

Revisiting the Fishers of Kerala, India

Janaki Srinivasan*

Department of Engineering Education
Virginia Polytechnic Institute
660 McBryde Hall
Blacksburg, VA 24061
+1-501-599-5143
janaki3@vt.edu

Jenna Burrell*

School of Information
University of California-Berkeley
102 South Hall #4600
Berkeley, CA 94720
+1-502-642-7584
jburrell@berkeley.edu

ABSTRACT

In this paper, we revisit a study that has become canonical in ICTD, economist Robert Jensen's study of mobile phone use in fishing markets in north Kerala. Jensen found that the use of mobile phones to share market price information made fish markets more efficient while also improving producer and consumer welfare. Based on our own ethnographic case study in the region, our goal is to understand the geographic and political-economic conditions in which Jensen's findings hold and to examine questions of generalizability. We show that what makes the fish trade in north Kerala a special case is, in part, due to its coastal geography and prevalent credit relationships that provided fishers the flexibility to optimize profits by selling at different markets. However, we also found that those working in various roles in Kerala's fishing industry emphasized more broadly the use of phones in maintaining trade relations, facilitating coordination, and protecting themselves during times of risk, vulnerability, or emergency. We suggest that parsimonious models, such as Jensen's, can generate blind spots, which are problematic when such studies are used to draw broader conclusions about policy and technology design.

Categories and Subject Descriptors

H 1.2 [Information systems]: User/Machine systems – *human factors, human information processing*

General Terms

Design, Economics, Human Factors, Theory

Keywords

market prices, mobile phones, fishermen, Kerala, India

1. INTRODUCTION

In this paper, we return to the site of a canonical work in ICTD, Robert Jensen's study of mobile phone use among fishermen in Kerala, India [1]. Jensen's study, carried out within the disciplinary tradition of economics, finds that the use of mobile phones for sharing market price information has made fish

markets more efficient and improved both fishermen and consumer welfare. Our goal in this paper is to understand the geographic and political-economic conditions in which Jensen's findings hold. By so doing, we also examine the generalizability of his findings.

Taking seriously the question of multi-disciplinarity in ICTD, we consider what alternative explanations or additional details might come to light when we employ an altogether different methodological approach grounded in different epistemological commitments towards studying the same geographic site and population, and to broadly consider the same topic as Jensen: how mobile phones are incorporated into fishing practices. Our work is framed around an ethnographic case study comparing two sites, one in north Kerala where Jensen's study was conducted and the other in south Kerala. We believe that the questions we raise and attempt to answer are of cross-disciplinary interest. The question of generalizability, particularly within the field of ICTD, is connected to the desire to scale successful development interventions and to maximize impact. Our work also speaks to a broader concern and interest in ICTD with how research findings are translated into policy practices or design strategies.

We arrived at five conclusions based on our research. We found that the fish trade in north Kerala is a special case and through our research we developed a growing list of the 'conditions' in the region, pertaining especially to its geography as well as prevalent investment and credit relationships, which allowed fishers the flexibility to sell at different markets. We examined fishing in south Kerala and found that these conclusions did not generally hold there. Second, we found that in both markets, only specific categories of actors within that market found price information critical in making trading decisions and regularly used phones to ascertain it. Third, we found that a majority of those at the fish market were using mobile phones in a much wider range of activities related to their livelihoods. Fourth, while a majority of these individuals perceived mobile phones as having enhanced their livelihoods and well-being, their implicit definitions of 'welfare' were rarely focused on improved incomes alone, emphasizing instead how they used their phones to maintain relations within and outside the market, and protected themselves during times of risk, vulnerability, or emergency. Finally, we found that fish markets have been shaped by the regulatory influences of both fishers' collectives and the government. It is worth considering how such models as Jensen's, which omit these features toward the aim of parsimony, may end up representing particular markets as more "free" than is warranted and potentially blind us to the power dynamics that shape such a market's daily working.

* *The co-authors contributed equally to conceptualizing and writing this paper.*

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The paper is structured as follows. We begin with a detailed description of Jensen's study and findings, highlighting the ones pertaining to prices and phone use that proved to be of particular interest in our field study. We then describe our methods. From there we go on to describe the working of a fish market in north Kerala, paying particular attention to who uses phones and in what manner. We then briefly analyze a south Kerala market in a similar fashion. The following section analyzes the broader use of phones in both markets and finally, we present our conclusions.

2. THE MATTER OF MECHANISMS

Robert Jensen's article "The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector" is an econometric study of the impact of mobile phones on price in a number of north Kerala beach markets [1]. The research design reflects Jensen's remarkable prescience. Anticipating the arrival of mobile phone coverage in the region, he and his research team initiated survey work in 1997, prior to the arrival of phones. They continued this work after mobile phone towers were erected in the region and mobile phones began to proliferate among those working in the fishing industry. Survey data was collected every week for almost five years from 20 fishing units (10 large¹ 10 small) each in 15 beach markets for a total of 300 fishing units. For the purposes of the article, the details especially about quantity of fish, price of the sale, and the particular beach market where it was sold, were critical to Jensen's subsequent argument about the role of the mobile phone in addressing information asymmetries that hamper market efficiency.

Jensen's study addressed differences in the price for fish (specifically, sardines) across geographically dispersed beach markets. Prior to the arrival of the mobile phone in north Kerala, learning the price of fish at a particular beach market meant physically travelling there, leading to high 'search costs' that included fuel expenditures and lost time, the latter a special problem for a perishable good like fish. Instead, fishermen generally went straight to the market closest to their catchment area. The result was that, on any given day, some beach markets were oversupplied with fish while others were undersupplied yielding to substantial differences in price at each of these markets. The term for this is 'price dispersion' and it indicates an inefficient market. Jensen cannily perceived that the arrival of mobile phones had the potential to drastically reduce search costs and that the resultant change in market efficiency could be measured to give evidence of the impact of mobile phones. He describes the research design as a 'natural experiment.'

As for the results of the study, Jensen found that prices per kilogram of sardine fluctuated fairly wildly at first, stabilizing almost immediately into a narrow range shortly after the date the phone network became available in each of three regions. This finding is powerfully illustrated in Figure 4 of his article. Thus, his evidence shows convincingly that price dispersion was reduced with the arrival of the mobile phone.

An additional important consideration in Jensen's account is the matter of welfare effects. He asks whether individual fishers benefit from improvements in income from this more efficient market. Jensen argues that "for the world's poorest, living standards are determined largely by how much they get for their output," (p. 880) and that ICTs such as mobile phones "may help poorly functioning markets work better and thereby increase

incomes and/or lower consumer prices." (p. 881). Indeed, Jensen found that in addition to a general improvement in market efficiency, fishermen gained about 8% in profits while consumers ended up paying less for sardines (by about 4%). In his elaboration of these welfare gains Jensen acknowledges that it was primarily the 'largest fishermen' who adopted mobile phones, but that the smaller fishermen still realized 'spillover gains' (that is, increased profits) from improved market efficiency even though they did not use the phone directly and even though they were not themselves able to carry out arbitrage practices. The reason for this, he posits, is that the smaller non-phone using fishing units, "no longer have days with unsold fish because boats with phones will switch to other markets when the local catch is high."

