

# When Technology Doesn't Fit: Information Sharing Practices among Farmers in Rural China

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## ABSTRACT

Mobile phones and the Internet are increasingly available in rural China, and used by people of all ages and educational levels. But despite the significant investments made by the Chinese State to “informatize” rural areas in order to help local residents improve their lives and economic opportunities, ICT do not seem to find a place in the one activity that still dominates the countryside: farming. This paper draws from ethnographic findings to show how the gathering and sharing of agricultural information is organized in rural China. By using a Community of Practice framework, it argues that ICT are not (yet) used by farmers because farming is a distributed social activity, where the individual farmer makes individual decisions, but these decisions are shaped by the decisions, expectations, examples and judgment of the community as a whole, a body of increasingly older people who are not always interested in maximizing their income and/or changing their practices to increase efficiency—through ICT or other means. Moreover, the rich and layered local knowledge built within the community is mostly based on oral exchanges and face-to-face encounters, and often relies on family ties and clan networks to evaluate the trustworthiness of communication. These patterns of communication are still not well supported by informatization projects and have proven resistant to such efforts.

## Categories and Subject Descriptors

H. [Information Systems]: Human Information Processing

## General Terms

Human Factors

## Keywords

Information Gathering and Sharing, Information Systems, Users, Farmers, Community of Practice, China

## 1 INTRODUCTION

*“You see, selling your crop is a bit like buying clothes. You might see something you like, but then you have to try it on, and see if it fits you—some*

*things look good, but don't fit you, others do fit you. So when you sell, you look at the buyer, at the price, at what would be the difference if you sold for 1 cent more or less, and then you decide.”*

*Mr. Cui, Village A*

Chinese rural residents have embraced Information and Communication Technologies (ICT) with much enthusiasm, and the rates of mobile phone and Internet penetration in the countryside have slowly but steadily increased [9]. But even though people have mobile phones and some access to computers, and older ICT such as television and radio occupy a prominent place in every household, these technologies rarely become an important part of farmers' way of doing business. In the three Northern China villages where I conducted the ethnographic fieldwork that constitutes the basis for this paper, agricultural prices are ubiquitously known, crops are regularly grown and sold, farming techniques are occasionally improved, but farmers gather and share (or not) all the knowledge needed for these activities with very little recourse to ICT. Since the mid 2000s, the Chinese central government has implemented several plans to ‘informatize’ the countryside, i.e. bring hardware and software to rural areas in order to help local residents improve their (economic) lives [30,42]. The central tenet of these plans is that “rural populations have dramatically increased their demand for new technologies, policies, and market information, and obtaining useful information in a timely manner has become critical to the rural economy and society” [35]: it is therefore worth exploring why the ICT that are already there and used in other areas of rural residents' lives do not find a place in the one activity that still dominates the countryside—farming.

I draw from a long-term ethnography that I carried out in 2010 and in the summer of 2011 in three Chinese villages in northern China, Village A and B, located in Shandong Province, and Village C, located in Hebei Province. By looking at how the gathering and sharing of agricultural knowledge is organized, I examine why ICT do not get routinely incorporated into the farming practices of these three villages, and ask whether the crucial premise of the informatization policies—farmers need to obtain useful information in a timely manner through ICT—does in fact hold true. I argue that ICT use is, at least for now, something that is situated in the household, for family activities. Farming, on the other hand, is a distributed social activity, where the individual farmer makes individual decisions, but where these decisions are shaped by the decisions, expectations, examples and judgment of the community as a whole—not of the family. As the quote above shows, decisions about farming are not one-size-fits-all; the goal of this paper is therefore to tease out the various factors that make a price fit a farmer but not another, and to redefine the concept of ‘useful’ and ‘timely’—invoked by the

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informatization policies—in view of the actual conditions in the villages, rather than the conditions of an abstract, rational market. In other words, I aim at showing how the non-incorporation of ICT into farming activities is, for farmers in the three villages, both a consequence of how they learn how to use ICT, and a “reasonable response to their present situation” rather than a puzzling, irrational behavior [17].

