

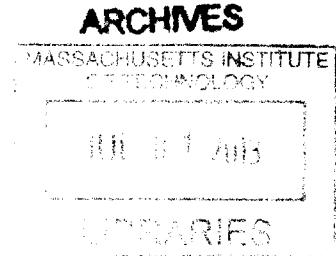
Professionalization and Market Closure: The Case of Plumbing in India

by

Aruna Ranganathan

B.Com. Human Resources and Labor Relations
University of British Columbia, 2006

M.S. Industrial and Labor Relations
Cornell University, 2008



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Signature of Author:

Aruna Ranganathan
Sloan School of Management
May 1, 2013

Certified by:

Paul Osterman
NTU Professor of Management
Thesis Supervisor

Accepted by:

Ezra Zuckerman Sivan
Professor of Strategic Management
Chair of the Sloan PhD Committee

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ABSTRACT

While professionalization has long been understood as a process of establishing market closure and monopoly control over work, this paper presents a case where professionalization erodes rather than establishes occupational closure. Using the case of plumbing in India, I demonstrate how the Indian Plumbing Association (IPA), a newly formed organization of internationally-trained plumbing contractors and consultants, is using the rhetoric and structures of professionalization to threaten pre-existing ethnicity-based closure enjoyed by traditional plumbers from the eastern state of Orissa. By employing a discourse of professionalism and by instituting codes, training and certification programs, professionalization in this case is hurting Orissan plumbers by changing the basis of plumbing knowledge and opening entry to outsiders. This paper concludes by suggesting that professionalization is a modern trope that does not necessarily imply monopoly benefits and higher job quality for all the members of a given occupational group.

Thesis Supervisor: Paul Osterman
Title: NTY Professor of Management

Introduction

Occupational change and restructuring is taking many forms today. Some occupations are experiencing a decrease in autonomy due to a rise in organizational employment (Van Maanen and Barley 1984), some are seeing increased insecurity as a result of outsourcing, temporary employment and employers' pursuit of flexibility (Cappelli 1999), others are being rendered redundant due to technological advancements and routinization (Autor, Levy and Murnane 2003) while still others are being upgraded through increased education and skills (DiPrete 1988). Professionalization, through the introduction of training and certification, is one of the prominent ways in which actors formally institute occupational change and is seen as an important tool in improving the economic position of a wide range of occupations in the developing world.

Professionalization is known to establish "occupational closure", i.e. monopoly control over work, leading to increased income, higher status and greater power (Weeden 2002, Larson 1977, Freidson 1970). The canonical example is that of medicine. The collective organization of medical practitioners into the American Medical Association (AMA) and the institutionalization of a system of standardized educational licensing supervised by the AMA eliminated other medical sects, asserted authority over other health-related occupations and established medicine as an independent, high paying profession in American society (Starr 1984). Similarly, the profession of accounting identified a unique knowledge base and demanded licensing through the Chartered Accountant (CA) qualification, and as a consequence realized higher income, respect and credibility (MacDonald 1995).

However, a wide array of occupations not traditionally considered professions such as hair stylists and interior designers also claim benefits from the process of professionalization. Notwithstanding the fact that these occupations may lack the authority of abstract theoretical knowledge that grounds doctors' and accountants' authority, the expected benefits of professionalization have led these occupations to employ structures and rhetoric characteristic of the traditional professions; members of these occupations now pay fees, take classes, pass exams, acquire licenses and consequently seek the benefits of professional market closure. Locksmiths in the state of Oklahoma, for instance, now submit a criminal background check, pay fees of up to \$350 a year and pass a 50-question exam in order to obtain a license to practice their trade. Many such attempts at increased professionalization by occupations not traditionally considered professions have yielded positive results. Reports indicate that licensed workers in the US earn, on average, 15% more than their unlicensed counterparts (Kleiner and Kruger 2008). This explains why several occupations including rather unusual ones like cat groomers and tattoo artists are now seeking the stamp of professionalization through licensing (Simon 2011).

Given the numerous instances in which occupations have successfully increased income and status in the western world through professionalization, the temptation has been to replicate similar strategies for upgrading labor and position in less developed economies. National occupational associations in developing countries are adopting structures of professionalization

in mid- to low-skilled occupations. For instance, the Philippine Welding Society, an association of construction, manufacturing and inspection companies, has been working to upgrade the practice of welding in the country through training and licensing (Mori 2005). In Ghana, hair care product companies along with the Ghana Hairdressers and Beauticians Association (GHABA) have spearheaded the licensing of hairdressing through formal training programs at vocational institutes and the introduction of trade testing and certification (Essah 2008). All these examples illustrate how the instrument of professionalization has been used to establish market closure to benefit the members of various occupations.

However, in this paper I analyze the case of a semi-skilled occupation in a developing economy where attempts at professionalization have faced resistance. I study the occupation of plumbing where the Indian Plumbing Association (IPA) has initiated a process of professionalization by employing structures characteristic of professionalization projects in the west: they have instituted a national Uniform Plumbing Code (UPC), rolled out a Plumbing Education to Employment Program (PEEP) and introduced certification of plumbing practitioners in India, while promoting a discourse of professional expertise. Despite these measures, existing plumbers are disenchanted with the project and are beginning to switch to other occupations. The discourse and structures of professionalization – including codes, training and certification programs – are in place and yet, surprisingly, traditional members of the occupation seem dissatisfied.

My research investigates under what circumstances professionalization might be resisted by the existing members of an occupation. While scholars have suggested that closure through professionalization is a “prize sought by virtually all occupational groups” (Freidson 1970:368), I explore when and why professionalization might not be desired by an occupation.

By focusing for the first time on a case where the onset of professionalization has faced significant resistance, I advance our understanding of the subtle interplay between professionalization and the social institutions that circumscribe its implementation. I show that before predicting the success of professionalization projects we need to consider the possibility of pre-existing closure in the occupation of interest and pay careful attention to the identity of the actors behind the professionalization process. In this case plumbers in India traditionally originated from the state of Orissa and had enjoyed ethnicity based closure which was being threatened by the professionalization project, driven by a newly formed Indian Plumbing Association (IPA) consisting of internationally trained plumbing contractors and consultants. I also uncover two mechanisms through which the structures of professionalization could engender dissent among incumbent members of an occupation. I find that by *changing the basis of knowledge* and by *allowing entry to outsiders*, the IPA-driven licensing and professionalization is undermining not reinforcing ethnically-defined closure enjoyed by Orissan plumbers which is leading to resistance. Finally, I discuss the implications of the paper’s findings for our general understanding of professionalization, especially in light of its increased

prominence as a potential tool to improve the economic conditions of semi-skilled occupations in developing economies.

Theory

Scholars have long contended that professionalization confers control in the economic marketplace by establishing occupational closure (Larson 1977). By instituting structures such as licensing, educational requirements, restricted training and ethics codes, professions are able to protect their jurisdiction from outsiders. In this way, the profession gains control over their supply of workers and the services it provides. In addition, sheltered from competitive market forces, professions acquire the freedom to set their own terms of compensation (Freidson 1970, Johnson 1972). Further, professionalization-based closure bestows credibility with the public, personal status and social mobility (Abbott 1988, Bledstein 1976). It is no surprise then, that closure through professionalization is viewed as offering “continuously independent life chances” (Abbott 1988: 324) since it allows occupations to construct and defend social or legal boundaries that, in turn, affect the rewards of their members and restricts access to resources and opportunities to a limited circle of eligibles (Weeden 2002). While not all occupations have the required abstract knowledge to become “professions”, almost all occupations have the potential to acquire the structures of professionalization by lobbying the government and acquiring state-sponsored mandates on licensing, educational credentialing, voluntary certification, association representation, or unionization and thereby enjoy closure. When successful, professionalization is thus a legally anchored and enforced process that by establishing occupational closure creates a protective economic niche.

However, the existing literature on professionalization provides little insight into why India's plumbing professionalization project is facing such resistance. By focusing predominantly on straightforward cases of professionalization primarily in the US and Europe (Abbott 1988, Starr 1984, Heinz and Laumann 1944), the literature has treated professionalization as a universal process, leaving little room in the general model for the national and cultural context in which the process of professionalization plays out. On the contrary, there are several reasons to suspect that the social conditions under which such efforts are instituted might matter. First, while professionalization improves the position of its practitioners by limiting access to practice, i.e. by establishing market closure among a group of otherwise disconnected workers, many occupations in the developing world already enjoy such closure via ethnic and geographic ties. Carpentry in India is dominated by the Marwari community from Rajasthan while the Kathiawaris from Gujarat are known for their skill in cutting and polishing diamonds (Munshi 2007). These communities enjoy the benefits of market closure even without the existence of formal professionalization structures. Therefore, in addition to closure through professionalization, closure based on ascriptive attributes like ethnicity and nationality also protects valuable and rare resources that reside in scripts, local knowledge and interpersonal ties. To be sure, while closure through professionalization relies on explicit structures like licensing and educational credentials, closure often also operates through these informal mechanisms.

In fact, since Weber [1968(1925)] scholars have identified a parallel set of attributes that form a basis for closure including social background, language, religion, nationality, race, ethnicity and gender (Manza 1992). These ascriptive attributes bestow closure by nature of birth with the help of beliefs and practices to sustain their control. These attributes can regulate access to resources and entry into an occupation by categorically defining the source of supply of new recruits. Tilly (1998) documents the example of Italian immigrants in Westchester, New York from Roccasessa near Rome who concentrated themselves in Westchester's gardening industry, gaining collective advantages by monopolizing access to jobs and firms. Along the same lines, retailing niches are often quasi-monopolized by one national group or another; examples include Indian newsstands and Korean groceries in New York, Macedonian fast-food restaurants and Italian barbershops in Toronto.