We give further attention to how Jensen describes the *mechanisms* at play in the article, in light of our own interest in examining these directly through our case study. How exactly is the mobile phone enrolled in this process of fish marketing? Jensen asserts that, "the phones were widely used for fish marketing; while almost all sales before mobile phones were conducted via beach auctions, fishermen with phones, often carrying lists with the numbers of dozens or even hundreds of potential buyers, would typically call several buyers in different markets before deciding where to sell their catch, in essence conducting a virtual auction, and committing to a price while at sea." (pp. 891-892). This is the extent to which the actual practice of mobile phone use among north Kerala's fishermen is specified in the article. While the quantitative data that forms the substance of Jensen's argument about the reduction of price dispersion are collected systematically and meticulously, the details about how exactly fishermen use phones are presented sparsely in the account and without the same kind of transparency about how such insights were acquired. Some of these details are deprioritized to footnotes. This is (broadly) a reflection of what counts as evidence in econometric analysis. Collected prices are data, but details on processes are background or explanatory material, not properly encompassed by definitions of empiricism implicit in the project.

There are further details about initial conditions of the industry in Kerala, specifically temporal and spatial constraints on trade that determined practices of fish marketing prior to the mobile phone and that were unchanged after its arrival. Jensen comments on the perishability of fish, the inability to store fish, and the narrow window of time when fish markets are open - all reasons why better price information is likely to have an impact in this particular market. He points also to the absence of two particular constraints, that of "interlinked transactions," the case "when a fisherman receives credit from a buyer and in exchange must always sell to them." (p. 897) and 'collusion' among sellers or buyers to 'punish' those involved in sales with non-locals (p. 897). Both conditions could (if present) prevent market efficiency improvements despite better price information. By identifying them, Jensen gives some indication of what to look for in other sites to determine whether such findings will generalize to new locales.

3. METHOD

Our method was a comparative analysis between the model presented by Jensen (which set our initial expectations and understanding of fishing in Kerala) and what we found returning to the region where the model was derived. We relied initially on Jensen's account for our baseline understanding of the mechanisms underlying fish marketing activities. We used his article to frame a set of questions around mobile phone use, price acquisition, and arbitrage work. However, where Jensen works backwards from indirect empirical evidence to an understanding

¹ Where 'large' is defined as a unit with a boat length of 28 ft or longer.

of how mobile phones impact market efficiency and welfare in the fishing industry, our aim was to understand the ‘mechanisms’ directly. In other words, what precisely are the practices of phone use around fish marketing (and other fishing-related livelihood activities) in Kerala? And besides fish marketing, what other value do fishers and others in the fishing supply chain attach to the mobile phone in their livelihood activities?

We were drawn to examine Jensen’s article in part because of its influence in the field of ICTD and apparent impact on broader public understanding of mobile phone diffusion in the ‘developing’ world. The article received considerable media coverage.² Perhaps more significantly, we were drawn to this piece because of its exemplary research design and execution in the disciplinary tradition it belongs to. We contend that in fields such as ICTD, where multiple disciplines intersect, we can arrive at novel insight and understanding only by a close study of *good* examples. Our close consideration of Jensen’s piece and revisiting the site of the work functions not as a critique of the particular model in question, but more broadly to consider how models and methods construct representations, how ways of understanding human behavior in any disciplinary tradition that deals with the social (including economics, sociology, anthropology, and human-oriented domains of computer science such as HCI) are always slightly skewed by the constructs, values, and priorities of that discipline. Our attempt here is specifically to show *how*.

While Jensen’s approach was econometric, ours is an ethnographic case study. Our goal was to account for a more complete story of the fishing industry in this region, its economic and political history, and how the industry in question is situated globally. Our purpose was to unpack the elements that Jensen reduced to essentials, to render the setting in its full complexity through holistic description. We should note that we did not find reason to refute Jensen’s overall findings, nor was our aim to disprove the model. Furthermore, coming from such epistemologically divergent positions, the parsimonious economic model and the ethnographic case study are not directly commensurable, though we believe they can be fruitfully put into a dialogue.

What is the purpose of making a complex mess out of such a compelling and clear model? In part, our goal was to address questions of generalizability. A widespread desire in the aid sector to quickly and widely scale ‘proven’ solutions makes the question of generalizing critical in the research field of ICTD with its intimate ties to that sector. Moreover, the current popularity of randomized-controlled trials as a method to establish what kinds of aid interventions work has also generated discussion and criticism about whether a positive finding in one setting might be predictive of the same outcomes in any other [2]-[4]. To hone in on the issue of generalizability, we conducted our research in two sites: the first in north Kerala, the site of Jensen’s study, to situate his findings in the region’s history, geography and political economy; and the second in south Kerala, an area Jensen did not study. In the south Kerala site, we found evidence of pronounced differences in the organization of the fishing industry that make it unlikely Jensen’s findings would generalize even that far. This paper is structured to highlight our comparison of these regions.

² See for example “To Do with the Price of Fish.” in *The Economist*, dated May 10, 2007 and “Dial ‘M’ for ‘Mackerel’: Can a New Mobile Phone Service in Rural India Help Promote Economic Empowerment?” in *The Wall Street Journal*, August 26, 2009.

Much of our description of how the fishing trade operates is presented in aggregate based on direct observation at beach markets and in audio-recorded interviews that took place over three months of fieldwork. We also employ a citation practice, more common in historical research, of identifying in footnotes the specific source by pseudonym (or real name in the case of activists, researchers and SIFFS office-holders), industry role, location, and the date of our interviews for the various claims made throughout the paper. We do so to allow readers an opportunity to assess our sources in relation to statements attributed to them. This practice serves as a counterpoint to Jensen’s description of these mechanisms where sources are not specified. We conducted eighty formal interviews, as well as more unstructured conversations, with people who worked across the full range of the fishing supply chain, including fishers who owned boats, fishers who worked on other people’s boats, buyers who bought wholesale, others who liaised with fish meal factories, or operated as export agents, as well as small-scale fish vendors (operating on bike and foot, male and female). Most interviews were conducted in Malayalam with the assistance of a translator. We also spoke with the investor-auctioneers who mediate between fishers and buyers, taking a cut of the profits and/or earning a commission. Organizing among fishers was prominent in Kerala’s fishing industry so we spoke with employees of fishers’ cooperatives (both fisher-organized and those affiliated with the government-run Matsyafed) and to members of fishers unions at both the state and village level. Finally we spoke with several experts and researchers, some of whom also identified as activists. In the course of this research, we acquired numerous publications, those produced by the government, by fishers cooperatives, unpublished research papers, etc. All are brought together to form the case study that merges a multitude of perspectives and sources.