This paper focuses on the everyday life of small Chinese villages and their production, gathering, and sharing of knowledge about farming. The population in the villages varied from around 60 individuals in Village A, to around 400 in Village B and 1,000 in Village C. As common in the Chinese countryside, most of the inhabitants in the age bracket 18-40 have migrated to near and far urban areas to work. Those left in the village were mostly women, children, and older people. Everybody had a piece of land to farm (as I will discuss in detail in the next section), although a percentage of most families’ incomes came from remittances from migrants, or wages from occasional non-farming jobs. I carried out semi-structured interviews in standard Chinese (mostly recorded, unless the interviewees asked me not to), participant observation, and casual conversations in the course of repeated stays with local families. The names of research participants have been changed. In the course of the paper, I will describe how locals learn farming and what it means to become a farmer; how ‘environmental’ conditions (social, economic, age-related) lead them to decide what to grow; how they learn prices and market conditions for their crops; how they decide to sell. Behind all these agriculture-specific processes, there are well rooted traditions and habits that allow the formation and circulation of knowledge and news around the village. This rich and layered local knowledge is mostly based on oral exchanges and face-to-face encounters, and often relies on family ties and clan networks to evaluate the trustworthiness of communication. In the village, this system works quite efficiently at allocating resources in a way that reflects reasonably well farmers’ preferences and choices. However, at the higher level of public discourse and State policies, this gets translated into ‘lack of information’ to be addressed by policies for developing the countryside through informatization. I suggest that this divergence between local knowledge and the external perception of it is the consequence of several factors: 1. the way the market works at village-level does not fit the abstract model of how a market is supposed to work; 2. the actual requests that farmers would have in order to ‘develop the countryside’ and improve their own economic conditions are much more intractable than building websites that provide information on prices.

The field of ICT and Development (ICTD) is characterized by a certain tension between the local and the global, between on the one hand the need to be aware of local conditions and provide locally relevant solutions, and on the other the desire to scale up these solutions (see [6] for a thorough discussion of these issues). Often, local conditions are not well known, and equally often there is not enough time to undertake immersive research projects that might provide insights into user requirements that are grounded in local practices. This can result into general solutions abstracted from specific realities, as in the case of the Chinese government’s informatization plans. Recent years have seen the deployment of a significant number of ICT-driven projects targeted at the agricultural sector in emerging regions [1,10,50]. Early impact evaluations suggest mixed outcomes, that often vary depending on local, specific conditions. This paper therefore has

two goals: first, to contribute to the growing body of ICTD literature that studies localized uses of ICT (and failures) to understand what are the specific conditions that facilitate or impede the adoption and use of ICT in specific areas, and to do so by bringing in specific evidence from China, an area rather unrepresented in the ICTD field despite the multitude of relevant projects being carried out by the government, NGOs and private actors. And second, to offer a critique of the neo-liberal view of markets that underpins many ICT systems deployed to bring information about agricultural prices to farmers in emerging regions, by showing how smallhold farmers and agricultural markets in emerging regions are often still embedded in social and very localized environments (see also [5]).

## 2 RATIONAL BEHAVIOR AND SOCIALLY CONSTRUCTED MARKETS

The failure of incorporation of ICT in farming practices in China compared to other developing countries where, at least in the general press, mobile phones appear to have the potential to change the lives of poor farmers, is surprising for several reasons. There is good mobile phone coverage and an electrical grid that reaches most of the country (and that, at least in these three villages, is very reliable), and increasingly widespread and good Internet connections. The cost of calls on mobile phones is affordable by the vast majority of farmers, and Internet access starts at CNY5 per month (approximately USD0.7), making it much cheaper, at purchasing parity price, than mobile Internet in most developed countries. There are a series of obstacles that many people face when they have to input Chinese characters on a mobile phone or computer, but even though these difficulties make literacy a necessary but not sufficient condition for actively using ICT, the majority of people in the areas I studied can at least read, if not write fluently, and is not illiterate.

These factors, combined with the widespread availability of mobile phones and, increasingly, computers, should make rural China an ideal case study of how ICT can improve the lives of rural residents. And yet the three villages are more of a case study in how ICT can improve the lives of rural residents, but not by improving their farming opportunities, nor their economic outlook. The goals, scope, reach, and funding of the different initiatives related to the informatization of the countryside are very diverse, and there is no general country-wide assessment available yet, but scholars looking at the impact of these policies from an ethnographic or qualitative perspective have also noticed these trends [38,41,45,46,47,48]. These studies, carried out in different provinces and looking at different aspects of ICT diffusion in the countryside, show consistently that information-sharing practices among farmers are still heavily based on face-to-face encounters and on social relations, even when more convenient, reliable, and cheaper alternatives exist. Even when survey data that show that farmers state that they are looking for information on agricultural practices and prices is considered, it is clear that what they say is often not matched by their actual behavior. However, policies and programs for the informatization of the countryside assume that there is a lack of specific agricultural information in the countryside, and that an increase in ICT devices, combined with an increase in the availability of specialized ‘information’ targeted at farmers, will increase the efficiency and productivity of agriculture and of the rural economy as a whole [26,42]. It is worth noting that