Similarly, the literature on ethnic entrepreneurship notes that entrepreneurs often rely on their group's local social capital to establish and retain their businesses within their ethnic community (Portes and Zhou 1992, Light and Gold 2000). The examples of Gujarati entrepreneurs in the US lodging industry (Kalnins and Chung 2006), and Hispanic entrepreneurs in the New York garment industry (Waldinger 1996) show how frequent interaction in a highly concentrated ethnic niche promotes a sense of group identity and keeps jobs, information about clients and skills within the community. Waldinger (1996) stresses that once established, these niches easily reproduce themselves because of their reliance on ethnically defined relationships that facilitate internal communication and collaboration and by delivering superior results to customers. This literature thus documents the prominence and persistence of ethnic niches, both job-centered and entrepreneurial in various ethnic categories.

Despite this, scholars have focused mostly only on the role of professionalization in establishing occupational closure. Further, while we have established that both professionalization and ascriptive social attributes could lead to closure, the interaction between the two has received little attention. In particular, what is the role of professionalization when bases for closure like religion or ethnicity might pre-exist in a given occupation? By challenging the predominant, singular understanding of professionalization I show that the interaction between pre-existing closure established through social identity and the formal structures of professionalization can often have harmful unintended consequences for the members of an occupation. Specifically the possibility that formal rules and procedures undermine benefits accorded through interpersonal ties and local knowledge cannot be ruled out.

Second, in developing economies, the move towards professionalization often arises not from within the occupation, as in the case of doctors and lawyers in the western world, nor from related occupations waging jurisdictional battles on the basis of abstract knowledge (Abbott 1988), but from interested, often entrepreneurial actors pushing for occupational change and means of enforcing normative control over workers. These entrepreneurial actors, in the name of professionalism, incorporate rational-legal forms of decision making, hierarchical structures of authority, standardization of work practices, accountability, target setting and performance

reviews (Evetts 2006). However, these occupational changes are often seen as nothing more than increased bureaucratization (for example, more paper work) and additional responsibilities with no corresponding increase in either collective or individual status or salary for the members of the occupation. For this reason, McClelland (1990) distinguishes between when professionalism is constructed 'from within' (by the occupational group itself) rather than 'from above' (by the managers in organizations) and emphasizes the need to consider who is constructing the discourse and who is benefiting, since professionalism 'from above' does not result in occupational control of the work by the workers but rather control by the organizational managers and supervisors.

This phenomenon is prevalent in both developed and developing economies. For example when hospital administrators in the US pursued professionalization structures for nursing (mandatory registration and licensing, a stronger theoretical base rooted in higher educational credentials) it resulted in the enlargement of the resident nurses' work to encompass a wider range of nursing tasks including the routine tasks formally delegated to less credentialed workers but resulted in no corresponding increase in any material benefits from the professionalization (Brannon 1994). Similarly, the appeal to professionalism as a disciplinary mechanism in novel occupational contexts (like janitorial and clerical positions) is used to inculcate 'appropriate' work identities, conducts and practices (Fournier 1999). In the context of developing economies, the discourse of professionalism is used among call center workers in India as a mechanism to institute international workplace norms and enforce managerial control (D'Cruz and Noronha 2006). Similarly, this discourse is also being adopted by a variety of business and employer-based associations in the developing world in the name of worker training and upgrading labor but often serves private interests of the members of the association instead (Doner and Schneider 2000).

Therefore, it appears that when the *existence of pre-existing closure* and the *identity of the actors* championing the professionalization process is considered we might be able to enrich our understanding of the professionalization process and analyze reasons for potential failure in developing countries. Ascriptive attributes have conferred occupational closure for generations in these contexts. Further, a variety of different occupational groups have personal interests at stake in a given trade here, and the drivers of professionalization are frequently not the dominant occupational groups themselves but other marginal organizational actors whose intentions might be orthogonal to other groups impacted by professionalization. In this paper, I investigate this phenomenon through the case of the Indian plumbing industry where pre-existing ethnicity-based closure within a certain community of plumbers is faced with professionalization instituted by a newly emerging community of internationally-trained plumbing consultants and contractors. Using this setting I am able to study, for the first time, a case where professionalization faces resistance from the dominant group in the occupation and trace interactions between the structures and discourse of professionalization and the practices of ethnicity-based closure. In this way, I contribute to the professionalization literature by describing the conditions under

which professionalization might not be considered desirable and suggesting when and why professionalization might be resisted by the members of an occupational group.

In the next section, I describe my methods for studying this case. I then describe the empirical material and findings for this study, demonstrating why it is well-suited to address the gaps in our understanding of professionalization.

Research Methods

This paper draws on four months of inductive fieldwork in India. I first gained access to the plumbing industry in August 2009 when I attended the 13th annual Indian Plumbing Conference, organized by the Indian Plumbing Association (IPA), and made several contacts within the industry. Then, from mid-November 2009 to mid-February 2010, I conducted in-depth, face-to-face interviews with 42 actors in the plumbing industry, including the founders of the IPA, Indian representatives of the International Association of Plumbing and Mechanical Officials (IAPMO), modern and traditional plumbing consultants and contractors, labor contractors, supervisors, plumbers (traditional and modern), plumbing manufacturers, builders, building engineers, residents and plumbing educators. In addition, I had informal conversations with more than twenty current and prospective plumbers in the context of observing their work on construction sites and in IPA training sessions. Obtaining these interviews was relatively straightforward. I enjoyed privileged credibility as a “researcher from America” but at the same time, was relatively non-threatening being a woman in an entirely male industry. For the most part, interviewees seemed to derive importance from being interviewed and were forthcoming when discussing their work and careers. As the President of the IPA stated, “they were thrilled to have caught the eye of academics abroad”.

I used a snowball sampling method, obtaining interviews not just with a pre-set list of persons provided to me by the Indian Plumbing Association and people I had met at the Indian Plumbing Conference, but also with others suggested to me by the interviewees themselves as persons who might have different perspectives on the plumbing sector or different experiences with respect to the ongoing effort to upgrade plumbing in India. I ensured that my sample captured diversity in role within the plumbing sector and encompassed different approaches to plumbing. I conducted interviews in Tier I cities in India – Calcutta, Chennai, Bangalore, Hyderabad, New Delhi, Mumbai and Pune – paying attention to regional variation. However, all my research was conducted in larger metropolitan cities (with populations greater than 1 million people), and to that extent there is a large-city bias in my sample.

The interviews lasted an average of one hour each and I conducted the bulk of them in either Hindi or English. For a very small subset of interviews with plumbers, I needed a fellow plumber to translate from Oriya (the regional language spoken in Orissa) to Hindi. I used a semi-structured interview format, which is located somewhere between the extremes of completely standardized and completely unstandardized interviewing structures (Berg 1989). This type of

interview involves the preparation of a number of predetermined questions and topics in the form of an interview protocol, formulated in words familiar to the people being interviewed. I informally asked questions from my interview protocol of each interviewee in the course of a conversation, skipping around as per the interview responses. I also probed far beyond the answers to the prepared and standardized questions to elicit respondents' stories. I began each interview by asking interviewees how they entered the field of plumbing and how their experiences compared to their colleagues in the same field. Following this generic opening, I inquired about how they perceived the evolution of plumbing in India, the problems they experienced in this sector, details on what their job entailed and how they approached their work, opinions on the IPA and the professionalization efforts. I collected data inductively with the aim of capturing as much detail as possible on the dynamics between the traditional and newer sections within plumbing in India.

Each interview was digitally recorded. In addition to taking notes during the interview, I also noted my overall impressions of the interviewee, his/her behavior and the setting at the end of each interview; all but two interviews were conducted at the respondent's worksite. This contextual information proved to be informative during the later interpretation of interview responses. The transcription of all 42 of my interviews, along with my interview notes, serves as the empirical basis of this article. I also relied on fieldnotes from participant observation on construction sites, at training programs and IPA chapter meetings, speeches from the plumbing conferences, press releases of the IPA as well as articles from the IPA's monthly magazine called the Indian Plumbing Today

The analysis of the transcripts' content proceeded at first by my reading through a subset of the 42 interviews and identifying themes that distinguished the traditional plumbing sector from the newly emergent modern plumbing sector in India. Based on this initial reading, I identified several themes, which I used to code the remaining interviews. These codes include references to organization of work, physical appearances of plumbing, quality of work, control over work, reputation, work commitment and pride, as well as references to specific roles within the division of labor such as apprentice, subcontractor or card-holding member of the Indian Plumbing Association. The codes were typed into the computer file of each of the transcribed interviews using Atlas.ti. I was thus able to search efficiently for any reference to these themes as they appeared across the 42 interviews. As a result of this process, some of the original codes were eliminated or collapsed with others, or new codes were added. In this way, my theorizing and analysis of interview data proceeded iteratively as is characteristic of grounded theory.

In the next section, I introduce my data by first describing the evolution of the plumbing sector in India over the years.

Data

The 21st century has seen significant changes in the organization of the plumbing industry in India. For several decades, plumbers from the eastern state of Orissa have controlled the occupation with little interference. More recently, with the growth of the construction industry compounded with the entry of internationally trained plumbing consultants and contractors, an Indian Plumbing Association (IPA) has been formed and newer training and licensing initiatives have been rolled out. The rise of these professional institutions has put the old, ethnicity-based institutions of Orissan plumbers in direct confrontation with the codified and formal institutional processes advocated by the IPA. In the following sub-sections, my data describes briefly the institutional, cultural and historical context for this study.

