5.1 portrays a linear relationship, the process is made cyclical by the fact that infrastructure access is inclusive of transportation access. It is also concluded that in light of these complex institutional relationships that shape access, increasing access to markets for rural populations will not be effective in the absence of socio-political considerations and measures to restore equitable terms of market engagement for all societal groups.

6.3 Synthesis

Together these manuscripts have evolved to explore the notion of infrastructure access. When viewed from a critical theoretical lens and based on the concept schematic offered in

Figure 1.1, the notion of infrastructure access can be better understood by examining three overlapping relationships of: agency and infrastructure acquisition, institutions and infrastructure acquisition, and institutions and agency.

6.3.1 Agency and Infrastructure Acquisition

Agency has been defined as the will and capability to act in a way that one has reason to value. Therefore, when considering the agency of infrastructure acquisition from the perspectives of marginalized groups, it is essential to first inquire whether such groups have a will to access infrastructure, and if the infrastructure system in question is defined as being advantageous according to emic definitions of development. While this research did not examine emic definitions of infrastructure in depth, emic perspectives were taken into consideration in Manuscript 2 (Chapter 4) in which the participants (women's groups) decided upon domestic water systems as the infrastructure system most worthy of research. Manuscript 3 was undertaken based on my assumption that informal vendors who travelled to the market would value transportation as a worthy infrastructure, along with the market itself as a worthy institution for research.

Pending that the infrastructure system in question fits within emic definitions of development, the ability to access infrastructure is largely influenced by the capabilities of actors, and more specifically, the compatibility of their existing capabilities with the institutions that regulate access to the infrastructure system. For example, privatized electrification systems and services are provided through the market institution, and require financial capabilities of the actor for access to occur. Without sufficient capabilities to access infrastructure services, the actor must deploy their existing capabilities to access infrastructure by alternative means. This may include gaining access by way of alternative institutions (often informal), by creating new institutional arrangements, or by creating one's own infrastructure (Figure 2.1 and Table 2.3). With sufficient capabilities to access infrastructure services, actors are well positioned to build on their existing set of capabilities. However, in situations in which access cannot be achieved,

either due to restrictive institutions or insufficient capabilities, not only can this predicament result in a failure to gain capabilities, but it can also lead to capability decline and/or vulnerability increase and an overall reduction in human agency (Manuscript 1, Chapter 2).

The capabilities of each actor within the case studies were examined in relation to the infrastructure that was being accessed. In Manuscript 2 (Chapter 4), differences surfaced between the financial capabilities of three women's groups. Based on a comparison of daily income, the urban group at first appeared more financially capable of accessing domestic water systems. However, when these capabilities were compared to the cost of infrastructure services, and in relation to other household expenses, it was found that the peri-urban and rural groups had greater financial access to domestic water infrastructure. Moreover, the contributions of physical labour by rural and peri-urban communities towards the construction and maintenance of their domestic water systems helped to maintain lower user fees. Another key difference that surfaced in the capabilities of the three groups is the social capital (trust) of women towards their institutions of domestic water provision. The peri-urban and rural groups were found to have more trust in their informal institutions than the trust held by the urban group toward their formal institution of domestic water provision. Based on these findings it is concluded that the provision of modernized infrastructure systems within urban environments does not guarantee access to quality infrastructure systems, particularly amongst marginalized groups.

In Manuscript 3 (Chapter 5), a number of differences surfaced between urban and rural vendors in Cajamarca's central marketplace. Urban vendors were found to earn 32% more by working in the market, and their daily transportation costs were reported as 68% less than the rural vendors. Another capability that was explored in this study was the political capability of vendors in the marketplace, which were insufficient in that their physical access to sell in the market was constantly restricted by municipal officials. While political capabilities seemed to be equally applied across rural and urban groups, I have argued that compromising the physical

access of vendors is more detrimental to the financial capabilities of rural vendors', which is also detrimental to their agency and comprehensive accessibility.

6.3.2 Institutions and Infrastructure Acquisition

The examination of marginalized actors' experiences of accessing infrastructure has revealed that the provision of infrastructure does not indelibly result in infrastructure access. Rather societal actors must constantly navigate various institutions that regulate the acquisition of infrastructure systems. These institutions, be they formal or informal, constantly regulate infrastructure access, and can be enabling or constraining to the acquisition process. Manuscript 2 (Chapter 4) has examined formal and informal institutions that are involved in regulating access to domestic water infrastructure. These institutions include those established by a state owned corporation (SEDACAJ) and two locally-elected water committees. In Manuscript 3 (chapter 5) I examined multiple institutions that are integral to the comprehensive process of rural accessibility (including transport, market, and infrastructure-related institutions). Particular emphasis was placed on the market institution in regulating access to transportation, market, and broader infrastructure access.