informatization efforts all rely on top-down approaches, and that there was no trace, at least in the three villages and in areas around them, of the community-based agricultural information sharing projects such as Digital Green in India [14]. These policies are inspired by a neoclassical view of a market, which sees 'demand' and 'offer' meeting there to create the 'going price', and is a place where ICT can play a role in decreasing the cost of finding information [23]. This kind of market, in its ideal form, is a completely commodified place: an entity that is governed by its own internal (economic) laws, where price is the critical factor, where both market actors and goods are wholly commodified, and where external factors such as social and cultural conventions do not play any role [44].

However, the type of market where the smallhold farmers I discuss in this paper are active is still embedded in a wide-ranging network of social relations, and very much the product of the intersection of economic and noneconomic decisions [15,40]. The mass commodification of farmers and crops that is the necessary prerequisite for large-scale commodity markets has not happened yet, at least at this level. A mix of social factors and market conditions determines what people grow and how/when they sell, with the former or the latter being prevalent according to how villages and households are integrated in the general economy. The government has to tread a fine line between creating liberalized markets, economies of scale, and the efficiencies that are necessary to secure high productivity in the agricultural sector (a key State priority) on the one hand, and keeping millions of farmers who do not have other opportunities employed and fed in the countryside on the other. Social factors still matter in rural markets, both for the government that wants to avoid mass exodus to urban areas and millions of people suddenly depending on welfare, and for individuals, many of whom consider farming as not only a source of income, but also a source of identity, pride, meaningful employment and independence. The community is a locus of socially shared information that is not captured by ICT, as I will describe in the following sections.

### 3 HOW TO BECOME A FARMER

To understand farming practices and farmers' behaviors in the three villages, it is necessary to understand some of the systemic characteristics of agriculture in China that have a direct impact on people's lives. In this section, I will first introduce significant features of farming and recent policies targeted at rural residents, and follow with a discussion on how people learn farming, and what consequences this has on their working and social behavior.

#### 3.1 Agriculture in China

In China, land has been owned by the State since the communist revolution of 1949. The land redistribution to poor peasants that took place in the 50s has created the current system dominated by small holdings (plots of lands cultivated by a household, by a corporation, by a cooperative or by the government) and intensive agriculture, or rather, "intensive gardening" [39]. In 2007, the Second Agricultural Census showed that the total number of people registered in rural households was 799,673,000, with an average of 4.1 people per household, around 480 million of whom are farmers [49]. There were around 122 million hectares of agricultural land, and the majority of the holdings (193,445,894) were cultivated by households, whose average plot was 4.4 to 5.1 mu (one mu equals 0.08 hectare, six mu equal one acre), followed by cooperatives, the government, and corporations. The land

remains property of the State, but rural residents are allocated small plots on long-term leases. And here is the first characteristic of Chinese agriculture: it is made of millions of tiny plots farmed by many people.

China also has a long history of centralized agricultural policies, from prices setting to subsidies to policies to regulate farming. In particular, because the fast economic growth of urban areas in the 1990s and early 2000s had led to a marked increase in the differences between urban and rural incomes, in 2006 the State Council launched the New Socialist Countryside policy. Part of the government Eleventh Five-year Economic Plan, this policy, or rather set of policies, focused on providing more support for agriculture and a better development of public services in the countryside, in addition to subsidies for rural health-care, bonuses for local governments to preserve farmland, etc [13]. The New Socialist Countryside follows a series of policies that began in 2004, which eliminated almost all agricultural taxes and fees, created subsidies for farmers, and established minimum procurement prices for major grains, including wheat and maize in order to protect farmers from the volatility of international markets [20,29]. In 2002, the State started to provide direct subsidies to farmers growing wheat, maize and rice to encourage steady production [25]. These policies dramatically changed life in the countryside, and illustrate well the second important characteristic of farming in China: the State is the source of the most important events that impact farmers' lives, from taxation to prices to subsidies [16]. A third characteristic of the three villages is that agriculture is an activity mostly carried out by women. There is a debate on whether agriculture at a country-wide level is becoming feminized, due to male-driven migration [3,37], but both in Village A and C, which had a more balanced female/men ratio of residents than Village B, and in Village B women dominated the daily running of the fields. Men help at seeding and harvest time, the most labor-intensive phases, but that is becoming less and less necessary, since most of the heavy work is now mechanized and even the poorest farmers can afford to rent one of the machines that come through the villages at harvest time and can harvest an average field in a few hours.