4. COMPLICATING THE MODEL IN NORTH KERALA

In this section we explicate several trends and events in the fishing industry in north Kerala that made it an ideal setting where the introduction of the mobile phone would lead to the observed improvements in market efficiency, and to ‘market mechanisms’ that could generate welfare gains accruing to both small-scale and large-scale fishing units. We find that the groundwork for the functioning of these markets was accomplished, in part, through forms of intervention into a prior monopsonistic order, in particular, through the formation of both government-run and fisher-organized societies that invested in fishing equipment and also systematized an auctioneering system on the Kerala coast. These interventions, we argue, can be characterized as *regulatory*, and fundamentally reshaped prior buyer/seller relationships that were dysfunctional and detrimental especially to fishers. In addition, we point to the history of mechanization and fish export in Kerala that has also shaped the adoption of new technologies and structures of marketing fish. Thereafter, we analyze a landing center in north Kerala, situating its working both within the state-level developments outlined above, and in the region’s particular geography and social order. The goal of taking such a political economic view that recognizes, “the mutual determination of political processes and economic activity in a historically viewed world system of nation-states” is to enable us to probe further into the possibilities of generalizing from the north Kerala case [5]: 79.

4.1 The Political Economy of Fishing in Kerala

Kurien remarks that Kerala’s fish economy has historically had three crucial components: natural resources, skilled labor power and techniques, all of which the region possessed or developed over time [6]. However, these factors are far from uniform along

the 590 km coastline of Kerala for both historical and geographical reasons [7]. Nor are the skill sets and techniques constant across seasons. Artisanal fishers in the region have historically used a variety of combinations of boat and gear to catch different varieties of fish and in different seasons [6],[8]. Large boats were used in the north, but these could not be used in south Kerala with its steep ocean floor and rough surf. During monsoons, many landing sites in the south were dangerous even for small boats. The prevalence of different species of fish in the two regions meant gear varied as well, as we will see in subsequent sections. While the specific boat types and gear have changed since Kurien's study, the principles on the relative size of craft across the north and south, the seasonality of safe landing spots in the south, and differences in fishing gear, hold.

While the varied equipment and techniques used on the Kerala coast have a long history, the relatively recent Indo-Norwegian project (INP) has also significantly shaped the Kerala fishing economy.³ Started in 1953, INP's goal was to modernize the fishing sector, focusing mainly on the use of mechanized craft and on exporting fish. While INP itself functioned only till the mid-1960s, it fundamentally shaped the technology and relations of production involved in Kerala's fishing sector ever since. For our purposes, it's important to note that fishing took place deeper in the ocean than before with the use of powerful motors and large boats, especially trawlers. Further, trawling nets caught everything in their path unlike traditional nets that targeted specific fish varieties. As trawlers landed bulk catches of fish, improved freezing and canning facilities helped process them for export. Even as exports skyrocketed in this period, artisanal fishers operating unmotorized craft, started to protest against these changes in the fishing economy. With the entry of trawlers and overfishing, it was increasingly harder for them to find fish. Nor could they hope to compete given the substantial capital investments required for large boats. As their problems intensified, artisanal fishers themselves started using outboard motors (OBMs) on their fishing craft by the 1980s. They combined OBMs with newly introduced plywood 'vallams' to go farther into the ocean to catch fish [12].

In addition to the adoption of new technologies, since at least the 1960s, fishers have also been involved in collective action to pressure the government to bring about structural changes to the Kerala fish economy. Several fish workers' unions (Kerala Swatantra Matsya Thozhilali Federation, KSMTF, being a prominent example) and a federation of fishing co-operatives called the South Indian Federation of Fishing Societies (SIFFS), were formed in the 1980s, and have been prominent in organizing fishers. These groups were formed to respond to the after-effects of mechanization and the export drive, but also to the historically exploitative relationship between fishers and middlemen-financiers.

Historically, middlemen-financiers would advance an amount to boat owners and in exchange, buy their catch at whatever price

they deemed fit.⁴ One of SIFFS' goals was to ensure that fishers received a better price at the first point of sale on the shore. Towards this goal, it worked with village-level fishing societies that offered loans to fishers for their equipment and also hired an auctioneer. The auctioneer would work on behalf of fishers, auction their fish for the best possible price and hand over a fixed percentage of the sales revenue to the fishers. This streamlining of auctioning has by all accounts been crucial to the way fish is bought and sold in landing centers in many parts of Kerala today. Many fishers' societies and unions have been formed since that time, including a government-sponsored federation of fishers' cooperative societies, Matsyafed. These societies also provide loans to purchase craft and gear. Over time, these new sources of investment, and the auction system, have posed some competition to private investors, thus shaping the dynamics at landing centers. SIFFS has also been instrumental in the development and manufacture of the plywood boats that now proliferate in Kerala's coastal waters. Meanwhile, the protests organized by fishers' unions on issues such as overfishing, the institution of a trawling ban, or the entry of outside ships into Kerala waters, have also had some impact on fishing policy and regulations in Kerala today. Finally, while SIFFS and KSMTF operate throughout the Kerala coast, they are stronger in south Kerala where they started out.

Several other factors, some of them not specifically related to fishing at first glance, have also shaped Kerala's fishing sector. The north Kerala coast has a predominantly Muslim population, while the southern coast is largely Christian. This has shaped the participation of women in fish marketing in the two regions. The prevalence of migration and the volume of capital available for investment in the fishing sector are also related to religion. Kerala has high rates of migration to the Middle East since the 1970s, with the north Kerala region sending the most emigrants abroad [15]. Remittances from emigrants and from returnees from the Middle East form an important source of private investment in the fishing sector, and especially so in the predominantly Muslim north.⁵

Having outlined important changes in the political economy of the Kerala fishing sector in the past decades, and pointed to some differences between the north and the south, we see how these shape the workings of a landing center in Kozhikode district, north Kerala.

4.2 The Case of a Landing Center in North Kerala

When we first arrived in Chaliyam, the two predominant kinds of fishing units in the region – the ring seine boats and plywood/fiberglass boats – were pointed out to us even before we arrived at the shore where auctioning took place. The auctioning in Chaliyam happens at a shore from where the sea is not directly visible, so we could only see the few fishing craft that were approaching or leaving from a nearby inlet and not all the boats out at sea. In fact, we could see more mopeds and trucks parked close to the shore and being loaded with blue and orange plastic crates

³ Interviews in Thiruvananthapuram with John Kurien, academic-activist and Vivekanandan, former SIFFS director, Jul 26 2012; T. Peter, KSMTF President, Aug 6, 2012; Maglin Peter, convener of Theera Desa Mahila Vedi, (an organization of fisherwomen), Sep 9, 2012; and Julian Telar, Chief Executive, SIFFS, Sep 11, 2012. See [6],[9],[10],[11] for more on the INP and its after-effects.