This research has taken a very different approach to institutions than what currently exists within the infrastructure research. Contrary to definitions that portray institutions as apolitical rules that guide human interactions, and in contrast with concerns over 'getting the right institutions' in place to facilitate etically-defined development processes; this research has viewed institutions from a critical-social theoretical lens. Through this lens, institutions have been described as products of socio-political actor relations. That is to say, institutions are typically created by more powerful actors within societies, and through the production of infrastructure institutions, these powerful actors largely shape the terms by which infrastructure systems (and other livelihood resources) can be accessed.

The importance of critically evaluating the role that institutions play in infrastructure access is that not all institutions are created equitably, nor do institutions always have equitable effects. This perspective provides an alternative view that contrasts with individualist notions of access, which point to a lack of individual capabilities and an unwillingness to pay, as a key barrier to infrastructure access. A critical analysis of the role of institutions in infrastructure access reframes the infrastructure polemic in a new way, which to my knowledge, has not explicitly been applied within infrastructure development research. For example, in Manuscript 2 (Chapter 4), the individualist polemic of inaccess might focus on the lack of capabilities of the urban women's group to demand access to their institutions and receive answers from the SEDACAJ office regarding the quality of their water. However, the institutionalist polemic of inaccess provides new insights to how inequitable access arrangements are produced. In this case, the most notable inequitable arrangement was the privileged access of the mining company to information about water quality over the access of the group and the general public. In Manuscript 3 (Chapter 5), the individualist polemic would view the inability of informal vendors in the central marketplace to be the result of their unwillingness or inability to work enough to generate sufficient capabilities to purchase refrigerators. However, an institutionalist polemic would focus on the saturated, over-competitive marketplace, and the informal political institutions that restrict the comprehensive accessibility of informal vendors.

Based on the findings of the case studies, it is concluded that infrastructure institutions may facilitate infrastructure for some, but they also may restrict access for other societal groups. Institutions may also be considered highly efficient and advantageous from the perspectives of their creators, and those who benefit from such institutions. However, from marginalized perspectives, institutions may restrict the generation of capabilities, and may create vulnerabilities as well. In this way, institutions, as products of socio-political relations, shape how infrastructure is accessed.

6.3.3 Infrastructure Acquisition, Institutions, and Agency

This analysis of institutions, agency, and infrastructure acquisition leads to a deeper understanding of the socio-political context and its integral role in infrastructure development processes with respect to infrastructure acquisition. From this critical analysis, the following conceptual insights have emerged:

- Institutions are produced by socio-political relations that intimately shape infrastructure access within societies.
- Like institutions, infrastructure are products of socio-political relations. For this reason, any infrastructure object or system can serve as a useful entry point towards understanding socio-political landscapes within societies.
- As dominant actors deploy their capabilities and exercise agency in shaping infrastructure and their related institutions, so too do dominant actors shape the terms of access. Through the production of institutions, dominant actors shape the acquisition of capabilities of others, having a direct effect on the agency of others within society.
- As marginalized actors exercise agency in navigating infrastructure institutions and accessing infrastructure systems, their agency to access infrastructure is largely determined by their capabilities in relation to the institutions that regulate infrastructure access. In cases where institutions restrict access, these actors may find alternative means to acquire infrastructure systems, but in other instances some actors will have insufficient capabilities and/or debilitating vulnerabilities that will limit their agency. In such cases, a lack of access to infrastructure systems will lead to ultimate deprivation of basic human needs.

Based on the empirical findings and these theoretical insights, it is concluded that inequitable power relations permit the production of inequitable institutions that shape inequitable terms of infrastructure access, which reinforce and perpetuate inequitable intra-societal relations. Here the term 'acquisition' of infrastructure assumes a double connotation in that successful

acquisition of infrastructure will, directly or indirectly, lead to greater acquisition of human capabilities, thereby increasing the agency and, therefore, power of marginalized groups.