Finally, the average age of farmers is increasing [21], which often means that farming serves as a combination of income generation and social security. These older farmers, who do not have any kind of state pension, grow crops that can be both sold and eaten, and often their main concern is predictability. If there are emergencies, it is easier to rely on remittances from migrant children or find a casual job nearby, as Mr. Liu of Village B says:

*"There isn't a big pressure to get a better income from the land, because almost everybody has income from work outside. I'd say for most families, half of the yearly income is from the land, half from other work... Also, my goal is not to grow my income or business, as long as things remain ok, that's all I need. The internet is useful for young people who want to improve and grow their business, not for old people like me. My children are all grown up and have good jobs, so I don't need much and don't have lots of worries. Until two years ago I also went out to work but now I don't. There's no need."*

The Chinese countryside is characterized by multiple job holding and circular migration [34], that is people holding jobs or migrating just for as long as it takes them to earn money to pay for

unexpected or unbudgeted expenses—sometimes necessary, sometimes superfluous. Similarly, crops that farmers would otherwise keep might be sold in order to buy a ‘luxury item’ such as an electric bicycle, or to front anticipated or delayed expenditures that cannot be covered with regular income. If this selling/buying behavior is seen as one discrete decision point, it often seems illogical, irrational, or irresponsible. Seen in a bigger context of life events and opportunities that unveil in the course of a longer period, and that are shaped by past experiences and current conditions of both the individual and the community, then they appear not only as logical, but also as inevitable from the perspective of the life-trajectory of the individuals involved. In the next part, I will discuss some of the factors that shape these experiences: village life, information-sharing, and attitude towards risk.

### 3.2 Farming as a Community of Practice

How does one become a farmer in rural China? And how is farming practice organized and sustained? The answers to these questions will help to understand the environment where ICT should be incorporated, and why they fail to be. Farming in the three villages is based on a “community of practice,” a concept developed in the early 90s by Lave and Wenger to describe “a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice. A community of practice is an intrinsic condition for the existence of knowledge, not least because it provides the interpretive support necessary for making sense of its heritage” [24]. In the contemporary Chinese rural context, the idea of ‘community’ carries a heavy historical legacy. Farming was collectivized between the 1950s and the late 1970s, and when rules were relaxed, there was a significant blow-back against any idea of cooperation among farmers that was compulsory and imposed from the outside [8]. And yet, the way people learn their practice, that is their skills and subsequent actions as individual farmers, is still strictly tied to the community. Both community and practice are key words: community is what comes around the practice and practice is what makes it sustainable [11]. As we will see below, this particular community of practice starts within the family, with children helping their parents in the fields from a young age, but then extends to the whole village, or at least to house- and field-neighbors in the case of bigger villages. Neighbors observe each other to decide when and how to do various agricultural tasks; when there are troubles or questions, the first people any farmer consults are those close by, in the village. In a practical sense, the three villages were a very clear example of communities of practice with clear boundaries (the village) and focus (farming).

The majority of farmers in the areas I visited grew the same crops: wheat and corn, typically planted one after the other, peanuts, sweet potatoes, some cotton. Farmers learn how to farm through what Lave and Wenger describe as ‘legitimate peripheral participation,’ that is by starting at the margins of the community with simple but real tasks, doing what more experienced farmers tell them to do, observing and imitating them. Young rural-to-urban migrants in their 20s like the children of the research participants have all grown up at a time when the farming community of practice was actively maintained. Ms. Long, a woman in her 20s who was originally from Village A, but who had been working and living in Beijing for several years, mentioned while we were visiting her family in the village that farmers started preparing the fields for sowing wheat in April, and

then listed all the works that came after that until harvesting in June. When I expressed my surprise at her knowledge of agricultural activities, she replied that when she was in elementary and middle school, all the children had to help in the fields, so she remembers the sequence of work very clearly. When she comes back to visit, four or five times a year, she still helps her mother in the fields. Ms. Yang, originally from Village C and now also living in Beijing, relates a similar experience: in the early 90s, when she was in elementary school, the school closed during harvest times, since the teachers were farmers themselves, and the students had to help their parents. She remembers helping with small tasks, especially chaffing the wheat. In the villages, during the summer, it is very common to see children of all ages helping their mothers in the fields, even if they are full-time students for the rest of the year, or have already migrated away from the village and are only coming back for short visits. Young men are allocated land in the village, and when they migrate, as it is common, it is usually tilled by their parents or relatives, or by their wives, who join the husbands’ household upon marriage.