⁴ Fishers sold their catch to merchants at low prices compelled by the perishability of fish, lack of access to a marketing infrastructure and the threat of physical violence if they sold elsewhere. Merchants also controlled the land on which fishers lived. See [9],[13],[14] for details on the fish supply chain along the Kerala coast.

⁵ Interview with Jolly, SIFFS Malabar coordinator in Kozhikode, Oct 23, 2012.

of fish, than we could see boats anchored at shore. We also saw ships and trawlers across the river at the Beypore harbor. Boats arrived with fish in their hold or in their freezer compartments. On the many-colored plywood boats at the shore, we could see fish being peeled off nets by 2-4 fishermen and gathered in fishnet-baskets. These baskets were brought out to the shore, and their fish neatly laid out on the sand. The fish were immediately surrounded by groups of people participating in an "auction" for them. A few men were moving between such groups, calling out prices for the fish. We saw multiple such auctions taking place simultaneously on the shore. We saw mostly large fish at this time - seer fish, sharks - but met people waiting for sardines, mackerel, which would come in later. Transactions between auctioneers and buyers were settled in cash, on the spot. Transactions between fishers and auctioneers, we heard, would mostly be settled weekly.

While the auctions took center-stage, they were by no means all that was happening on the shore. An ice crusher on one side under a tent was in constant use, droning in the background of all conversation on the shore. The machine was fed large slabs of ice by two men, and it spit out crushed ice that was collected in plastic crates. More men would then directly shovel this ice onto the back of pick-up trucks (where fish was then loaded) or added it to crates with fish in them. The men doing this work conferred frequently with the buyers of fish. Besides the pick-up trucks, there were motorbikes and cycles with two or three crates stacked on their back, yet to be loaded. Finally, there were the large trucks that were waiting at the entrance to the landing center and that would travel longer distances. Other men were engaged in weighing the fish after the auctions. Two men had set up stalls to sell fish to individual buyers on the beach. Another had a stall where fish was sliced into pieces for individual customers. Some others, 'scavengers,' were picking up fish that was accidentally dropped into the water while baskets of fish were transferred from boat to sand. The only women in sight were engaged in this activity, one with a baby strapped on her back.

As this vignette from a morning at a beach market in Chaliyam shows, daily activity at the market involved different kinds of actors employing a wide range of tools and forms of equipment structured by several institutions and relations. Fishing near this shore was carried out on mechanized mini-trawlers, motorized ring seine units (60+ ft), (plywood/fiber) gillnet units with internal motors (typically up to 36ft), (plywood/fiber) smaller boats called 'vallams' that used external motors (OBMs) and oar-operated boats.⁶ The gear used for fishing was equally varied, including trawl nets, ring seines, different sizes and types of gillnets, and hook-and-lines. Thus, a range of boat sizes and gear were in operation, leading to many more combinations than the two categories of 'small' and 'large' fishing units offered in Jensen's article. These combinations differed in terms of the volume and

⁶ By one estimate, there were 75-100 gillnet units, 125 small boats with OBMs, 15-20 manually operated boats, 10-25 vessels for mussel fishing (medium size- 35 ft), 7 ring seine boats and 6 mechanized boats in Chaliyam. From an interview with Ismail, private investor-auctioneer, September 27, 2012.

varieties of fish they caught, their revenues, and in how their investment, ownership and revenue distribution was structured. We examine these next, focusing on ring-seine units and gillnet boats, the principle boat types used for fishing for sardines.

Ring-seine units require an initial investment of between 60 to 75 lakh rupees on the main boat, carrier boats, engine and nets. This is in addition to periodic investments (ranging between tens of thousands and a few lakhs of rupees) on repair or replacement of damaged nets, engines or the boat. Ring-seine units are typically collectively owned, but because of the scale of investment and expenses, they also need investment from beyond their group. Ring-seine units use a crew of 45 to 50 people. Of these, 25 to 35 are share-owners, with an investment of about a lakh rupees each. External sources, such as private investors (of whom Chaliyam had several, many of whom had invested their earnings from the time they were working in the Middle East), or loans from fishers' societies (three groups affiliated to the state-led Matsyafed, and a weak group affiliated to SIFFS) provided the rest. In return, the primary private investor (typically having invested 10 lakh rupees or more) or a society-appointed 'auctioneer' in case of society loans, received the right to auction the catch on the boat on that shore. In addition, these investors received a 'commission' on the sales revenue. Other private investors, who typically provided amounts for repair or smaller amounts as capital, were strategically chosen from nearby landing sites, of which there were many, to ensure that a unit would have auctioneers on the different shores where it chose to sell its catch on a given day. On a day with good catch, ring-seine units could use up to 4 carrier boats, each with a capacity to store 4-6 tons of fish.⁷ These units primarily brought back sardines, but also some mackerel and prawns during season time (Jun-Aug). The earnings from a trip (sales amount minus expenses, including commission, fuel, food, loan repayment) were distributed between capital (fishers who had a share in the boat) and labor (everyone who went to sea, regardless of whether they had a share in the boat or not) in a 40:60 ratio.

Gillnet boats cost much less, typically between 6 and 10 lakhs depending on their size, type (external or internal motors), storage capacity and nets in use. These boats typically had a single 'owner,' who brought in part of the capital. External sources (private investors, society loans, bank loans) provided the rest. Much as in the ring-seine units, these external investors auctioned the catch from the boats they had invested in, receiving a commission on the sales in return. Because of the relatively small capital involved, gillnet boats borrowed from a single investor. If they borrowed from investors in other locations, the amount was low, typically in tens of thousands of rupees. These boats typically had a 4-5 member crew and used gillnets to catch a variety of fish including seer fish, tuna, mackerel, pomfret and anchovies in addition to sardines. They brought back 400-500kg on average, and a maximum of 1000-1500 kg. The earnings from a trip (sales amount minus expenses such as commission, loan repayment, fuel, food) would be divided into equal parts with a part given to the boat owner, one to the engine owner, and a part each to the workers.

In Jensen's account he uses boat size as a proxy for volume of fish brought in. As such it works reasonably well for his analysis though we find the 28-ft specification rather arbitrary as it is inclusive of all ring-seine boats, but only some of the boats that use gillnets and not others (since these boats range typically from

⁷ The numbers we use draw on interviews with Ismail, private investor-auctioneer, September 27, 2012, and members of a ring-seine unit, October 25, 2012.

24 to 36 ft.).⁸ We found that the descriptive fishing unit ‘type,’ was more consequential for categorizing fishers, their marketing practices and phone use, as we will detail below.