6.3.4 A Critical Perspective of Infrastructure Development

The critical perspective that has been applied in this analysis of infrastructure development processes has helped to deconstruct the power asymmetries inherent to the production of infrastructure systems and infrastructure knowledge. Towards this aim, I have developed the Critical Acquisition Framework. However, the greater purpose of this exercise lies not solely in deconstructing current ideas of infrastructure development, but in aiding the recognition that current practices in infrastructure research and praxis can be challenged and transformed. The importance of the critical perspective towards infrastructure is that it helps to envision an alternative reality in which infrastructure development research and praxis may equitably serve the needs of all societal groups. It helps to envision an alternative reality by which social equity may be achieved.

6.4 Addressing the Research Objectives

Following the previous discussion that revisits the key themes of the conceptual approach, it is now appropriate to discuss how the research addressed the objectives set out in Chapter 1. These objectives and the corresponding chapters in which they have been addressed are outlined in Table 6.1.

Table 6.1 Addressing the Research Objectives

Research Objectives	Chapters in Which the Research Objectives are Addressed
1. To conceptualize the role of human agency in infrastructure development processes.	Chapter 2: Capabilities are explained as being central to agency, and are conceptualized as being integral to infrastructure acquisition. The Critical Acquisition Framework (CAF) focuses on agency-oriented process of infrastructure development.
	Chapter 4: Insights derived from case study inform the CAF. Rural and peri-urban women demonstrate little financial capability yet high social capability, the latter of which facilitates their access to domestic water. The lack of agency of urban women in terms of social and human capabilities demonstrates the limits of agency in accessing infrastructure.
	Chapter 5: Multiple capabilities (financial, human, social, political) are recognized as necessary to navigate access to multiple overlapping institutions, which regulate infrastructure development and particular acquisition processes. The absence of political capabilities restricts access to financial capabilities, and therefore to infrastructure.
2. To develop and apply a systematic framework for analyzing agency-oriented processes of infrastructural development.	Chapter 2: The CAF is drafted and applied to two case studies. Findings from the case studies are integrated to refine the CAF.
	Chapter 4: Insights from case study help inform the CAF regarding the acquisition capabilities and vulnerabilities as well as enabling and disabling institutions.
	Chapter 5: Insights from case study help inform CAF insofar as illustrating how socio-political context is comprised of actors of differential power, some of which enable while others restrict multiple accessibilities
3. To examine how marginalized groups exercise agency in accessing infrastructure systems, and to understand how access to infrastructure systems (and a lack of access) influences their agency.	Chapter 4: Access to domestic drinking water is more accessible to rural groups through their deployment of financial and social capabilities. The urban group deploys financial capabilities, but does not have sufficient social or human capabilities to facilitate access to domestic water systems.
	Chapter 5: Access to rural transportation is largely dependent on financial, political and human capabilities (health). When political access is denied and/or goods are compromised, capabilities decline significantly, thereby limiting agency to access infrastructure systems and overall agency. Some vendors sacrifice certain infrastructures (ie. refrigerators) in order to access education for their children.
	Chapter 2: Capabilities and therefore agency are understood as partial to the acquisition process. Vulnerabilities are also noted to influence human agency. These insights are integrated into the CAF.
4. To examine how marginalized groups access infrastructure institutions, and to	Chapter 4: Rural and peri-urban groups easily access informal water institutions, in comparison to the urban group’s access to a formal water institution. Rural institutions demonstrate a more democratic structure, while the urban institution is less navigable or negotiable due to impenetrable power