Orissan Plumbers

“Everywhere you go, you will find us, Orissan plumbers”

Plumbers in India have traditionally come from the eastern state of Orissa. In fact so striking is this concentration that more than 70% of the plumbers practicing the trade all across India come not just from the same state but also from the same cluster of villages from the "block" Pattamundai in the Kendrapada district of Orissa (Ray 2004, Sahoo et al 2011). For this reason, Pattamundai is often called “India’s capital of plumbers”. It is estimated that there are more than 20,000 Pattamundai plumbers now practicing across India (Kar and Mishra 2010). The chief technical consultant with the Directorate of Industries agreed that “plumbing is a significant economic activity in the region, sustaining thousands of families in the Kendrapada district where there is practically no other industry.”

How did the Orissans get into plumbing? In the early decades of the 20th century the first plumbers from Pattamundai began working with British contractors and firms in Calcutta. This account of the origin of Pattamundai as the plumbing capital of India has been corroborated by several Indian academics including Satpathy et al. (2002) and Ray (2007) and a large number of my interviewees. In the words of the President of the Indian Plumbing Association, “During the British days [colonial rule], the original capital [of India] was Calcutta, which is close to Orissa. At that time, there was no plumbing in India and an Englishman started the first plumbing contracting business in Calcutta. He picked up all his plumbers from a particular village in Orissa and that just became the trend.” These first plumbers had no knowledge of their future profession but learned on the job from their English employers. What followed was a pattern of migration from the "mother" block to other parts of India that resulted in Orissan plumbers completely monopolizing the supply of labor in this market. While initially the bulk of the plumbing activity was in Calcutta, as new townships came to be constructed, plumbers from Orissa were taken by English contractors to other cities in India and places like Burma (Myanmar) and Afghanistan to help set up plumbing infrastructure. Despite this migration, Orissan plumbers all across India maintained strong ties with their community and village and visited at least once a year for the harvest festivities. This ensured that the migration process continued and the villages of the

Pattamundai block and its neighboring areas maintained their status as the epicenter of the plumbing trade in India.

The Orissan plumbers adopted a craft system of work in governing both entry into the trade and training. Boys from the Pattamundai villages typically started working as helpers with a practicing plumber, often a relative, in the city hailing from the same or a nearby village. The apprentices lived and ate with the experienced plumber and helped with other chores too. The apprentices learned on the job as they worked, and slowly became plumbers like in many other guilds (Roy 2008). In turn, over time they took their own helpers in a similar fashion, again from among their kinsmen, as work became more abundant. Ray's (2004) survey of 413 plumbing households in Pattamundai and 511 plumbing households in Delhi revealed that while most of the plumbers (more than 90%) had received formal schooling in Orissa, hardly any had technical education or training in plumbing at the time of migration. Technical training in plumbing was received only on-the-job while working with other plumbers where the focus was on practical, not formal, knowledge. During my fieldwork at a Mumbai-based construction site, a senior Orissan plumber explained this to me as he initiated an Orissan teenager into the occupation:

“No one teaches plumbing like you think. We all learn by just seeing and observing over time. And we work too, while observing. Whatever the supervisor tells us to do, we have to obey. After doing the work, we get an idea of how to do plumbing. If we think about the work and learn to make sense of it in our heads and then be creative, we learn faster and graduate from being a helper to doing our own plumbing sooner. Yeah, and once we learn, we go back to our village and bring more people into plumbing. That's the way this works.”

Orissan plumbing has sustained itself in this way because the plumbers share a common heritage having originated from the same cluster of villages in Orissa. Further, they are all from the same scheduled castes, speak the same language- Oriya- and marry within their community. Ethnicity-based closure established in this way affords Orissan plumbers a number of advantages that ultimately result in monopoly control over work. First, Orissan plumbers have successfully controlled their opportunity structure by retaining information about job opportunities, entry into the trade and training. It is through their model of apprentice-based recruitment and training that Orissan plumbers control their work and prevent the entry of others into their occupation. Nearly all Orissan plumbers entered plumbing in the new cities through relatives and friends without pecuniary exchange in securing their first jobs. Second, Orissan plumbers keep their unique expertise within the community. Plumbing knowledge is transferred only through apprenticeships with experienced plumbers and Orissan plumbers retain control over their jobs since there are no courses or other means to acquire the required skills and finesse in this occupation. They take pride in this closure too, as is reflected in this quote by a plumber in Bangalore: “we have a human network [that] helps each other since we are emotional about our

roots and for this reason, we don't teach apprentices not from our community". Nor do these networks exist within a particular block or a village but often transcend generations within a family. A Calcutta plumber proudly attests to the power of these family ties in obtaining training: "In those days, my grandfather was known as the super plumber and he was a graduate and we have been doing this for generations ... so we know the subject backwards".

So widespread is their reputation and domination of the occupation that, among builders all over India, plumbing is uniquely associated with Orissa. A builder in Mumbai acknowledged that "The best plumbers in India are all from Orissa ... they are hard-working boys ... they do the job well". The Orissan plumbers, too, have come to believe that they were always "meant" to do this work and that they have a right over it. This sentiment was echoed by one of the plumbers I interviewed: "Actually, now that I think about it, we Orissans are good only at plumbing, nothing else!" Another plumber admitted that, "If offered a different job, I wouldn't accept it because in this one life, I have chosen plumbing and will do this only now." Their importance is not lost on the political class within Orissa either. The chief minister of Orissa acknowledged in a press statement saying, "The plumbers of Kendrapada have made their presence felt throughout the country with their skill and hard work." (Kar and Mishra 2010).

In this way, ethnicity-based closure has enabled Orissan plumbers to build a reputation, control entry into the trade and monopolize skills, shrouding their invaluable tacit knowledge in secrecy. Such control over work has meant that plumbers in India earn between Rs 200 and Rs 250 (\$4 - \$5) a day initially and Rs 300-350 (\$6 - \$7) after having obtained some experience (Kar and Mishra 2010). While these are not exorbitant salaries, in a country with extreme poverty, they constitute respectable amounts which puts the plumbers in the 20th -30th percentile of India's income distribution. This is not to say that there are absolutely no problems in the field of plumbing. Safety in high-rise buildings and the stigma of dirty work continue to be an issue.

Remarkably though, Orissan plumbers have achieved control over the occupation of plumbing in India without many of the formal structures one would expect. While the occupation of plumbing is deeply entrenched within the Orissan community, it has done so with practically no written down codes and no formal training programs. This has been possible because the construction sector has correspondingly not insisted on mandatory plumbing standards and norms normally prevalent in the western world. While India has a National Building Code (NBC) that devotes one chapter to a code of practice for plumbing installations, this is based on the British colonial system, is over six decades old and is outdated as it does not speak of modern materials nor to plumbing for high-rise buildings. For example, the industry now uses ten plastic and two copper pipe varieties but the code refers only to GI (galvanized iron) pipes. Further, guidelines outlined in the NBC serve as recommendations only and are not mandatory. There is no system in place to ensure that the codes are followed, nor is there any mechanism to either penalize those egregiously violating the norms or to bring them into compliance. Moreover, on the supply side, India has never had structures in place to produce formally trained plumbing professionals. In most developed countries, admission to the plumbing trade is through training at a post-

secondary institution, like a community or technical college, followed by an examination which results in a license to operate as a plumber. However, the situation is different in India. Plumbing courses have existed in India's Industrial Training Institutes (ITIs) but enrollment for these courses are extremely low and graduates of the programs are known not to receive jobs.

In this way, despite lacking many formal institutions and norms that typically characterize groups that monopolize and control access to occupations, the Orissan plumbers have successfully deployed ethnicity-based ties to achieve occupational closure and monopoly control over work.

However, in recent times changes in the nature of demand and an influx of internationally-trained plumbing practitioners from the Middle-East have posed a threat to their dominance in this industry. The next section describes the origins of India's modern plumbing sector by historically analyzing migration chains between India and the Middle-East and seeks to understand the genesis of Indian plumbing's recent professionalization project.

Modern Plumbing Sector

Since the mid-1970s, more than 500,000 workers from India have migrated to Middle Eastern countries (also called "the Gulf") including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE) to work in the construction business (Nayyar 1994). While the bulk of these migrant construction workers in the Gulf were unskilled laborers on construction sites, about 40% of them were civil engineers with undergraduate degrees who were hired to work as supervisors in various construction trades including plumbing. Despite their qualifications, most of these workers were employed in "contract jobs", where returning to the home country was an essential end-step of the migration process (Prakash 1998). While in the Gulf, these workers found work with British and American firms that dominated the plumbing industry and executed a majority of the new construction and plumbing projects. These companies followed international plumbing codes and trained migrant workers according to these international standards. Consequently, South Asian civil engineers hired by these companies were exposed to international plumbing codes, standards and best practices that they would eventually bring back to their home countries.

As this process was unfolding in the Middle-East, significant changes were happening in India. In the early 1990s major policy changes at the national level saw the liberalization of India's economy leading to speedy urbanization and a concomitant boom in construction. These construction projects contributed to a surge in plumbing activities in India, primarily in cities and urban areas. Also, a newly affluent middle class was demanding expensive and fashionable plumbing products and accessories from the west and changes in lifestyles necessitated the mushrooming of apartment-style housing, hotels and resorts, all of which required an increase in the supply of high-end and modern plumbing accessories and products. By the end of 2007, the plumbing industry in India was estimated to have grown to over \$350 million, a significant

chunk of India's \$14 billion construction industry (Kumar 2008), and this was only the tip of the iceberg with the impending urbanization of rural areas.