The ‘buyers’ of fish too were of several kinds in Chaliyam: purchasers who bought for export companies, wholesale merchants and small-scale vendors. The purchasers and wholesale vendors bought relatively large volumes of fish that they would send on further to processing facilities (peeling for export, powdering for fishmeal production), domestic markets or export agencies. An agent for a fishmeal factory in Mangalore, who had started operations in 2002, was also a bulk buyer, and acted as an assured buyer of sardine of a range of qualities. Small-scale vendors bought only a few baskets of fish that they could transport on autos, or mopeds. They sold in nearby markets, to restaurants, at roadside stalls and to individual homes in fixed neighborhoods. The diversity among buyers meant that different types of buyers made use of price and supply information in different ways in their buying and selling of fish.

Next we consider how this effort to differentiate the kinds of fish producers and buyers relates to the question of price information that Jensen’s findings focused on. We argue that different producers and buyers in Chaliyam regarded ‘price information’ differently in their lives. Because of these differences, the relationship between mobile phone use and price varied across these groups.

4.3 The Importance of Knowing Prices (or Not) and the Role of the Mobile Phone

Among the different categories of producers, price mattered the most to ring-seine unit owners. These units brought in large volumes of fish, which made them sensitive to even slight variations in unit price in different markets. Further, they had borrowed from multiple investors given the scale of their investment, and by choosing their investors strategically, they had an auctioneer at different markets through whom they could sell without much of the inconvenience and unpredictability involved in selling at an unknown market.⁹ The owners on these boats would use their mobile phones as soon as they came within range to call their auctioneers at different landing sites to ascertain prices.

Those fishing on gillnet boats, on the other hand, brought in much less catch overall with the lower catch further spread among multiple fish varieties. As a consequence, these fishers required a much greater difference in price per unit to find it profitable to transport the fish to a market with higher per unit price. They tended typically to fish and sell in Chaliyam. As many fishers told us, to the extent possible, they preferred to sell their fish as soon as possible at a place they knew, and return home to rest their exhausted bodies after long hours (or days) at sea. To the extent that these fishers sold elsewhere, they said it was because they had found fish elsewhere, rather than because they had gone out in

⁸ Other styles of small boats of less than 28 ft. (vallams with OBMs, manually operated craft etc. using hook-and-line) did not figure in the ‘small’ category because they did not fish primarily for sardines.

⁹ Interview with Kamaluddin, gillnet boat owner, whose boat was financed by a single private investor, Oct 23, 2012. Talking of the difficulties of selling in other locations, he explained “if we land at a different place than the one we are from, we don’t know enough about the market, agents, purchasers, so we need the help of some one.”

search of better prices after fishing.¹⁰ A matter of detail applicable in both the ring-seine and gillnet cases is that fishing units almost always called their auctioneer, rather than the buyers directly to talk about prices or what they had caught.

Similarly, among buyers too, the wholesale merchants, export purchasers, and fishmeal agents who work from the shore were more likely to find fish price critical than the small-scale vendors. Additionally, export purchasers also found details on the availability of different varieties and specific volumes at a landing center critical to their calculations since their calculations changed everyday in accordance with daily instructions from their export companies. Export companies, in turn, based their calculations of acceptable price and required volume for the day on currency exchange rates and international demand. The mobile phone was used regularly to conduct these conversations. Before the mobile phone, these conversations had been conducted on landline phones at the offices of export agents or their homes.

Small-scale vendors, on the other hand, came to the same beach market every day. They varied the quantities or varieties they bought in response to the changing prices they found at the shore, but short of very low supplies, these changes seldom drove them to other markets. They also mentioned having some leeway in how they priced their fish for regular customers. They set prices to ensure that they didn’t suffer losses regardless of the prices at the shore.¹¹

Thus, finding out the prevalent price of fish prior to deciding where to transact mattered to different degrees across the range of sellers and buyers of fish in Chaliyam. Their use of the phone for finding out prices, consequently, also varied. In summary, it mattered most at higher volumes of fish, higher investment levels, and with higher profit opportunities and therefore among fishers, investors, and buyers who were the (relatively) more affluent market actors in the industry.

4.4 What Complicating the Model Tells Us

Generally speaking, we found a broad congruence between the use of phones for price information gathering and arbitrage work described in interviews at our north Kerala site and Jensen’s claims about these uses in this region. A former fisherman, now an investor, commented that the phone helped fishers to, “determine where to sell their catch.”¹² A wholesale buyer noted that fishers used the phone to, “find best prices” and that before the arrival of the phone, fishers would “just sell at the nearest landing site.”¹³ It was not just the fishermen who initiated this practice: a Matsyafed auctioneer for example said, “if price is low here, we call and tell [the fishermen] to land in other ports where price is high...they call us and we tell them.... If a boat has a catch of [valuable] fish, they will immediately call us. Following

¹⁰ Conversation with Kamaluddin, gillnet boat owner, Oct 25, 2012, who told us he had sold fish elsewhere only 5-6 times in the past year and those times were because they had fished elsewhere.

¹¹ Nooruddin, cycle-based vendor, noted that he followed a fixed route to sell fish, adding “I buy only fresh fish from here, so all of my customers have faith in me. They purchase even when the rate is high.” Oct 25, 2012.

¹² Interview with Ismail, private investor-auctioneer, Sep 27, 2012

¹³ Interview with Suresh, wholesale buyer, based in nearby Koyilandi who frequently bought fish from nearby markets, Sep 29, 2012

that, we call the major markets in Kerala to know the price.”¹⁴ From such accounts we can confirm that practices of spatial arbitrage (among *some* fishers and buyers) using the mobile phone do exist and endure in this environment despite the lapse in years between Jensen’s account and our study. Furthermore, these accounts confirm that fishers and others in the fishing supply chain recognize the mobile phone as initiating a change in practice, the impact of which Jensen aptly measured.

By complicating the model, however, we have been able to recover what it was specifically about this industry in north Kerala that was omitted from Jensen’s account. We elaborated the diversity of roles within the broad categories of ‘producers’ and ‘buyers,’ and found roles not mentioned at all, such as that of the investor-auctioneers. Furthermore, we recovered some details specifically about processes of collective organizing, regulation, and investment flows, all features of the industry that we suggest were necessary groundwork which made it possible for the arrival of the mobile phone in the region to be as impactful as it was.

It was particularly those roles and processes that pertained to the work of collectives (unions and fishers’ societies) as well as forms of cooperation (more on the use of mobile phones to share information between fishing boats later) that went unmentioned while Jensen’s market actors are represented as highly competitive, acting according to a model of atomistic self-interested optimization. That the history of collectives did not figure into Jensen’s model is no surprise, nor are we arguing that in some way it should have. However, the characterization of exchange as happening between ‘producers’ and ‘buyers’ directly (omitting the mediation of auctioneers) is a slight (but important) discrepancy between Jensen’s account and ours.¹⁵ This discrepancy is not likely to alter Jensen’s overall findings regarding price dispersion, but when considering the implications for policy and design that might be drawn from this type of study, we argue that this discrepancy has consequences. This is worth acknowledging since this particular study has had a much larger life beyond the community of development economists it is oriented towards as its primary audience. For example, a prevalent policy thrust that informs ICT interventions associates the availability of price information using ICTs with bypassing middlemen.¹⁶ From the Kerala case, where society auctioneers were *introduced* between buyer and seller in order to reduce the exploitation of fishers, we see how the presence of middlemen cannot automatically be assumed to introduce exploitation in a market. As we examine later, when we shift our focus to the auctioneer as the person doing more marketing work than fishers, we introduce the possibility of understanding what other uses fishers have for phones.