understand how their ability to navigate and shape infrastructure institutions influences their agency.	relations.
	Chapter 5: Informal vendors primarily access infrastructure (including transportation) via the market system. However, informal political institutions play a major role in their generation of financial capabilities in the central marketplace. New economically powerful actors have been introduced to the market. In effect, the market has become saturated, competition and inflation has increased. Vendors who were once on the margins are further pressed to meet their daily needs.
	Chapter 2: The CAF illustrates that institutions may play a role in the enabling or disabling of the acquisition process. Institutions are described as being enabling when they promote the generation of capabilities. Institutions are described as disabling when they lead to the generation of vulnerabilities. The CAF further explains that infrastructure institutions are shaped by more powerful actors in societies, which shape the terms of infrastructure access.
5. To analyze the interrelationships between structural and agency-oriented processes of infrastructure development.	Chapter 4: With respect to the urban women’s group, it is suggested that the ineffectiveness of the urban institution may be actively constructed to maintain the interests and perpetuate the power and agency of local elites. And yet with regard to all groups, certain compromises to water quality or quantity can create substantial human vulnerabilities (ie. health) of populations, which directly hinders their agency, not only to access infrastructure, but to navigate and negotiate the institutions that shape infrastructure access.
	Chapter 5: The constant negotiation between individuals and their capabilities with regulating institutions is demonstrated through three sub-processes of transportation access, market access, and infrastructure access. The socio-political context, particularly manifested in the actions of local municipal police, have a direct effect on the ability of informal vendors to generate capabilities and agency.
	Chapter 2: Based on the experiences of infrastructure acquisition in the case studies, the CAF is designed to reflect a cyclical process of constant interplay between capabilities and institutions.
6. To integrate place-specific and marginalized perspectives in the reconstruction of infrastructure knowledge.	Chapter 3: A mixed-methods research design is used to generate place-specific insights towards the generation of the CAF.
	Chapter 2: The findings and insights from Chapters 4&5 have been integrated to refine the CAF. The insights from these case studies were primarily generated by examining the experiences of marginalized groups as they accessed various infrastructure systems. The findings then informed the refinement of the CAF as it appears in Chapter 2

6.5 Research Challenges and Contributions

Throughout this research, a number of challenges were encountered that posed several limitations for this research. To begin, the scope of the interdisciplinary literature pertaining to infrastructure development meant that only a selective literature review could be applied within Chapter 2. More detailed and thorough literature reviews were conducted with respect to the infrastructures examined in each case study. While the tendencies of technocratic perspectives to place infrastructure systems over social entities were critiqued in Chapter 2, the literature reviews of both case studies were anchored by the respective types of infrastructure systems. These unifying themes of domestic water systems and rural transportation reflected the current organization of infrastructure research.

While the two case studies explored topics of infrastructure acquisition in considerable depth and breadth, it must be acknowledged that the insights generated from these case studies are partial, and have been influenced by my critical-social theoretical lens to observe and expose societal inequities. Throughout the research, I employed various methods to ensure rigour of my interpretations, and to aptly represent the experiences of the research participants (Sections 3.5.5 & 3.5.6). However, it is indeed possible that at times my interpretations were coloured by my theoretical lens.

The empirical findings that were generated through two case studies provide a limited representation of processes of infrastructure acquisition in Cajamarca, and in Peru more generally. Much less can these findings represent infrastructure development processes in Latin America and all inequitable societies. However, these case studies are viewed as a starting point, by which empirical, place-specific observations can begin to inform the way infrastructure development is understood. Therefore, it is expected that with more case studies on the process of infrastructure acquisition, the Critical Acquisition Framework will be further revised.

Finally, while the research intentionally focused on the experiences of marginalized groups as they interacted with various institutions at the local scale, this emphasis was at the cost of acknowledging other institutions and actors at larger scales of analyses. In part, this local focus was maintained due to the contentiousness of the case study area at the time of field work. While this lack of emphasis on other actors was also a conscious trade-off that was made in order not to compromise my rapport with my primary research participants (Section 3.5.4), I acknowledge that this choice may have limited my insights into the actions and motivations of more dominant actors and influential institutions within Peruvian society.

6.5.1 Theoretical Contributions

This dissertation offers a new way of thinking about old infrastructure and development problems. The critical perspective towards infrastructure research has addressed inequities in the production of infrastructure development research, so as to generate more inclusive knowledge and debate of infrastructure development processes. The need to examine infrastructure from a critical lens, along with the need for more place-based research of agency-oriented processes, carves ample opportunities for development scholars, policymakers and practitioners to make new contributions to the infrastructure research. Increasing place-based research on infrastructure processes can also lead to more geographical, cultural, and politically relevant analyses of infrastructure accessibilities. By examining infrastructure development processes from the perspectives of marginalized groups, researchers can identify inefficiencies and inequities within institutions of infrastructure acquisition to complement recent research on the governance of infrastructure provision. With increased coordination of critical perspectives, and improved knowledge of the diversity and complexity of infrastructure development processes, infrastructure policy and planning may be better informed and produced towards the aim of reducing inequality. Pending the political will to adopt this research into policymaking and praxis circles, infrastructure policymaking and planning has potential to be planned in place-specific, locally relevant and more effective manner.