This rise in demand precipitated by a number of market-friendly changes around the period of liberalization meant that the time was ripe for many engineers in the Gulf to return. Plumbing engineers employed in American and British firms in the Middle-East were naturally a part of this return migration. Despite being educated as civil engineers, given their deep familiarity with the modern plumbing process these returnees found it attractive to start their own small businesses as plumbing contractors or consultants and hence capitalize on a burgeoning domestic market. This process eventually sowed the seeds of what has become India's "modern plumbing sector". These new players in the modern plumbing sector had been trained in American or British plumbing codes and when they returned to India, preferred using these codes instead of imitating Orissan plumbing practices that were the norm even in the newer construction sites. These return migrants also had ample exposure to international practices and methods of doing plumbing and sought to incorporate many of these practices into their plumbing approach in India. This was the first time many of these practices were seen in the Indian market. For example a plumbing contractor said:

"I produce detailed working drawings for plumbing which specify the work in greater detail; we make the material specifications and with these, we decide how to go about executing the work. For 13 years, I worked abroad, and this is the practice followed by contracting companies abroad. People here don't follow this, but this is the way I control quality; I started this culture in India which was followed in [the Middle East] but only the cream of the crop in India follow this."

Today, these newly formed firms occupy a unique place in the Indian plumbing industry. They represent a new way of performing the plumbing trade in India. As one Saudi-Arabia returned plumbing contractor said, "We are like an institution here in the absence of plumbing education and training. We have to hire people and train them in our plumbing standards". While directly applying methods and practices popular in the west, the newly emerging class of plumbing contractors holds dogmatic views about their modern plumbing practices and considers them to be vastly superior to the Orissan way of plumbing. A Dubai-returned consultant explained to me: "They[Orissan plumbers] have nothing up there. I don't know where they are coming from and how they are dreaming about earning [big money]. They aren't able to visualize and execute the jobs."

While returnee migrants from the Middle-East form the core of India's newly emergent plumbing industry, they are supported by other international entrants who also seek a pie of this market poised for explosive growth. These include foreign manufacturers of plumbing equipment and international Project Management Companies (PMC). By 2005, imports of plumbing products in

India had risen to around 10% of total demand in terms of value, though these products are largely restricted to the higher end of the market. While no foreign companies have production facilities in India, many operate sales centers in the country and participate in the Indian market in various ways. Products of certain large multinationals such as Jacob Delafon, American Standard, Kohler, Vilroy Boch and Toto are being imported into India by distributors. Given the rise in demand for luxury products, several foreign manufacturers have also participated in joint ventures or have cooperative agreements with Indian companies. Jaquar a leading Indian manufacturer of plumbing products, for example, markets products made by the German bath fittings company Hansgrohe in India and participates in a manufacturing alliance with Italian ceramics firm Glass Idromassaggio. Given the increasing technical complexity of the modern plumbing business, many Project Management Companies (PMCs) have also sprung up that act as middlemen helping construction companies and consumers better understand their choices.

These new project management companies, foreign manufacturers together with returnee plumbing contractors and consultants are transforming the face of Indian plumbing. The “modern plumbing sector” they seek looks very different from the traditional sector on many counts. They differ in some of their core processes: they adopt a two-pipe core plumbing infrastructure, as done in the west and hide piping under false ceilings. They are more comfortable experimenting with newer synthetic materials like CPVC, whereas the traditional sector prefers to stick to the tried and tested Galvanized Iron (GI). In addition to changes in what they work with and how they work, these new firms also portray a more professional image and constantly reference their international connections as a source of credibility. Their workers receive formal instruction in plumbing via training programs and adhere rigidly to formal objects like codes and plumbing drawings. This is in contrast to Orissan plumbers who are trained on the job through informal apprenticeships and who rely instead on their carefully cultivated expertise and years of experience. Table 1 illustrates these differences in greater detail.

Despite these differences, the modern plumbing sector caters to only 10% of the market and their clients are mostly MNCs, builders of international technology parks and high-end hotels, who consciously seek to implement western plumbing standards.

In order to grow from being niche suppliers of high-end construction projects to firms with a wider mass-market presence, the actors behind the modern plumbing sector have turned to the tools of professionalization. They have organized themselves under the umbrella of the newly-formed Indian Plumbing Association (IPA) and have instituted a new Uniform Plumbing Code (UPC). The next section describes the development of this process in greater detail.

Indian Plumbing Association (IPA) and Professionalization

When returning plumbing contractors and engineers from the Gulf arrived in India they were immediately attracted by the possibility of applying their plumbing knowledge and exposure to international plumbing standards in the Indian context. They were however dismayed to find that

the sector was controlled almost exclusively by the Orissan plumbers. Moreover their deep-rooted views about the “right way to do plumbing” faced opposition at every turn: the Orissan workers shunned formal codes and practices and relied instead on community-based learning and informal training. The difficulty in penetrating the market closure Orissan plumbers enjoyed combined with the rapidly booming market for plumbing in India proved to be perfect conditions for the birth of Indian plumbing’s professionalization project.

In 1993, the Indian Plumbing Association (IPA) was born with an initial membership of fifteen consultants and contractors. Its objectives were to organize and represent the interests of India's modern plumbing sector and push its agenda forward. The early goals claimed by this Association were to “rectify the state of plumbing in the country, increase awareness of good plumbing and disseminate technical knowledge” (Interview, VP, IPA). The official goals and objectives of the IPA can be seen in Figure 1.

Today, the IPA has eleven chapters in major cities across India and counts more than thirteen hundred members from all over the nation. Its members represent all broad segments of the trade including consulting, manufacturing, contracting, and project management. Even today, its initial founding members, who form its National Executive Committee (NEC), are deeply involved in making important decisions within the IPA. In this way, over the past 15 years, the IPA has organized a rag-tag bunch of return migrants under an umbrella organization that has overseen their growth to the present day. The modern plumbing sector now controls approximately 10% of India's lucrative plumbing industry, though they aspire to increase their share of the pie to 70% (Interview).

Thus, the IPA seems to represent an assortment of interests that are all keen to import global norms and standards into the Indian Plumbing industry and potentially sidetrack valuable ethnically-closed skills that the Orissan plumbers have cultivated over many decades. As the president of the IPA said, “We want to expand such that there is no regional bias within this industry [referring to the Orissans]. Instead we will focus on education. I can say that all the educated players in the plumbing sector, more or less they are already in the IPA.” This sentiment underlies a series of initiatives the IPA has taken to “professionalize” its work.

First, they have partnered with the International Association of Plumbing and Mechanical Officials (IAPMO), an organization headquartered in California, which is in the business of developing and publishing plumbing and mechanical codes. Together, they have introduced a Uniform Plumbing Code- India (UPC-I), a modified version of IAPMO’s parent document, the Uniform Plumbing Code (UPC), that is ratified by many municipalities in the US. The approach has been to use a set of codes already developed in the west instead of building a new set of codes and norms suited to the Indian conditions from scratch. The IPA claims that the Uniform Plumbing Code-India (UPC-I) is a comprehensive document covering every aspect of plumbing installations and that it takes into consideration new materials, technology and latest installation practices followed in the west. UPC-I with its accompanying publication – the Illustrated

Training Manual – offers almost 1000 pages of specifications, drawings, charts and tables. As the head of the NEC said, “even simple things, you know like designing a piping system for a toilet, to take an example, each fixture has to have some sort of a weight specifications, which is different in the American, British and Indian systems and we offer a common currency.” The management of the IPA holds dogmatic views about their method of plumbing, believing it to be a “science” and therefore universally correct. As the VP of the IPA said, “Note that the codes are embedded in engineering, so it is not subjective. There is a right and wrong.” However, like the National Building Code, the UPC-I too is recommended not mandated, although the IPA plans to approach government bodies for the ratification of UPC-I so that it can be made legally binding. The goal is for the UPC-I to be revised every three years to keep pace with the latest developments in plumbing technology.

Similarly, in the domain of training the IPA has tied up with IAPMO to launch a Plumbing Education to Employment Program (PEEP) across the nation to impart western knowledge of plumbing through formal training programs. PEEP is being implemented in partnership with existing vocational training institutions and polytechnics. IAPMO provides the syllabus and training materials for PEEP and conducts an initial ‘Train the Trainer’ program for the faculty members of the partnering institutions. PEEP offers 3 structured courses called Plumbing Systems Design (PSD), Plumbing Construction Management (PCM) and Plumbing Technology for design engineers, construction managers/supervisors and plumbers respectively. PSD is a one-year course for engineers, that teaches design and review of plumbing systems within the building architecture. PCM is a one-year course for contractors, construction managers and supervisors of construction sites to understand the basic principles and the code requirements of plumbing systems. Finally, the Plumbing Technology program is a two-year program that teaches installation, repair and maintenance of a variety of piping systems, plumbing fixtures and other equipment associated with water distribution and wastewater disposal. These PEEP courses are the first accredited courses to be offered for training plumbing engineers, designers, supervisors and plumbers in India. As the president of the IPA said, “There might be good designers and engineers out there, but that’s not enough. The people who actually do the job need to be trained..You might be knowing that Bill Gates is a school dropout, but who will you recruit, [Bill Gates or] a trained person? Training is required, some people are exceptions, but we can’t go on exceptions.”

The IPA’s final initiative is a certification program based on an examination at the end of the training. The VP of the IPA explained to me, “What are the implications of the license? It’s like [in] a pharmacy, a druggist. There should be somebody who knows what they are doing and has obtained a license.” A candidate who undergoes a PEEP training program and passes the exam is designated a Certified Plumbing Systems Engineer, Certified Plumbing Supervisor, Certified Plumber or Certified Master Plumber and given an operating license. Alternatively, practitioners already in the field can choose to directly undergo the examination to acquire the certification. The IPA’s end-goal is for certified plumbing professionals to exclusively undertake plumbing

work in the country. As the president said, “Our goal [...] is that, like in other parts of the world, we want to see a certificate: a plumber with a certificate. For anybody who comes into the house, I can ask: do you have a certificate? Then only I will decide that ok, you know plumbing.”