We also find the complications we introduced in the account of the fishing industry challenge the notion that we can adequately talk about information apart from capital and investment, even in settings where supply of capital seems sufficient and flows in a relatively unencumbered way. A kind of received wisdom in

¹⁴ Conversation with Shajahan, Matsyafed auctioneer, Oct 10, 2012

¹⁵ As Peer Mohammad, fish wholesaler and export agent noted “No boat will directly call the market. They will only call their [auctioneer] in different markets.” Oct 10, 2012

¹⁶ For example, see the World Economic Forum’s Global IT report (2008-09) which explicitly states that Jensen’s work shows how mobile phones “reduced the role” of “middlemen” [16]: 60.

ICTD is the notion that anyone can act upon information: the central challenge is to reduce the costs of acquiring information such that everyone can acquire it, regardless of their socio-economic circumstances. Omitting a discussion of the distribution of capital and the nature of investment in this industry (as Jensen does) protects this notion and ignores how capital flows shape an individual’s ability to act upon information within prevalent trade relations and practices. Relatedly, we find another slight discrepancy between our account and Jensen’s when he suggests that ‘interlinked transactions’ (that limit fishing units to sell only to those who had offered them credit) as well as collusion among buyers to artificially lower prices did not exist in this region. We found evidence of both practices.¹⁷ In general, information about prices did not travel as impersonally as it seems in Jensen’s account. We did not find evidence of direct selling to strangers based purely on the ‘best price’ but rather of trade practices based on long-standing relationships that might be beneficial or detrimental to different categories of fishers.

Finally, this process of complicating the north Kerala fishing industry also generated a growing sense of the difficulty and limitations of generalizing from parsimonious models such as Jensen’s. Digging deeper we began to find many more conditions that made the mobile phone such a success in north Kerala, a growing checklist of what one would potentially have to find in a new site in order to expect the same beneficial outcomes from the introduction of the mobile phone into marketing practices. We elaborate on this in the next section through a comparison with our second study site in South Kerala.

5. GENERALIZABILITY: THE CASE OF A SOUTH KERALA LANDING CENTER

In South Kerala, we conducted fieldwork in Vizhinjam South, a fish landing center in Thiruvananthapuram district, with the goal of understanding (just as we did in north Kerala) the organization of the fishing industry, the processes of the supply chain, and the incorporation of the mobile phone by different roles in this industry. Based on the way the fishing industry is organized in south Kerala, we find it unlikely that Jensen’s findings would generalize to this southern part of the region despite the geographic proximity, same federal and state context, and the same perishable good being traded.

The differences between the two sites that are consequential to the organization of the fishing industry start with oceanic topography. The ocean floor in southern Kerala has a steep slope that leads to rough, surf-ridden wave patterns, particularly during monsoons when a number of landing sites are virtually closed down because of the rough sea [8]. A rough sea has historically made the operation of large fishing craft unsafe in the region, unlike in the central and northern belts of the state where the ocean floor has a gradual slope. Large boats like ring-seines do not operate in south Kerala. Instead, we found much smaller and robust plywood/fiber vallams with external OBMs and more rarely, catamarans, being used for fishing in Vizhinjam [12],[18],[19]. Further, because the coast in this region has sandy floors with reefs, the gear used by fishers – gillnets and hook-and-lines – is adapted to allow for more selective fishing among a wide variety of fish. This is different than the ring seines or trawl nets used in the north, which

¹⁷ “There’s chavittal, which means the agents join together and reduce the price of the fish” observed two crew members of Kamaluddin’s gillnet boat, on Oct 24, 2012. Sreekumar also reports collusion in his accounts of south Kerala [17].

target the abundantly available schools of sardines or prawns that thrive in the clayey northern coast, respectively.¹⁸ Catches in the south comprise varied species in smaller quantities, very different than the bulk catch of ring seines and trawlers (in hundreds of kilograms, rather than in tons). Finally, there is a single harbor in the region. Of the other landing sites where beach markets take place, many operate only seasonally, with the rough monsoon surf making them unsafe for launching boats or fishing. Thus, the distance between markets periodically increases and many fishers also travel elsewhere to fish in the 'rough' season.¹⁹ We see, therefore, that in addition to the volume of fishing, the relatively short distance between beach markets in north Kerala contributed to making fishers' spatial arbitrage strategies there worthwhile.

Culturally, the fact that coastal south Kerala is predominantly Christian has also shaped the working of the fish economy in the region [21],[22]. Women participate publicly in the fish economy, as small-scale fish vendors and more rarely, as purchasers for export agencies, whereas in the dominantly Muslim coastal north Kerala region, women were entirely absent from the public space of fish markets due to religious observance.²⁰ Furthermore, in Vizhinjam, the Catholic church was deeply entwined in the fishing industry (levying a daily tax through a church tax collector, the most apparent way the church superseded the role of local government). Market actors here did not benefit from the same magnitude of remittance flows with the Middle East as did the dominantly Muslim Keralites of the north²¹. A common career progression described in our north Kerala site, where men start as fishers, then do a stint in the Middle East, acquire savings, and return to become a fishing industry investor-auctioneer²², was not as apparent in Vizhinjam. The large-scale investment required to operate ring-seine and other boats in the north was, in part, fed (and diversified) by these transnational financial flows passing along the channels of a religious community.

We can point to these geographic differences as well as investment flows as context for the predominant boat type (plywood/fiber vallams with OBMs) in Vizhinjam (by contrast to the ring seines of north Kerala's sardine industry). These boats cost 2 to 3 lakh rupees. Because of the relatively low cost (one-fifteenth that of ring seines

¹⁸ See [8] and [20] for more on gillnet types and names

¹⁹ Vizhinjam has a sheltered cove, and regularly attracts boats from unsafe landing sites between June and August.

²⁰ Women were involved in activities such as net-making even in the north, but this happened at home, not in public spaces. It's worth pointing out that while women did not face religious taboos against being vendors in the south, the profession was nevertheless seen as an undesirable one for 'respectable' women as Hapke shows and as we heard in conversations [9].

²¹ An older study from roughly around the time of Jensen's study found 1.5 million Keralites lived outside India and sent more than Rs. 4,000 million a year as remittances [15]. Also, 750,000 former emigrants returned, living mostly on savings, work experience, and skills they brought back. 95% of the emigrants went to the Middle-East. A further finding was that a Muslim individual had 2.2 (49 per cent) times the chance of the general average to emigrate. Muslims also received 47% of total remittances.