6.5.2 Empirical Contributions

Specific to the case studies in Cajamarca, Peru, the findings point to a need to address current inequalities that are produced in the form of inequitable institutions that regulate the infrastructure acquisition process. The institutions examined in Manuscript 2 (Chapter 4) suggest that more accountability and transparency is needed within the urban water institutions. Also, given the dire effect these institutions can pose for the health of Cajamarquino society, the consequence of not addressing institutional inefficiencies will weigh directly on the abilities of the people of Cajamarca to navigate and negotiate their water institutions. Based on the findings of Manuscript 3 (Chapter 5), it is also advisable that in order to increase infrastructure accessibility, the transparency of the local municipal police must be addressed, and the informal institutions that promote the harassment of vendors and confiscation of their property must be resolved. Further measures to regulate participation within the local market, and to promote participation of local vendors would also be helpful. Altogether, these findings indicate not a need for further development programs aimed at improving the capabilities of marginalized groups, but rather a need to re-habilitate ineffective institutions for the purpose of restoring equity in the infrastructure acquisition process.

6.5.3 Methodological Contributions

While the application of a critical methodological approach and mixed-method research design has not been the central focus of the research, this approach has not been widely applied within the existing research on infrastructure development. Guided by philosophical assumptions that understand truth as a contested concept, the critical methodological approach can potentially produce much different insights than positivist paradigms that currently dominate infrastructure development research. Furthermore, the application of mixed-methods was a necessary approach for achieving an inclusive and equitable research process. Thus, the application of critical and mixed methodological approaches is a promising area for future

research, which may pioneer a more inclusive and representative process in infrastructure development research.

6.6 Future Research Directions

The research presented in this dissertation and particularly the Critical Acquisition Framework can be further elaborated in a number of research directions. First, further validation of the Critical Acquisition Framework can be achieved through its application to other case studies within inequitable environments apparent within both developed and less developed country contexts. The Critical Acquisition Framework should also be expanded to investigate acquisition experiences relating to other infrastructure systems beyond those that have been examined in this research. These can include welfare serving types of infrastructure, such as education, healthcare, justice and protective services, or physical types of infrastructure that rely on renewable sources of energy. The framework may also be applied towards understanding different dimensions of power relations, possibly defined by gendered, ethnic, sexual orientation or otherwise differentiated.

While the research has largely emphasized the capability component of agency as it related to infrastructure access, there is also much room to explore the will of different marginalized groups to access infrastructure systems. This will necessitate an exploration of alternative definitions of infrastructure and of development, and can likely provide insights into more culturally sensitive and locally relevant infrastructure interventions.

This research has focused on social, political and the built environments. However, the connection of infrastructure systems to the natural environment requires further exploration, and may be incorporated into the Critical Acquisition Framework. These considerations are particularly apparent in the energy required to fuel infrastructure systems (gasoline, electricity, and water sources), and new concerns over infrastructure in northern regions amidst changing natural environments in light of climate change.

In exploring the agency-oriented aspects of infrastructure systems, this research has focused on how marginalized actors exercise agency in relation to infrastructure interventions. However, there is more to be explored on how such acts of agency take the shape of civil resistance towards unwanted infrastructure objects and systems. In addition, there is fertile ground to discover how marginalized actors exercise agency in providing for their own infrastructure needs.

The Critical Acquisition Framework is a conceptual model, and for this reason, the findings that are presented in the two case studies are not intended to be explanatory or generalizable to other locales. However, there is potential to apply critical perspectives in general and the Critical Acquisition Framework in particular for the purpose of understanding infrastructure development processes in inequitable societies beyond Cajamarca, Peru.

Continued research may involve applying the critical perspective and the Critical Acquisition Framework towards the aim of understanding the experiences of infrastructure access among First Nations communities in Canada. Potential topics to be examined include the experiences of First Nations groups as they access basic infrastructure services of heat, electricity, domestic water, transportation, education, legal aid and healthcare services. The critical perspective can help to explore the consequences of integrating First Nations groups via various infrastructure systems into a broader Canadian society, situated within current and contested cultural, social, and political realities. Such research may also bring to fore the agency of more dominant actors in the construction of infrastructure systems – systems that may be seemingly apolitical and promoted under the guise of a single and homogenous national interest. Finally, there is much opportunity for continued research that seeks to understand infrastructure development processes, which are emically defined and based on multiple perspectives of First Nations people. Understanding how and whether infrastructure systems and institutions contribute to human agency, in accordance with the values of First Nations groups, may be key in constructing equitable processes of infrastructure development.