In addition to codes, training and certification programs, the IPA employs a discourse of professionalism, with an eye to being identified as a profession and for occupational workers to be labeled professionals. Here the appeal to professionalism is to a myth or an ideology that includes building a professional identity through an emphasis on public service, comparisons with prototypical professions, a client-focused mindset and building respect for the occupation. This professional discourse is evident on the IPA’s website,

“IPA has succeeded in creating awareness about [the bad quality of Indian plumbing], but we have a long way to go. Our professionals must match their global counterparts in terms of skills and expertise. Professionals in our plumbing industry need exposure to international codes and practices to grow beyond their inherent limitations and be competitive and competent on a global scale.”

A critical component of the IPA's discourse is its emphasis on “public service”. While rolling out its professionalization structures the IPA's discourse stresses heavily on the fact that the purpose of the professionalization was to “do good for our society”. In various interviews, press material and speeches, IPA members have said, “you know that the IPA is an honorary organization, not a financial or technical organization; we are just trying to do something for our countrymen, something for everybody’s interests” and that “once they [the government] realize that there has been an NGO [the IPA] sitting here and doing all this work, things will happen.” The IPA is confident that their altruistic private efforts to upgrade plumbing through the UPC and training programs will be acknowledged, respected and ratified by the government such that their efforts will not be in vain. Further, the IPA members never fail to advertise how they have invested their own money into the professionalization initiatives such that “each one has donated more than Rs. 1 lakh [\$20,000] for it” (Interview). In this way, they argue that even though “we have been asleep so far, this is our contribution back to the society” (Interview).

Further the IPA often draws comparisons with prototypical professions to claim legitimacy. In particular, since medicine is a classic case of professionalism being deeply entrenched in an occupation, the IPA often draws comparisons between plumbing and medicine and says that they “believe that plumbers are health workers”. They justify this comparison by creating awareness of the vitally important role of plumbing and the building services industry in promoting health. For example, the treasurer of the IPA reminded me that “the SARS disease in Hong Kong started from a basic plumbing fixture, the trap. In every bathroom, you have a floor trap and the SARS bacteria or the virus came through that. So, actually that is where it all started.” The IPA also incorporates health as one of its core values and a key goal of the professionalization initiatives

and they hope that that the IPA “will become one of the powerful tools to bring a focus to health and public safety [through] education about why toilets and good plumbing are important.”

The IPA also places a strong emphasis on being customer-focused and catering to the demands of the new Indian middle class. While these clients pay attention to the aesthetics of their plumbing fixtures they sometimes neglect the technical aspects of plumbing according to some of my interviewees. Therefore the IPA considers it their responsibility to remind the clients to supplement aesthetically pleasing fixtures with technically grounded plumbing. As one plumbing consultant in Bangalore said, “the whole concept is changing in India. Where earlier you know, one corner of the house somewhere will have one bathroom where you can wash your face and all those things, now in most of the houses you can see a good bathroom, people spend a lot of money. What we are saying is when you spend a lot of money on the tiles and fixtures, decorating the whole thing, you must appoint a good plumbing contractor and spend a little more money on proper plumbing”.

In addition, the IPA seeks to eliminate the stigma associated with plumbing. Where earlier plumbing was associated with performing “dirty work”, this is slowly ceasing to be the case if the IPA’s discourse is to be believed. As the president of the IPA said, “There is no more stigma associated with the plumbing trade, earlier there was no value for the profession, no dignity, people thought it was a dirty job ... Today, plumbing is a specialty- there are trained, qualified people who look after this work.” The core IPA members seem to believe that “now plumbers are having conferences and so the image will change; this will have impact on the market”. The IPA contends that their professional and polished approach to plumbing will bring the occupation both respect and dignity: “Respect for the profession will come, then respect for [the] industry will come.”

Moreover, the IPA holds monthly chapter meetings in various cities across India, hosts an annual national conference, an annual plumbing product exhibition, publishes a monthly magazine “Indian Plumbing Today” and has established an expensive Plumbing Laboratory (for live demonstrations) in Pune, India, as well as a plumbing product certification facility.

As a result of all these professionalization structure and the discourse around professionalization, the IPA expects that “in no time, in another five years, probably we will see a drastic change in the plumbing industry in India. At least you will have good qualified plumbers like in the US or in other European countries” (Interview).

Distinguishing the Traditional and Modern Plumbing Sectors

Despite achieving initial success, the IPA has created tension in the Indian plumbing industry between themselves and the Orissan plumbers. Fundamental differences in their philosophies over the performance of work and a battle to wrestle control of a lucrative market has alienated Orissan plumbers from their occupation's primary professional body, showing how professionalization can often be a double-edge sword depending on the actors responsible for the

professionalization. Here, I document the points of discord between the traditional and modern plumbing sectors.

The modern plumbing sector views the traditional sector as an unfair monopoly, is critical of the traditional sector for lacking in formal, theoretical plumbing knowledge and accuses them of being “stuck in time” and lacking dynamism. This view has allowed the IPA to justify their intervention of professionalization. As the president of the IPA said, “we [the IPA] have to educate them [Orissan plumbers]...we need to be there and we need to [teach] new techniques, new technologies, new materials that are coming to the market. They [Orissans] don't know where to go and learn, that is the big problem. There is nobody to guide them or educate them. This is where we want to step in and then, automatically they will drift towards this direction.”

The traditional sector, on the other hand, expresses repeated cynicism about the objectives of the IPA, suspicion about their motives and skepticism about the effectiveness of their western professionalization. As a plumber in Bangalore said, “The IPA has been formed for commercial reasons. There are certain people who want to rule this area, this sector all over the country wherever you go.” Further, several Orissan plumbers commented that the Middle-East returned plumbing practitioners who constituted the IPA formed a fairly close-knit community, helping each other achieve their commercialization interests. As one supervisor said, “at present all the returnee contractors have good contacts with the consultants...they get good margins by recommending each other for projects.” In addition, the Orissan plumbers view the modern sector as lacking in plumbing knowledge relevant to the Indian context. They are skeptical of the applicability of American or British codes in India because of the differences in topography, climate and the availability of natural resources. For example, to conserve water, three-liter or six-liter flushes have traditionally been used in India, instead of the twenty-one liter flushes typical in the west but the new code ignores these Indian innovations. The Orissan plumbers also find the style and attitude of the modern plumbers too “gimmicky”. They argue that the modern plumbing sector places needless emphasis on marketing, lavish plumbing conferences and exhibitions, at the cost of neglecting substantive elements of plumbing.

These arguments, as summarized in Table 2, form the backdrop against which the present conflict between the modern plumbing sector and the Orissan plumbers is playing out.

In the last 15 years the IPA has brought new technology, a better understanding of the global market and a system of management and organization (including licensing and codified methods of performing work) that was previously not seen in this industry. While traditionally such professionalization initiatives are seen to increase monopoly control over work and worker rents, the incumbent workers in Indian plumbing, the Orissan workers, have strongly resisted these changes. The conditions that surround the establishment of the IPA and their interplay with the traditional ethnicity-based closure enjoyed by the Orissan workers provide clues for why this might be the case. The following section presents an analysis of this tension, and sketches an

argument explaining the role of institutional and national context in evaluating the success of professionalization initiatives.

Findings

The question that I proposed at the start of this paper is when and why a professionalization attempt might be resisted. The findings from this research are threefold. First, I demonstrate that despite theoretical predictions of professionalization enforcing closure, in this case there is evidence to the contrary. Indeed, professionalization can sometimes erode occupational closure. I show that the modern plumbing sector with its tools of professionalization (such as the UPC-I) is threatening the traditional ethnicity-based closure enjoyed by Orissan plumbers. Second, I uncover two mechanisms that drive this phenomenon. By introducing codes and training the IPA is changing *the basis of knowledge* in this industry thereby undermining the value of on-the-job experience held by traditional plumbers. In addition, by *allowing entry to outsiders* via open licensing the IPA is encouraging workers not affiliated with the Orissan community in any way to participate in the occupation. Third, I propose why in this case professionalization might have had effects contrary to our prior beliefs. I suggest that the interaction between pre-existing closure established by social identity and the formal structures of professionalization, as well as the question of who is doing the professionalization provide resolutions to this puzzle.

Professionalization Erodes Closure

In my field research I document numerous instances that indicate the fact that Orissan plumbers are beginning to lose occupational closure that had this far allowed them to control entry into the occupation, plumbing knowledge and set standards for the performance of work. My data suggests that Orissan plumbers are slowly ceding such control owing to the modern plumbing sector's professionalization initiatives.

First, plumbing in India is increasingly seeing entry by a wide variety of demographic groups, not just Orissans. One plumbing manufacturer in Delhi provided preliminary evidence saying, "The plumbers used to be heavily migrant workers from Orissa—but that trend is changing now". A builder in Mumbai confirmed, "[While] most plumbing labor used [to be] from Orissa and that had continued over the years, I know that we have some plumbers from Hyderabad (mostly Muslim) and Kerala too now." Plumbing is now starting to be seen as an occupation in which a wide variety of workers from across India are able to find work, undermining the tight control Orissan plumbers have traditionally had over this occupation.

Second, future generations of Orissan plumbers are looking at alternate careers as a result of challenges posed by professionalization. A plumber, reflecting on this situation said, "ever since this training started, some of the children meant to become plumbers are beginning to work in the malls since they are not able to practice their own trade." Similarly, a prospective teenage plumber whose family has been in the profession for decades agreed, "My father is based in

Raipur, the capital of Chhattisgarh. I was hoping to join him there in a year and learn everything from [him]. Now I don't know what to do.”

Third, Orissan plumbers no longer control the knowledge associated with the occupation of plumbing in India. In the past, they decided “what was right” and passed on such tacit knowledge through informal mechanisms within their community. The onset of professionalization has meant that the knowledge created by Orissan plumbers now faces competition. The IPA has encouraged the codification of tacit knowledge through the UPC-I, has imported new knowledge from the west and has created completely new bases on which such knowledge is to be evaluated. Figure 2 shows one typical example – a diagram explaining the installation of water heating equipment. The codification of pre-existing tacit knowledge and the importing of knowledge from the west is undermining the control over work and knowledge the Orissan workers enjoyed previously. As one plumber complained, “IPA has adopted international standards in India. There is definitely a difference between this code [UPC] and our practices. We are able to sense that difference now but it is hard for us to implement.”