²² Such as Ismail, one of the largest investor-auctioneers at the site, who had invested in 55 odd boats, interviewed Sep 27, 2012, and Peer Mohammad, wholesaler and export agent, interviewed Oct 8, 2012

or trawlers, in the north), boats in Vizhinjam had a single investor and a single owner, rather than multiple of both as in the north. The boat crew was between 2-10 people depending on the type of gear and species being targeted. As in the north, the investor could be an individual, or a society, and received auctioning rights and a commission in exchange. The only differences with similar single-investor boats in the north are in how the commission is calculated and the much stronger fisher societies in the region (especially SIFFS, which was established first in south Kerala).

How do all these factors come together to influence the importance of prices and mobile phone use in Vizhinjam? As might be expected, the practices of fishers in Vizhinjam were more akin to the small-scale fishing of sardines by gillnet boats in north Kerala than that of the large ring-seine boats. Vizhinjam-based fishers perceived little utility in seeking out prices for the purposes of comparison or doing spatial arbitrage due to the distances between beach markets, the small size of the boats they could safely operate in the region, the consequently smaller volume of fish brought in, and the single-investor structure. Consistent with this organization, fishers rarely mentioned checking prices or making decisions about where to sell based on price when they described their use of the mobile phone. Where fishing units sold their catch depended more on seasonal cycles. In the winter months, or at other times when fish was not to be found in Vizhinjam, some fishers traveled northward (to Kollam, north Kerala, even up to Mangalore) and stayed there for a week or month. At these times, they did not sell in Vizhinjam, but this non-local sale depended on *where* they fished rather than on which market offered the highest price.

Fishers did mention one use of phones in relation to prices: since the price of fish changed through the day at the market, they said they used the phone to find out prevalent prices for a fish variety to decide *when* to land. Even in this case of using mobile phones to discuss price, fishers seldom called buyers directly. Much like we saw in north Kerala, they preferred instead to call their auctioneer to discuss prevailing prices on the beach. Alternatively, they might call the church tax collector (who was thought to understand the dynamics and fluctuations of the market very well by virtue of spending long hours with various sellers and buyers of fish everyday). Among buyers, here as in Chaliyam, the wholesale merchants and export purchasers found it critical to gauge price details in different markets, while small-scale vendors did not involve themselves as frequently in gauging prices across markets, preferring to visit the same landing site regularly and moving only according to seasons, if at all.

Thus, we see that at the Vizhinjam landing center too, geographic, historical and political-economic reasons explain how important price was (or was not) to different categories of actors, how they procured prices, and where mobile phones fit in that process.

6. MOBILE PHONES AND OTHER TECHNOLOGIES

We have already accounted for the specific types of market actors in Kerala's fishing industry for whom the phone proved useful specifically for acquiring and sharing price information and doing spatial arbitrage work, the mobile phone practice that was the focus of Jensen's analysis. In this section we broaden our consideration of the mobile phone to discuss the varied uses that were emphasized by different roles in the fishing industry. We suggest that the seeking of market price information via mobile phones should not be given an over-privileged role. Our goal here is to relate mobile phone uses to a more fine-grained understanding of income-levels,

socio-demographic distinctions, and thus to an expanded and ethnographic (rather than economic) notion of welfare.

At the time Jensen wrote his paper, phones cost Rs.5000 on average, and there was a clear division between those who possessed phones and those who did not. By the time we conducted our study, phones could be purchased for as little as Rs. 700 and many owned multiple phones. No boat went out to sea without a phone (and most typically had multiple handsets) onboard. Nor was this restricted to fishers: an auctioneer told us “There’s no business here without mobiles”²³ and we heard this from almost all categories of actors operating in both Chaliyam and Vizhinjam. Jensen’s focus on who possessed phones and who did not is therefore less significant today than it was during his study. The more interesting question today is how phones are being used by different categories of users. In addition, we saw that other technologies such as GPS and echo sounders have become popular since Jensen’s study, making it worth asking how phones are being used in conjunction with these technologies.

Among the broader uses of the mobile phone, co-ordination work between the different actors in the fish economy constituted an important category of uses. This was important in fish marketing activities, as well as in fish preservation. Boat owners and fishing crew described, and we saw, how they would call their auctioneers a few minutes before they arrived at the shore to ensure someone was on hand to perform the auctions.²⁴ As we mentioned earlier, Vizhinjam fishers also mentioned discussing the timing (rather than site) of landing to optimize pricing. The ice seller on the shore called the ice company to order ice based on how much fish was being transacted on a given day.²⁵ Wholesale merchants and export agents also mentioned using the phone to communicate details of the trucks on which they were sending fish to agents at the destination.²⁶ The perishability of fish, of course, was part of what made this coordination work critical.

Phones were also mentioned in the context of coordinating or balancing work and home concerns, most often by women vendors in Vizhinjam. With the growth of fish exports, the presence of export company agents on the beach and the entry of cheaper fish from neighboring Tamilnadu, small-scale vendors are increasingly being marginalized in this region.²⁷ Many small-scale vendors in this region have started traveling to markets in Tamilnadu to buy cheaper fish. Women comprise a part of this population that travels long distances everyday to purchase fish. A woman vendor’s work day, which includes traveling by public or hired transport because she doesn’t own a vehicle, attending an auction, purchasing fish and selling it at a market or at individual

houses, can last longer than 12 hours. Since women are also seen as the caretakers of this family in the prevalently patriarchal structure of the region, they worry about their families, especially their children, through the day that they spend away from home. Many of them mentioned that having a phone helped them inform their family of their schedules and delays, know what was going on at home, and relieved them of constant worry.²⁸

Mentioned just as frequently as coordination work was the use of mobile phones for fish-finding. Fishers used phones at sea and on shore to gauge fishing grounds on a given day. We found, in addition, that phones were often used in conjunction with the Garmin GPS units that all fishing units carried. The GPS was used to mark and specify the exact location where fish had been found. Fishers both used these markers themselves at a later date to look for fish, and also shared them with friends and relatives, a practice also noted by Abraham and Sreekumar [17], [23].²⁹ The widespread use of GPS as well as echo sounder technologies to pinpoint the location of fish and the use of GPS coordinates to precisely share such prime fishing locations with others post-dates Jensen’s study and is another element of the changing industry. However, it’s worth noting that Jensen considers and dismisses the likelihood of such a practice as being against fishermen’s self-interest³⁰.