6.7 Concluding Remarks

This research has identified a fundamental inequality within infrastructure praxis, policymaking and research. To address this issue, I have sought to further the knowledge of infrastructure and infrastructure development processes through integrating the experiences of marginalized groups to help shape a new and inclusive reconstruction of infrastructure knowledge. Towards this aim, I have created the Critical Acquisition Framework and applied the framework to two case studies situated within the context of high inequality located in Cajamarca, Peru. Together the findings have produced an array of insights relating to infrastructure access, agency, and institutions, which have contributed to the current knowledge of infrastructure development processes from an acquisition perspective. It is hoped that continued research in this area can help to counter the inequitable power asymmetries within infrastructure knowledge, such that infrastructure development can be planned towards the aim and effect of restoring societal equity.

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Appendices

Appendix 1: Manuscript 2 Group Interviews

Field visit no. 1.

TA Group	2 meetings	Urban
CH Group	2 meetings	Peri-urban
BH Group	2 meetings	Peri-urban
AH Group	2 meetings	Rural
DL Group	1 meeting	Peri-Urban
AL Group	1 meeting	Urban
UR Group	1 meeting	Peri-Urban

Field visit no. 2

Group Interview No. 1	December 13 2011	Urban
Group Interview No.2	December 16 2011	Peri-urban
Group Interview No. 3	December 17 2011	Rural
Group Interview No. 4	January 17 2012	Urban
Group Interview No. 5	January 17 2012	Rural
Group Interview No. 6	January 18 2012	Peri-urban
Group Interview No. 7	January 25 2012	Peri-urban
Group Interview No. 8	January 24 2012	Urban
Group Interview No. 9	January 28 2012	Rural
Group Interview No. 10	January 31, 2012	Urban
Group Interview No. 11	February 3 2012	Peri-urban
Group Interview No. 12	February 4 2012	Rural
Group Interview No. 13	February 7 2012	Urban

Appendix 2: Manuscript 2 Key Informant Interviews

Key Informant No. 1	May 21, 2011	Water Committee President Rural
Key Informant No. 2	January 17, 2012	Civil Engineer
Key Informant No. 3	January 20, 2012	Progresso Representative at SEDACAJ
Key Informant No. 4	January 28, 2012	Water Committee Meeting Peri-Urban
Key Informant No. 5	February 2, 2012	Manager of Operations at SEDACAJ
Key Informant No. 6	February 2, 2012	Manager of Quality Control at SEDACAJ

Appendix 3: Pilot Study Questionnaire

Questionnaire – Pilot Study #1

Cuestionario – Estudio Piloto N°1

Sexo: Femenino ____ Masculino ____

Gender: Female ____ Male ____

1. ¿Cómo vino Usted al mercado hoy día? (caminando, bus, taxi, combi)
How did you come to the market today? (walk, bus, combi, taxi)
2. ¿Por qué escogió este tipo de transporte?
Why did you choose this type of transportation?
3. ¿Cuánto le cuesta venir al mercado? (ida)
How much does it cost you to come to the market? (1 way)
4. ¿De qué barrio o comunidad viene Ud.? b ¿Vive allí?
From which neighbourhood or community did you come? Do you live there?
5. ¿Qué tiempo vive en Cajamarca? (años)
How long have you lived in the department of Cajamarca? (years)
6. ¿Es Ud. del campo o de la ciudad?
Are you from the city or the fields?
7. ¿Cuánto se demora en venir al mercado? (minutos) ¿Y regresar a casa?
How long does it take you to come to the market? (minutes) and to go home?
8. ¿Se siente seguro(a) viniendo al mercado? ¿Por qué?
Do you feel safe walking to and from the market? Why or why not?
9. ¿Se siente seguro(a) caminando dentro del mercado? ¿Por qué o por qué no?
Do you feel safe walking inside the market? Why or why not?
10. ¿Tiene un puesto para vender sus productos (dentro del mercado)?
Do you have a stand to sell your products (in the market)?
11. ¿Este es su negocio o trabaja para alguien?
Is this your business, or are you working for someone else?
12. ¿Qué tipo de productos trae al mercado?
What kinds of products do you bring to the market?
13. ¿Cómo trae sus productos al mercado? (carga en la espalda, triciclo, moto, etc.)
How do you bring these products here? (carry on back, cart, moto)
14. ¿Hace sus productos Ud. mismo(a) o los compra de otro lado?
Do you make/produce these things yourself, or do you buy them wholesale?
15. ¿Qué tiempo que vende productos en el mercado?
For how many years have you sold products in the market?
16. a. ¿Cómo inicio su negocio?
How did you start your business here?