In my interviews I also document Orissan plumbers' anxiety over the expansion of the IPA and the professionalization initiatives, concern about the longevity of their own careers as plumbers and broad resistance to change. One plumber complaining about the onset of licensing said, “I'd prefer we don't get a license, that would make our life difficult, we are illiterate, I know my work but if they won't let me practice my work because I can't get a license that would be bad” and another said, “I don't have a certificate and I wouldn't want to go through training at this point in my life”. A third plumber grieved that “if IPA forms a nexus like this, then they will see to it that those internationally-trained people who have membership will get good business and we will languish.” Because the Orissan plumbing community is based on thousands of individually-crafted ethnic ties, they lack central organization to actively resist such changes and India has not witnessed any demonstrations or protests. However through my interviews I am able to uncover and give voice to a deeply rooted passive opposition to the professionalization process as reflected in this quote,

“I've been in plumbing for 20 years now. I'm happy with my progress. God willing, I hope to do this for 10 more years since there is nothing else I know to do.”

Mechanisms

Having described Orissan plumbers' gradually eroding occupational control, this section delves deeper into the mechanisms underlying such erosion. I find evidence for two major mechanisms that cause professionalization to be resisted in this setting. First, the codes and training programs initiated by the IPA sought to change the basis for knowledge in the plumbing trade and second, certification and licensing including an emphasis on standardization and codified knowledge allowed entry to outsiders.

Changing the knowledge base

First, the IPA-driven professionalization challenges the traditional knowledge-base of the Orissan plumbers by codifying a competing knowledge base and giving it legitimacy through professionalization. Two elements about the new knowledge base make it particularly challenging for the Orissan plumbers. First, it is very theoretical making it inaccessible to the traditional plumbers whose entire system of learning was geared towards a very practical orientation and second, the knowledge base (since it is based on IAPMO's codes in the US) is quintessentially western and therefore, not entirely applicable to India. The Orissan plumbers' core expertise is specifically suited to Indian conditions. This expertise is unique and has developed over generations of practice. Unlike in the west, India's unique geographical and cultural context means that construction activities are not planned to every detail; there is flexibility so that plumbing blueprints have room to deal with unexpected contingencies such as water shortages or monsoons and the Orissan plumbers have mastered this craft. However it is now being replaced by a formally codified body of knowledge that Orissan plumbers believe to be potentially inferior and lacking in Indianness. This has the effect of both eroding Orissan plumbers' expertise and replacing their skills with an unfamiliar body of knowledge.

In discussing the excessively theoretical new body of plumbing knowledge being introduced in India, a plumber said, "The code is very theoretical, it will take forever for us to learn this, if at all!" and another plumber said, "Any training has to be theory and practice. Can you be a theoretical doctor? But right now the training offered is all theory, and quite frankly, we know only the practicals though we know that very well." An instructor for the new PEEP training program secretly admitted to me that "the new curriculum misses important things like going to the local hardware store down the street and finding out how much different things cost, what materials are durable in reality, what kinds of joints/connections are available, what materials are even out there etc. This sort of practical knowledge is essential to being a good plumber in India but the UPC and PEEP don't value it and so Orissan plumbers who know this at the back of their hand will lose out".

Similarly, the unfamiliarity of the IPA's westernized professional codes was explained to me by a plumber in Mumbai, "from what I understand, this code[UPC] is not Indianized and that is a challenge for us since there are lots of things that are not relevant to how we perform Indian plumbing. For example a floor trap is irrelevant to India since we have wet toilets here and it is going to be particularly challenging for us, who have never used floor traps, to get used to this." Further, because the origins of the IPA are in serving the very high end of the market, their discourse is often out of touch with the realities of most people in India. A plumber described that, "A major section on the last day of training is on how to conduct water audits. A water audit consists of 4 areas- outside the house, kitchen, laundry and the toilet. The outside section includes how irrigation is done for landscape greenery, how often a swimming pool is refilled etc. but these lifestyles depicted and also the assumptions with respect to water consumption are culturally irrelevant and do not reflect the Indian context."

In this way, the theoretical western knowledge backed by the IPA is replacing the decades of carefully guarded tacit skills of the Orissan plumbers thereby threatening their monopoly control over plumbing in India.

Entry to outsiders

The second tool for erosion of the Orissan plumbers' closure is provided through PEEP since it enables easy entry into plumbing, where earlier, the ropes of the trade could only be learned through informal apprenticeships with existing plumbers in the Pattamundai community. A builder, a silent spectator to all these occurrences agreed that, "now through PEEP, IAPMO is trying to bring non-technical people into the field. They don't have the basic background [like the Orissans] and the PEEP course also doesn't provide adequate training but yet, they will get the new jobs". Further the entry of new communities has been accompanied by a gradual withdrawal of traditional Orissan plumbers from the occupation. This is because, the newly established conditions for entry as laid down by the IPA are particularly hard for the Orissan plumbers to fulfill despite being steeped in the plumbing occupation.

The new PEEP, for example, remains extremely inaccessible to the Orissan plumbers for three main reasons- it relies on book-based learning, its classes are taught in English and the course remains prohibitively expensive. As various plumbers mentioned in interviews, "I can't read or write", "See for all that money, there will be a course that we [plumbers] will not understand" and "they charge Rs.20,000 (\$400) for the course from the students. And then there are examination fees and each student has to pay Rs.4,000 (\$80) for that." While it is hard for Orissans currently employed in plumbing to take these certification exams, this is also discouraging future generations from entering the occupation. A plumber in Bangalore expressed his concerns, "Well, my son is only I right now. First he will study and after that I wanted to teach him plumbing and this is a good job, so why not. But now I'm not so sure anymore" suggesting that there are new roadblocks to becoming a plumber such as taking the PEEP courses and getting certified. Due to precisely these reasons the professionalization of plumbing is keeping out the very people who possess the practical skills to pursue the occupations while encouraging the educated, English-speaking lower-middle-class to enter.

Conditions for Success of Professionalization

This section suggests reasons for why professionalization might be resisted in plumbing in India. While the literature, by selecting on successful cases of professionalization, has often assumed that professionalization is desirable, this case helps us identify conditions under which such success might not be attained. In particular I highlight two conditions under which professionalization might not just be ineffective but also be resisted.

First, when closure pre-exists through other means like ethnicity or nationality, professionalization can often be harmful. Professionalization in this case is likely to undermine rather than reinforce strong connections and ties that such informal bases of closure provide. In

fact it is unclear why formal, professionally constructed structures of professionalization should provide a superior way of establishing closure over a given occupation when such closure might have arisen via other more natural and organic processes. This study via its unique setting where professionalization takes place in the presence of pre-existing closure makes clear this tension and highlights the problems with treating professionalization as the only way to establish market closure in occupations.

Second, when professionalization takes place in the presence of pre-existing closure it is quite likely that it is explicitly designed to break such closure rather than reinforce it. In such a case, it becomes important to pay attention to the primary actors that lead the professionalization effort. While the literature often assumes that the dominant groups in the occupation are the only ones capable of launching professionalization projects, this case study shows that it can also be used by marginal actors seeking legitimacy and the benefits of market closure. Such marginal attack is often more likely when incumbents are poorly versed in the language of modern professionalization and marginal groups are more sophisticated. The contribution is that future study of professionalization must seek to understand the relative differences between factions within the occupation of interest and explicitly consider the identity of major actors proposing the professionalization project before making claims about its effectiveness. This study shows that the identity of the champions of professionalization determines if professionalization projects ultimately help incumbent actors.

In the final section I summarize the findings of this study and discuss its implications for our understanding of the process of professionalization. The Orissan plumbers in my study have provided us with reasons to believe that our understanding of professionalization might be fundamentally incomplete.

Discussion

This paper has asked why professionalization might sometimes meet with resistance. In this section I state my contributions, highlight limitations and study implications for further research and policy.

Contributions

My first contribution has been to document the resistance that the professionalization project is facing in India. Using field interviews and participant observation I describe the occupational change induced in Indian plumbing through the recent professionalization project and show how professionalization initiatives ostensibly aimed at improving the lot of plumbing in India have hurt the incumbent Orissan plumbers who previously dominated the profession of plumbing.

My second contribution has been to uncover two primary channels through which professionalization is harming the Orissan plumbers. First, professionalization, through its technically sophisticated discourse, knowledge imported from the west and an emphasis on

English has changed the primary basis of knowledge of plumbing in India. Second, while traditionally professionalization has prevented outsiders from gaining entry into the profession, in the Indian case professionalization has had the opposite effect. It has made it easy for outsiders to gain entry (via codified manuals and training programs) while designing these means of entry specifically to deter the incumbent Orissan plumbers. Because training is conducted in English and is expensive, plumbing is fast becoming an occupation with workers from India's increasingly upwardly mobile middle class which is replacing incumbent Orissan plumbers.

And third, having established that Orissan plumbers oppose such professionalization initiatives and having suggested mechanisms through which such resistance is fostered, I seek to understand why professionalization might face such resistance. This is a puzzle because the literature suggests that licensing, training programs and other professionalization structures should unambiguously help actors obtain occupational closure by establishing monopoly control over work and prohibiting entry to outsiders. With its emphasis on successful cases of professionalization mostly in the US and Europe, the literature has focused almost exclusively on benefits emerging from such professionally-mandated closure. In light of this singular focus, it becomes difficult to explain the empirical facts emerging out of my fieldwork in India.