Finally, mobile phones (along with other communication devices) were perceived to be important in times of emergency, as others have also noted [17], [23]. Fishers used both phones and wireless sets (the latter were typically installed only on ring-seine boats and trawlers) to contact the shore or other fishers in case of emergencies (such as running out of fuel, a damaged engine). Fishers frequently mentioned the dangers of fishing.³¹ A fisherman in Chaliyam relayed a story of being out at sea when the fuel finished and his eventual rescue following a phone call placed on a satellite phone to a coastguard office, adding “I have great respect for this device because it saved our life.”³²

Using examples from north and south Kerala, we outlined six primary uses of the mobile phone – (1) price information gathering in combination with (2) arbitrage work (as considered by Jensen), as well as (3) coordination work, (4) balancing work and family (5) fish-finding, and (6) emergency response. We did this to question the often singular attention placed on the first two in ICTD, and the pithy statement that commonly circulates in the aid sector and the mass media that ‘farmers/fishermen use mobile

²³ Interview with Siraj, private investor-auctioneer in Chaliyam, Oct 9, 2012.

²⁴ Kamaluddin, owner of three gillnet units in Chaliyam, told us his boat crew had just called him to say his boat was going to reach shore soon, they had said only 5 more nautical miles to the shore, Oct 21, 2012.

Shanawaz, gillnet boat owner and fisher in Chaliyam, Oct 9, 2012 said: “We call agents when we return for telling them the time of arrival. Otherwise no need to call them.”

²⁵ Interview with Arif, ice-seller, Chaliyam, Oct 9, 2012.

²⁶ Interview with John, export agent in Vizhinjam South, Aug 26, 2012

²⁷ Interview with activist Maglin Peter, in Trivandrum, September 8, 2012.

²⁸ Conversation with a group of ten women vendors at a meeting of the Trivandrum Archdiocese’s Fish Vending Women’s Development Forum, Vizhinjam, Sep 9, 2012; interviews with women vendors who buy from Vizhinjam and sell at a fish market in Trivandrum, Sep 5, 2012; interview with activist Maglin Peter, in Trivandrum, September 8, 2012;

²⁹ Interview with Susadima, vallam owner and fisher, Vizhinjam, Aug 26, 2012; conversation with Thomas, vallam crew member, Vizhinjam, Sep 6, 2012; conversation with Kabir, ring-seine share-owner and fisher, Chaliyam, Oct 25, 2012; conversation with crew members of Kamaluddin’s gillnet boat, Chaliyam, Oct 21, 2012.

³⁰ Jensen notes, “catch is to an extent rival, so those with a good catch have an incentive to lie” [1], footnote 24.

³¹ We came across one such tragic loss of a fisherman at sea when we were visiting a village in South Kerala.

³² Conversation with Shanawaz, gillnet boat owner and fisher, Chaliyam, Oct. 10, 2012

phones to get a better prices for their goods.’ What we heard from fishing industry actors in the field in both north and south Kerala is that there is no single practice that prevails as the most significant or universally valued use of the phone. It is important here, we argue, not to mistake the focus and priorities of disciplines (such as the concern in economics for how information asymmetries affect market functioning) for the interests and priorities of target populations. There are opportunities in the ICTD space (perhaps underexplored) to support the underlying needs that these alternate practices reflect.

The varied uses of the phone among these actors are matched by almost as many understandings of ‘welfare’ in their lives. People did not define their well-being or welfare primarily in terms of their income, or in terms of optimizing it. Many of them, especially the owners and crew of vallam and gillnet boats, and small-scale vendors, spoke instead in terms of managing or coping. They spoke of their physical and mental well-being, sometimes prioritizing that over an increased income (such as the fishers mentioned earlier, who wanted to sell quickly and move on to rest, rather than wait to get the best price). The survival of a fishing unit lost at sea or caught in a storm is, of course, critical to fishers’ own long-term welfare and that of their families. Fishers and others in the fishing supply chain spoke also in terms of maintaining relationships, with fellow fishers, their auctioneers, or regular buyers, rather than solely in terms of optimizing their incomes (as reflected in practices of sharing fish-finding locations). These practices may very well eventually lead to improved incomes, but in a longer term and less easily measurable way. They also lead us to ask if Jensen’s definition of the fisherman’s problem as “maximizing profits by choosing where to sell their fish” or concluding with income increases as ‘welfare benefits’ doesn’t narrow our understanding of the reality of the fish market.

7. CONCLUSIONS

In this paper, we investigated the conditions underlying Jensen’s influential findings regarding mobile phone use among fishers in north Kerala. We identified a set of factors, including closely spaced landing sites and the presence of multiple investors for a boat that gave some fishers the flexibility to choose where to sell. In the absence of these conditions in south Kerala, we found that fishers preferred to sell at the same market. We showed that the importance of gauging price information in the two cases was consequently different. We found that this difference also existed between actors within a market in both regions with categories such as ‘fishers’ or ‘buyers’ concealing the full range of economic and social circumstances, as well as phone uses, within those broad groups. We emphasize these differences to show how a reliance upon aggregates and averages, with the positive uses and outcomes of the relatively more affluent being generalized to the whole category, risks obscuring the lower-income subsets of the larger group. We argue that there’s a need to differentiate the qualitatively different uses of the mobile phone by (for-example) small vendors, small-scale fishing units, and workers without boat-owning shares (that are often related to managing risk and vulnerability rather than optimizing efficiency) in order to design for and reach such groups directly and not just through “spillover effects.”

By situating Jensen’s claims within the political economy of the fishing sector in north Kerala, we also fundamentally questioned the extent to which the beach markets functioned as open and free markets. We found that credit dependencies following from investment structures did, in fact, shape decisions on where to sell, even if they were not limiting in an absolute sense, in both north and south Kerala. Even more importantly, we showed that the

systems of auctioning and investment that beach markets relied on were brought about by the efforts of state and non-state actors. Fishing regulations and rules were also enacted and implemented by the state. Far from complaints about interferences from the state, the fishers we met complained only of how the state was not doing *enough* to police these regulations. A representation of such a market that does not account for the ways in which it has been regulated has political implications. This is of special concern in ICTD where claims about the empowering qualities of information or of ICTs can make underlying and ongoing political struggles invisible. Yet, these struggles shape the market and the power relations within which ICTs can be effectively put to use.

A larger interest of this paper is in how we might make use of relevant work in different disciplines given the specific interests and concerns of the field of ICTD. Our multi-disciplinary community must be mindful of the disciplinary skew produced by any one approach to handling a site and subject matter. It is, for example, possible to read Jensen’s account as a market where decisions are impersonally driven by information (market prices). The purposeful omissions and minor discrepancies we found in his account of the mechanisms of fish marketing in north Kerala do not discredit his findings about mobile phones and market efficiency in the context of debates within economics, but when such a representation is applied to larger policy or technology design decisions, this can lead to misguided solutions. For example, the multitude of SMS-based price information systems now available in many countries seem to misunderstand the enduring power dynamics of trade and its basis in person-to-person relationships. The problem is not just one of unwarranted generalizing, but this basis of trade in relationships is true of market functioning in the fishing industry of north Kerala as well. While *information* was by all accounts critically useful to the Kerala fishing industry as a whole, its utility clearly flowed along a baseline of exchange relationships developed among actors in the supply chain.

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