- b. ¿Recibió ayuda de su familia, amigos o esposo?
Did you receive some help from your family, friends, or spouse?
- c. ¿Recibió préstamo de un banco o de un prestamista?
Did you receive a loan from a creditor or bank?
- d. ¿Usó sus ahorros propios?
Did you use your own personal savings?
17. a ¿Tiene Ud. licencia de funcionamiento?
Do you have a business license?
- b ¿Tuvo que comprar su licencia de funcionamiento?
Did you have to buy a permit or license?
- c ¿Cuánto costo?
How much did it cost?
- d ¿Con qué frecuencia la renueva?
How often must you purchase one?
18. ¿Hay algo más que le ayude a vender en el mercado?
Are there any other things that help you so that you can sell things in the market?
19. ¿Hay algo que le haga dejar de vender en el mercado? ¿Puede explicarlo? (personas?, reglas?, leyes?, dinero?)
Is there anything that prevents you from benefiting from the market? Can you explain? {people?, rules?, laws?, money?}
20. ¿Cómo le va en su negocio estos días? ¿Es más o menos difícil hacer una ganancia? ¿Por qué?
How is business these days? Is it more or less difficult to make a living? Why?
21. a En promedio, ¿Cuánto gana en un día, después de hacerse cargo de sus gastos?
On average, how much do you earn in a day, after taking care of your business expenses? OR If the participant is an employee and not an owner, then ask 20.b.
- b En promedio, ¿Cuánto gana en un día?
On average, how much do you earn in a day?
22. ¿Cuántas personas sustenta con su ganancia?
How many people do you support with your earnings?
23. ¿Es Ud. la única persona que sustenta a su familia?
Are you the sole supporter of your household?
24. Muchas gracias por responder a mis preguntas. Hay algo más que le gustaría compartir que no haya preguntado?
Thank you very much for answering my questions. Is there anything else you would like to share which I did not ask about?

Appendix 4: Final Questionnaire Interview Questions

Final Informal Questionnaire

- 1a. ¿Cómo vino Usted al mercado hoy día?
How did you come to the market today?
- 1b. ¿Por qué escogió este tipo de transporte?
Why did you choose this type of transportation?
2. ¿Cuánto le cuesta venir al mercado? (ida)
How much does it cost to come to the market (1 way)?
- 3a. De qué barrio o comunidad viene Ud.?
Which community or neighbourhood did you come from?
- 3b. ¿Vive allí? Do you live there?
4. ¿Es Ud. del campo o de la ciudad?
Would you say that you live in the city or in the fields?
- 5a. ¿Cuánto se demora en venir al mercado? (minutos)
How long does it take you to come to the market? (in minutes)
- 5b. ¿Y regresar a casa? And to return home?
6. . ¿ Le es difícil o fácil a venir al Mercado? ¿Por que?
Is it difficult or easy to travel to the market? How come?
7. ¿Se siente seguro(a) viniendo al mercado? ¿Por qué?
Do you feel safe walking to the market?
8. ¿Este es su negocio o trabaja para alguien?
Is this your business, or do you work for someone else?
9. ¿Qué tipo de productos trae al mercado?
What type of products do you sell?
10. ¿Cómo trae sus productos al mercado?
How do you bring your products to the market?
11. ¿Hace sus productos Ud. mismo(a) o los compra de otro lado?
Do you produce these products or do you buy them somewhere else?
12. ¿Qué tiempo que vende productos en el mercado?
For how long have you sold products in the market (in years)?
- 13a. ¿Cómo inicio su negocio?
How did you begin your business?
- 13b. ¿Recibió ayuda de su familia, amigos o esposo?
Did you receive any help from family, friends or a spouse?
- 13c. . ¿Recibio algun prestamo do alguna persona o algun lugar?
Did you receive a loan from anyone or place?

13d. ¿Usó sus ahorros propios?

Did you use your own savings?

15. ¿Hay algo que le haga dejar de vender en el mercado?

¿Puede explicarlo? (personas?, reglas?, leyes?, dinero?)