Working alongside more expert farmers in the fields, watching them, imitating them, and following orders, constitutes the basis of learning the practice, and starts to legitimize the participation of the inexperienced member into the community. Corrections happen in an implicit rather than explicit way, with the more expert farmer redoing the work that has been done by the novice without any verbal comment, as happened to Ms. Yang and myself when we were helping her mother harvest yellow lilies. Mrs. Yang often walked through the row we had already harvested and picked up buds we had not seen or had left on the plant, without making any comment but showing us what were the characteristics of the buds we were supposed to pay attention to. As young farmers gain independence, they still take their cues on timing, sequence of jobs, quantities of fertilizer or pesticide to use from older farmers, until they can work independently. Learning to farm, in fact, is not a formal apprenticeship, as in traditional community of practice examples. This means that there is even less of a boundary between work and life, and also that there is no specific end to the process: farmers do become more independent with time, but the formality of ending the internship and becoming an ‘independent farmer’ who does not need to rely on other people’s advice is often blurred, especially now that many young people try to avoid becoming farmers. People might start their learning process, then interrupt it, then go back to it when life circumstances require it – all without really being aware of the stages of the learning process, and without being sure themselves whether they’re ‘new-comers’ or ‘old-timers’ (to borrow Lave and Wenger’s definition) to the world of farming.

The most important point is that nobody in the villages had learned farming by studying it in a formal setting, and nobody teaches their children how to be farmers by giving them discrete information about it. Learning happens through practice in the fields (“The physical layout of a work setting is an important dimension of learning, since apprentices get a great deal from observing others and being observed.” [24]. Here we have a first reason for the failing of the informatization of the countryside in the three villages: the salient features of its implementation (providing prices and websites that show farmers the how-to of farming) are based on a school learning model, where specific units of learning (a price, a technique, etc) are taught by experts to learners. The model works in theory, and in fact some farmers

referred to tv programs for learning about farming and even praised their usefulness. However:

*“For example, there are television programs on agriculture, and then there’s a phone number that you can call to find out more information. (Q: what program?) The Shandong Agricultural Channel. It is reliable, with good information. The programs are mostly of specialists from universities, and they have experimental fields, so you can look at what happens. They talk about seeds, about technology, about pesticides. Then there is a number that you can call if you want to find out more information (Q: did you ever call?) I never called. (Q: did you ever do anything that you saw on tv?) I never did. But once I called a number that I saw advertised on the paper, it was a private company advertising grape seedlings, then I went and bought them, but it didn’t work. These ads are often unreliable, because they just want to sell things.”*

*Mr. Liu, Village B*

In fact, it was not uncommon for farmers to praise the potential of the informatization program, but I never saw their words matched by their behavior. The Agricultural Channel was watched only when it showed entertainment programs like Miss Countryside, or various kinds of games set in rural areas. Computers were seen more as a symbol of potential economic development, than a tool to achieve it. In Village B, there was a seed store which featured prominently a desktop computer. The owner and his wife had been migrant workers in Qingdao for several years, and there they had heard about a seed company that was opening franchise shops in the countryside. They decided to give it a try, and opened a shop back in his home village. For a fee to the franchising company, they received training, various materials, and the computer. If his clients-farmers had specific problems that he could not solve, he could ask a specialist at the headquarters of the company on video conference. He added that he could also look up things related to farming on the Internet. On a later visit, when I asked him if he could show me how the video-conferencing worked, he said that he didn’t have an Internet connection, and so in fact had never used the system. On a closer inspection, the computer didn’t have a video camera either, but the shop owner said that he felt his clients would be impressed if they saw the computer in the shop.