In order to explain why attempts to professionalize plumbing in the Indian context have faced difficulties, I advance our understanding of the professionalization process. In particular, I posit and show that understanding the cultural and national context that circumscribe the implementation of the project is necessary before success can be predicted. First, I note that while professionalization has typically been uniquely associated with the establishment of occupational closure, such closure can often be established through other means including geography and ethnicity. When closure pre-exists in this way, I show that attempts to professionalize might weaken rather than reinforce such closure. This is a significant departure from our understanding of professionalization and closure which assumes the former to imply the latter. Second, I show that the identity of the actors doing the professionalization is critical to a complete understanding of the benefits of professionalization process. While the literature has often treated workers in a given occupation as one entity, I distinguish between the dominant incumbent group comprising Orissan plumbers and the newly emergent group of returning plumbing contractors and consultants from the Middle East. By making this distinction I am able to show that considering the identity of the actors behind the professionalization project is critical to analyzing its impact. While previous studies have assumed that incumbent groups choose professionalization structures specifically designed to help them achieve market control, the case of plumbing in India shows that professionalization can prove to be a double-edged sword. In this case, the returnee migrants are using licensing, training programs and ethics codes precisely to break occupational closure enjoyed by the Orissan plumbers. Thus, professionalization structures cannot unambiguously be associated with the establishment of market closure since they can, in fact, be molded to suit the intentions of the actors behind their institution.

Limitation: Evaluating Quality of Plumbing

In this paper, while I argue that professionalization faces resistance from dominant incumbent groups, given data considerations I am unable to establish the impact of professionalization initiatives on the overall quality of plumbing in India. In particular, my preliminary investigations about the effect of professionalization on quality delivers ambiguous results.

On the one hand, it is reasonable to expect that the IPA with its focus on adopting standardized training practices and international environmental-friendly standards should improve the quality of plumbing in India. As a plumbing consultant in Calcutta explained to me, “every car cannot be a Rolls Royce on its own, in the same way a plumber who is not up to quality.. can now get there through training.” The IPA’s provisions also actively encourage plumbers to use environment friendly materials and more efficient plumbing techniques. A plumbing contractor told me “Now in place of GI pipes, we are using PPC (poly plastic). They are environmentally better and cheaper by 20-25%”. These quotes provide the supporters of professionalization with reasons to associate the era of modern plumbing in India with higher plumbing quality.

At the same time, there exist reasons to doubt the claim that India’s modern plumbing sector might usher in a wave of increased quality. While it is clear that the IPA is promoting the rapid import of international standards and technologies into the Indian plumbing market, many interviewees express concerns over their suitability to Indian conditions. When asked if the Uniform Plumbing Code was adapted to Indian conditions one plumber replied, “it’s not fully Indianized. There are lots of things that are not relevant to Indian plumbing, either appliances or systems but also social habits of the population here are very different.” Another plumber analyzed that “a lot of Indian innovations that work brilliantly for our conditions here will be lost..for example, after the monsoons, pipes leading to the drainage often get choked and we have used firelines to clear it up..this will no longer be allowed under the UPC but the monsoons are not going to stop, so not sure how we will deal with the problem.”

In this way, pending further research there exist reasons to support both sides in the debate on professionalization’s impact on quality of plumbing in India. While the focus of this paper is to analyze resistance to professionalization initiatives by Orissan plumbers, the effect of professionalization on plumbing quality remains a question to be addressed in future work.

Implications for Policy

Finally, this paper has implications for policy in the area of professionalization and licensing. The most strident critique is against the direct import of international professionalization structures in developing contexts. While the problems faced by a variety of semi-skilled low-income occupations in the developing world are real, as I show in this paper, these problems might be exacerbated by instituting policies orthogonal to occupational interests. In particular, such arrangements are susceptible to capture by powerful actors who can use them against the very people they were intended to serve. The general lesson is that such professionalization

initiatives must be adapted to local conditions and involve incumbent actors right from the beginning. Even though the implications of such professionalization structures on quality are ambiguous, what is clear is that in this case the professionalization project is having particularly malicious effects on Orissan plumbers. Equity considerations and redistributive effects of licensing and professionalization initiatives must be considered by policy. If professionalization is seen as inevitable, one suggestion is to implement re-skilling and training programs so that incumbents are able to participate. It is indeed unfortunate for Indian plumbing that a community with decades of experience in local conditions should systematically be excluded from participating in its own professionalization.

In sum, by exploring a novel setting where professionalization faces opposition I am able to analyze the effects of institutional and cultural context on its success and uncover new extensions to our understanding of professionalization and occupational change. In the future, a more complete analysis of professionalization needs to consider pre-existing reasons for closure and the identity of the actors behind the establishment of professionalization. Finally this paper provides concrete guidelines that inform policy designed around professionalization projects in the developing world.

References

- Abbott, Andrew. 1988. *The System of Professions: An Essay on the Division of Expert Labor*. University Of Chicago Press.
- Amjad, Rashid. 1989. *To the Gulf and Back: Studies on the Economic Impact of Asian Labor Migration*. New Delhi, India: International Labor Organization.
- Autor, David H., Frank Levy, and Richard J. Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *The Quarterly Journal of Economics* 118(4):1279-1333.
- Barley, S. R. 1992. "The New Crafts: On the Technization of the Workforce and the Occupationalization of Firms." *Philadelphia: National Center on the Educational Quality of the Workforce*.
- Berg, B. L. 1989. *Qualitative Research Methods for the Social Sciences*. Allyn and Bacon.
- Bledstein, Burton J. 1976. *Culture of Professionalism: The Middle Class and the Development of Higher Education in America*. W. W. Norton & Co Inc.
- Brannon, R. L. 1994. "Professionalization and Work Intensification: Nursing in the Cost Containment Era." *Work and occupations* 21(2):157.
- Cappelli, Peter. 1999. *The New Deal at Work: Managing the Market-Driven Workforce*. Harvard Business Press.
- D'Cruz, Premilla, and Ernesto Noronha. 2006. "Being Professional: Organizational Control in Indian Call Centers." *Social Science Computer Review* 24(3):342 -361.
- Diprete, Thomas A. 1988. "The Upgrading and Downgrading of Occupations: Status Redefinition vs. Deskilling as Alternative Theories of Change." *Social Forces* 66(3):725-746.
- Doner, Richard and Ben Schneider. 2000. "Business Associations and Development: Why Some Associations Contribute More than Others." *Business and Politics* 2(3):261-288.
- Essah, Doris S. 2008. "Fashioning the nation: Hairdressing, Professionalism and the Performance of Gender in Ghana, 1900-2006." *Dissertation*. University of Michigan.
- Etzioni, A. 1969. *The Semi-Professions and their Organization*. Free Press.
- Evetts, Julia. 2006. "Trust and Professionalism: Challenges and Occupational Changes." *Current Sociology* 54(4):515 -531.
- Fournier, Valérie. 1999. "The Appeal to 'Professionalism' as a Disciplinary Mechanism." *The Sociological Review* 47(2):280-307.
- Freidson, Eliot. 1970. *Profession of Medicine: A Study of the Sociology of Applied Knowledge*. University Of Chicago Press.

- Harper, D. A. 1987. *Working Knowledge: Skill and Community in a Small Shop*. University of Chicago Press.
- Heinz, John, and Edward Laumann. 1994. *Chicago Lawyers. Revised Edition: The Social Structure of the Bar*. Northwestern University Press.
- Johnson, T. J. 1972. *Professions and Power*. Macmillan Pub Ltd.
- Kalnins, A., and W. Chung. 2006. "Social capital, geography, and survival: Gujarati immigrant entrepreneurs in the US lodging industry." *Management Science* 52(2):233.
- Kar, Manoj, and Ashutosh Mishra. 2010. "Drip, Drip: Let's Fix It." *The Telegraph*, October 28, Calcutta.
- Kleiner, Morris M., and Alan B. Krueger. 2008. "The Prevalence and Effects of Occupational Licensing." *National Bureau of Economic Research Working Paper Series* No. 14308.
- Kumar, Sanjeev. 2008. "Plumbing in the Depths." *The Hindu*, September 14.
- Larson, Magali Sarfatti. 1977. *The Rise of Professionalism: A Sociological Analysis*. Univ of California Pr.
- Light, Ivan H., and Steven J. Gold. 2000. *Ethnic Economies*. Academic Press.
- Van Maanen, John, and Stephen R. Barley. "Occupational Communities: Culture and Control in Organizations." *Research in Organizational Behavior* 6:287–365.
- MacDonald, Keith M. 1995. *The Sociology of the Professions*. Sage.
- Manza, J. 1992. "Classes, Status Groups and Social Closure." *Current Perspectives in Social Theory* 12:275–302.
- McClelland, C.E. 1990. "Escape from freedom? Reflections on German professionalization 1870-1933." Pp. 97–113 in *The Formation of Professions: Knowledge, State and Strategy*. London: Sage.
- Mori, Hiroaki. 2005. "Activity to Form the Network of Young Engineers and Researchers in Relation to Welding Fields in Asia." *Journal of the Japan Welding Society* 74(1):62-65.
- Munshi, K. 2007. "The Birth of a Business Community: Tracing the Path to Entrepreneurship in a Developing Economy." *World Bank*.
- Nayyar, Deepak. 1994. *Migration, Remittances and Capital Flows: The Indian Experience*. Oxford University Press, USA.
- Pathak, Bindeshwar. 1995. "History of Toilets." Hong Kong. *International Symposium on Public Toilets*.
- Portes, A., and M. Zhou. 1992. "Gaining the Upper Hand: Economic Mobility among Immigrant and Domestic Minorities." *Ethnic and Racial Studies* 15:491–491.