Is there anything else that stops you from selling things in the market?

16a. ¿Cómo le va en su negocio estos días?

How is business these days?

16b. ¿Es más o menos difícil hacer una ganancia? ¿Por qué?

Is it more or less difficult to earn money here in the market these days? Why?

17. . ¿Cual de las siguientes cosas le impide mas ganarse la vida en al mercado: transporte, personas, leyes, capital, o seguridad personal?

Which of these presents the biggest problem to you from making a living in the market:

Transportation, competition, people, laws, capital, or personal safety?

18a. En promedio, ¿Cuánto gana en un día, después de hacerse cargo de sus gastos?

On average, how much do you earn in a day, after business expenses are paid? (owner)

18b. En promedio, ¿Cuánto gana en un día?

On average, how much do you earn in a day (if a business employee)

19. ¿Cuántas personas sustenta con su ganancia?

How many people do you support with your earnings?

20. . ¿Cuantas personas mantienen a su familia?

How many people support your family?

21. ¿Cuánto se paga por la electricidad?

How much do you pay for electricity?

22.¿Para qué utiliza electricidad para?

What do you use electricity for?

23. ¿Tiene un refrigerador en su casa?

Do you have a refrigerator in your home?

24. Muchas gracias por responder a mis preguntas. Hay algo más que le gustaría compartir que no haya preguntado?

Thank you very much for answering my questions. Is there anything you would like to share which I did not ask about?

25. Tiene alguna pregunta para mi?

Do you have any questions for me?

Appendix 5: Manuscript 3 List of Follow up Interviews with Informal Market Vendors

Follow up Interviews among Market Vendors:

Informant	Position	Date	Location
1	Market Vendor	January, 11, 2012	Central Marketplace
2	Market Vendor	January, 11, 2012	Central Marketplace
3	Market Vendor	January, 11, 2012	Central Marketplace
4	Market Vendor	January 12, 2012	Central Marketplace
5	Market Vendor	January 12, 2012	Central Marketplace
6	Market Vendor	January 13, 2012	Central Marketplace
7	Market Vendor	January 13, 2012	Central Marketplace
8	Market Vendor	January 13, 2012	Central Marketplace
9	Market Vendor	January 13, 2012	Central Marketplace
10	Market Vendor	January 13, 2012	Central Marketplace
11	Market Vendor	January 13, 2012	Central Marketplace
12	Market Vendor	January 13, 2012	Central Marketplace
13	Market Vendor	January 13, 2012	Central Marketplace
14	Market Vendor	January 13, 2012	Central Marketplace
15	Market Vendor	January 13, 2012	Central Marketplace
16	Market Vendor	January 13, 2012	Central Marketplace
17	Market Vendor	January 13, 2012	Central Marketplace
18	Market Vendor	January 17, 2012	Central Marketplace
19	Market Vendor	January 17, 2012	Central Marketplace
20	Market Vendor	January 17, 2012	Central Marketplace
21	Market Vendor	January 17, 2012	Central Marketplace
22	Market Vendor	January 17, 2012	Central Marketplace
23	Market Vendor	January 17, 2012	Central Marketplace
24	Market Vendor	January 17, 2012	Central Marketplace
25	Market Vendor	January 17, 2012	Central Marketplace
26	Market Vendor	January 17, 2012	Central Marketplace
27	Market Vendor	January 17, 2012	Central Marketplace
28	Market Vendor	January 20, 2012	Central Marketplace
29	Market Vendor	January 20, 2012	Central Marketplace
30	Market Vendor	January 20, 2012	Central Marketplace
31	Market Vendor	January 20, 2012	Central Marketplace

Appendix 6: Manuscript 3 Other Individual Interviews

Informant	Position	Date	Location
1	Senior Police Personnel	January 14, 2012.	Municipal Police Office
2	Combi Driver	January 20, 2012	Market
3	Manager	January 26, 2012	Regional Ministry of Transportation
4	Gas station Manager	January 20, 2012	Gas Station
5	Loan Officer	January 20, 2012	Micro Credit Agency
6	Loan Officer	January 12, 2012	Mibanco Office
7	Manager of Economic Development	February 3, 2012	Municipal Office
8	Architect of Transportation	February 3, 2012	Municipal Office
9	Sub-Manager of Transportation	February 3, 2012	Municipal Office
10	3 Transportation Officers	February 3, 2012	Municipality Office