The fact that farming is part of a communal, rather than individualistic, activity, means that the community shapes actions of the individuals that belong to it. Sometimes all the farmers have to perform the same actions at the same time because of external factors. For example, when it comes to harvesting wheat and maize, the machines that do the work arrive in the village at the same time, and everybody rents them in the same days and pays the same price. Selling decisions, as we will see more in detail below, are more independent, but also influenced by when traders are coming through the village, what the weather forecast is, and what other farmers are doing in response to these events: do they believe it is going to rain? Are they selling to the harvesters or the first traders who come through the village or do they think there is a chance that the price will increase? Sometimes a farmer will take the initiative (or have the right contacts) to negotiate the sales price of certain crops on behalf of the whole village, as it happened in a village near Village A. Ms. Deng, whose parents

are both farmers, said that the head of the village knew someone at a maize factory and negotiated directly with him, without going through intermediaries. She added that because there was a personal relationship, most farmers in the village believed that the price was better than what they could get from traders, so they went along with the deal negotiated by the head of the village. As Lave and Wenger put it, “Activities, tasks, functions, and understandings do not exist in isolation; they are part of a broader system of relations in which they have meaning. These systems of relations arise out of and are reproduced and developed within social communities, which are in part systems of relations among persons. The person is defined by as well as defines these relations.” (1991:53).

Relations within a village are characterized by friction as much as by a certain willingness, or sometimes necessity, to cooperate and share risks. Experienced farmers, or ‘old-timers’ for Lave and Wenger, considered younger people as lacking the time in the fields that was necessary to become real experts; the few young people who were farming considered older people stuck in their ways and unwilling to change. In Village C, Mr. Xue was the only person I talked to who said he used the Internet to read agricultural websites in order to find out about new techniques for farming. He was 32-years-old, and worked as a cook in a nearby town, but had fields in the village, which were cultivated by his parents and wife. He said that he often watched the agricultural channel on television, and one evening he told the neighbors, during the customary after dinner chat, about a new technique to grow sweet potatoes like tomatoes, e.g. hanging upside down instead of buried, which, he said, yielded a greater amount of sweet potatoes than the traditional technique. The women all commented that he knew a lot of things about farming, but the older man in the group said that the technique was nonsense. His parents and wife farmed the exact same crops as everyone else, in the exact same way as everyone else. As Lave and Wenger note, tensions between old-timers and new-comers are typical of the process of social reproduction of communities of practice, and are a symptom of the conflict between status quo and change and their proponents. New farming techniques on websites, online commerce and market information, prices over a mobile phone represent potential changes to the practice of the community, and are more likely to be taken up by the new comers, the younger, less experienced farmers with less cachet among the members of the community of practice. Because of migration and other opportunities, there are many more old-timers than new-comers among farmers in the three villages, and, as noted by rural sociologists, they tend to keep their habits, and see ICT as irrelevant. But it is this tension between the old and the young, and between the tradition represented by farmers who do things ‘as they have always been done’ and those who experiment (who are not necessarily old and young, respectively) that creates a space for change within continuity and that prevents the community of practice from becoming a static, closed environment. It is a matter of balance between continuity that can lead to paralysis, and change that can lead to fragmentation. An innovation such as using ICT to be a farmer represents a major point of change in the practices of the community, and would probably create tension between those who use it and those who do not. However, in these three villages ICT has not (yet, perhaps) become in any way an instigator of change in practices, for two reasons. The first is that ICT and knowledge about what it is useful for, is brought to farmers mostly by their family members who are not involved directly in farming, and do not think of

farming practices when they use the Internet, so cannot pass on this knowledge to their families. The second is that, as I will argue in the next section, the way in which the community gathers and shares knowledge about farming and agriculture is more flexible and adaptable to the changing needs of the community than ICT and the systems they support can currently be.

### 3.2.1 Knowledge and Information Sharing

The existence, circulation, and sharing of knowledge, both explicit and implicit, is at the core of the maintenance and reproduction of a community of practice. In this section, I will discuss two ways knowledge is reproduced and shared in the villages: through casual, but regular, gatherings outdoor, and through encounters with ‘experts’ who come through the village throughout the year (agricultural extension workers, officials, traders, etc.)