- Prakash, B. A. 1998. "Gulf Migration and Its Economic Impact: The Kerala Experience." *Economic and Political Weekly* 33(50):3209-3213.
- Ray, Shovan. 2009. *Handbook of Agriculture in India*. Oxford University Press, USA.
- Ray, Shovan. 2004. "Roles of Agriculture." *Indira Gandhi Institute of Development Research*.
- Roy, T. 2008. "The Guild in Modern South Asia." *International Review of Social History* 53(S16):95-120.
- Sahoo, Mahendra Nath, Jatindra Singh, and Jagabandhu Nayak. 2011. "127 Kendrapada Plumbers Duped out of Rs. 1 Crore." *Times of India*, May 9.
- Satpathy, A.K., J.P. Mishra, and N. Prakash. 2002. "Skill mapping and skill development for employability: the case of Cuttack." *Indian Journal of Labor Economics* 45(4):1235-1250.
- Simon, Stephanie. 2011. "A License to Shampoo: Jobs Needing State Approval Rise." *The Wall Street Journal*, February 7.
- Starr, Paul. 1984. *The Social Transformation of American Medicine: The rise of a sovereign profession and the making of a vast industry*. Basic Books.
- Tilly, Charles. 1999. *Durable Inequality*. University of California Press.
- Timmons, Edward J, and Robert J Thornton. 2010. "The Licensing of Barbers in the USA." *British Journal of Industrial Relations* 48(4):740-757.
- Waldinger, Roger. 1999. *Still the Promised City? African-Americans and New Immigrants in Postindustrial New York*. Harvard University Press.
- Weber, Max. 1968 (1925). *Economy and Society*. Bedminster Press.
- Weeden, Kim A. 2002. "Why Do Some Occupations Pay More Than Others? Social Closure and Earnings Inequality in the United States." *The American Journal of Sociology* 108(1):55-101.

Table 1. Distinguishing the Traditional and Modern Plumbing Sectors

	Traditional Plumbing	Modern Plumbing
Market Share	90%	10%
Clientele	Residential and Low-End Commercial Projects “Most builders go directly to the Orissan contractor. There is no quality control or anything, it seems to work on trust”	MNCs, Five Star Hotels “That’s why when any big hotel project is being done, we see the same 4-5 companies everywhere.”
Appearance of Plumbing	Two pipe plumbing system, pipes outside building, GI pipes	One pipe plumbing system, pipes hidden behind false ceilings, plastic pipes (PVC/CPVC)
Image	No-Fuss “People think of Orissan plumbers and think of plumbing as associated with bad hair, wearing dhoti[lain cloth] but excellent skills.. and hard working guys, you have to give them that.”	Professional “We are professionals behind the work... Now plumbers are crisply dressed, having conferences in five star hotels”
Primary Source of Legitimacy	Hereditariness We are "khandani" [family-based], you know what that means? My father was doing plumbing and I also learned plumbing. We’re the only ones who know the different kinds of materials out there, the difference in quality and what is best for a particular situation.“	Internationality “Our course content comes from an international association of plumbing [IAPMO] that you must have heard of. IAPMO has invested heavily in India and is responsible for all the training development.”
Mode of Learning	Apprenticeship “For example, our Bandhu Patra...he can look at something and within 5 minutes, diagnose the problem. He is from Orissa. There is no training school in Orissa, but they learn both the theory and practical elements of plumbing within 4-5 years of experience, by seeing and doing”	Training Programs “During training, you can create virtual models and then study the hydraulics, how it acts and then you know when the trap is not fully vented, what kind of turbulence you can get and what these kinds of things mean, where the trap seal is going out and all these things can be studied.”
Knowledge	Tacit Knowledge “When trying to find water in the ground, I think asking the Orissan plumber would be more useful than an educated hydrologist or plumbing engineer. From my practical experience, I am telling: I have paid lakhs of Rupees to the hydrologist to find a point of water and then also, what they find for me is insufficient. But the untrained, often who has been a villager, who has field experience, will use his own resources and then come and tell me, “Here Sir, here there is water.” They have intuition.”	Formal Knowledge “Theoretical knowledge is important to distinguish between different materials, how the hydraulics, specifically for plumbing, work. For example, if they [plumbers] are designing a system, they will find where there is moisture, they will calculate the run-off, the cross section of the pipes, what is the total sewage that is coming, what is the amount of solid waste..these things are required.”
Attitude to Plumbing Drawings	Flexibility “Usually if we are going to fix up a bathroom of a flat then it is mentioned in the drawing what height customers want their shower head at or at what height they want water pressure. So it totally depends on the drawing given by the consultant. But there are lots of contingencies in India and we [Orissans plumbers] use the drawings as guidelines. This way at least we ensure that people are getting some water!”	Rigid Adherence “While on the site in Shoba, a consultant who was doing the drawings once told me that he wanted to drop some pipes with three 90 degree bends. I told him that this would not be possible. If he wants so many bends, the angles would have to be 50 degrees. Otherwise, I told him that I can do one 90 degree bend. The drawings have to be accurate, otherwise what’s the point.”

Table 2. Tension between the Traditional and Modern Plumbing Sectors

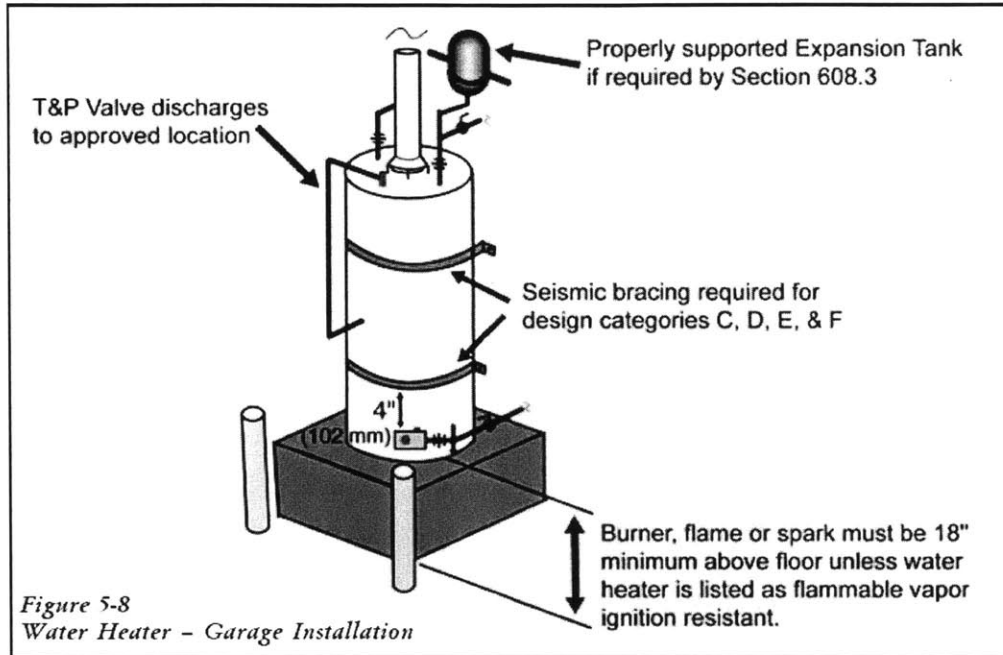
	Modern Sector’s Opinion of the Traditional Sector	Traditional Sector’s Opinion of the Modern Sector
Control over Work	<p>Unfair Monopoly “I find that they [Orissan plumbers] are being very exclusionary. Only they know where the projects and where the jobs are, won’t tell anyone.”</p>	<p>Commercial Interests “Everything is money-making. Don’t think that these organizations are all doing good. In the front, they speak about public service, but behind the only thing that matters is revenue generation. Even Mr.Nair [part of IPA] said that they would do all this[professionalization] as long as the funds kept pouring in!”</p>
Knowledge	<p>Lack of Theoretical Knowledge “They have learnt the work down the generations, hands-on. They are sort of an unorganized section. But why they have to fit one thing to another, they don’t know; similarly [they don’t know] why the pipe has to be of a certain diameter; their theoretical knowledge is very low.”</p>	<p>Lack of Knowledge Relevant to India “With the IPA folks, if the code says that a pipe should be painted black, they will do so. They do not question why [this] should be done or if black is an appropriate color for India and that project. In this way, India-specific needs and plumbing adaptations are not necessarily reflected in the UPC or new training programs.”</p>
Approach	<p>Stagnant “Unless they [Orissan plumbers] were to get involved in conferences or technical exhibitions, they wouldn’t get updated: what developments are there, what innovations, what new materials; so they would lag behind.”</p>	<p>Superficial “He[IPA member] will charge a lot and speak in English but he doesn’t know plumbing. He is a good salesman and he talks well but he has no background in this matter. I know I want to be in a technical trade not a sales gimmick.”</p>

Figure 1. Aims and Objectives of the Indian Plumbing Association

- ^ To promote the advancement of the plumbing and building services industry in the country.
- ^ To provide a platform for the dissemination and exchange of knowledge on all matters related to the industry and offer advice to all concerned, on the subject.
- ^ To promote and foster feelings of brotherhood and achieve co-operation and mutual help among professionals in the industry.
- ^ To encourage its members to achieve high standards of workmanship, adopt correct business practices according to the ethical code of conduct to maintain the dignity of the profession and emphasise on their duties and obligations.
- ^ To establish means of communication and harmony between the authorities and the plumbing & building services industry, for discussion of problems faced with government, semi-government, municipal, public and private organizations.
- ^ To make efforts to find solutions to the satisfactions of all concerned and generously contribute to the improvement of working conditions for the benefit of the society at large.
- ^ To organize conferences, seminars, tours, etc., which may benefit and educate the members of the trade and to promote, support and advance the building services industry.

Source: Indian Plumbing Association's Website

Figure 2. Diagram of Installation of Heater



Source: Indian Plumbing Today