**Figure 1. Aerial view of Village C surrounded by fields; ‘Xs’ indicate two common meeting places for farmers**

During the winter, people visit each other at home, but as soon as the weather gets milder and works in the fields begin, the prevailing mode of communal interaction are outdoor gatherings. In all three villages, they take place on a road that leads to the fields, or anyway where people must pass through. There are always several such gatherings going on at the same time, and people join one or the other according to family allegiances, or gender, or life stage (young mothers with babies and toddlers, or old women). Sometimes they are impromptu gatherings occasioned by specific events. For example, in Village A in the summer 2011 the Long family was restoring the deceased grandparents’ house, situated on the main road of the village. Throughout the day, people from the village stopped by to watch and comment on the work being carried out, and Mr. and Mrs. Long as well as the foreman exchanged at least a few words with everybody. In Village C, the fireworks for a neighbor’s wedding attracted a group of people from outside that area to admire the spectacle and find out the latest about who was getting married, with whom, the wedding cost, etc. It is difficult to retrace with precision the ‘rules’ that governed these gatherings and who participated—my time in the villages was not sufficient, my presence tended to disrupt the rules by attracting ‘strangers,’ and I was de facto excluded from the men-only gatherings. The gender division was quite clear, with women gathering with women and men with men, but there were several exceptions. Older men and

husbands of core participants could join the women’s gathering, and games of cards or mahjong could be more open to mix-sex interactions, although typically of older people. Younger women, both married and unmarried, stayed with the women of their family. A core of people would always be at a certain place at certain times; others would come and go. The ‘special events’ were an occasion to overcome familial or other allegiances, and allowed people who would normally not talk directly to each other or to certain groups to participate to the event and exchange the latest news. What was learned at the regular gatherings and at the special events was then discussed at home, or among relatives or closer friends.

In Village A there were no more than 50-60 residents left, by most villagers’ reckoning. Since the village had only two roads that lead in and out of it, there were only a limited number of places where people could assemble, and it was difficult to reach any house without passing through one of the gatherings. Therefore people had more occasions to interact with everybody in the village, unless they had a specific reason to avoid their co-villagers. Village C was informally divided into four areas. The one where my hosts, the Yang family, lived, at the north end of the village, was shared by people with their same last name and another last name. They all knew each other and were more or less closely related, so they tended to stay among themselves, trust each other, and not have many exchanges with the rest of the village. These ties were inescapable during daily life, as all the people in that neighborhood walked along one road to go to the fields, and they stopped for a quick chat several times during the day, and sometimes for longer periods at night. The familial ties were also rekindled more formally during special occasions such as weddings, funerals, or holidays like Spring Festival, when people visited each other according to a strict choreography dictated by the type and strength of relations that exist among them [27,43].

In Village B, the best gathering place was next to the paved road leading to the city, and it was monopolized by men. Women gathered in smaller groups in the internal roads of the village, but since I was not living with a family from the village, I was excluded from the men’s gatherings, and never moved beyond being the novelty in the women’s gatherings.

The conversations during these gatherings cover any topic in the life of the village, from discussions on who is going to or should marry whom, to children’s schooling, to health issues and healthcare, to television and technology. This is how many older people who do not have computers at home hear about the Internet and what is possible to do with it. For example, one evening in Village C the conversation turned to the Internet. Mrs. Li, in her late 30s, told her father-in-law about Farmville, describing how one could steal virtual rabbits and vegetables and so improve one’s own virtual farm. Then Mrs. Xue, 32 years-old, and a former migrant worker, helped Ms. Yang explain to the older people how online shopping worked. They both browsed frequently the website taobao.com, a sort of ebay, and Ms. Yang often bought clothes from it, both when she was in Beijing and when she was in the village. Mrs. Li’s mother-in-law asked how could the payment work, and whether it was secure. Mrs. Xue and Ms. Yang explained that that the buyer pays the money to the website, which does not release the money to the seller until the buyer has confirmed that she has received the goods and is satisfied. Mrs. Li’s father-in-law then asked how online purchases can arrive to any home, and Ms. Yang explained that it was

through the express mail, which is not delivered to the village but rather to an office in the nearby town, where she goes there to pick her packages up. The old man asked her several times if she was sure, and if it really did work as she said, or if she was rather describing who she thought the system worked, and at the end still doesn't seem convinced. Older people, on the other hand, are the ultimate authority in terms of history of the village and, if men, on politics and market issues.

What is important to note about these meetings is that orality dominates: conversations about the daily happenings are in fact intertwined with exchanges of information regarding farming and business—who is starting to water the fields, who is spraying pesticide, which trader stopped by. The essence of these conversations is not an explicit exchange of information related to farming, but rather a casual mentioning of various tidbits of information and news. These gatherings usually take place in the evening or in moments of lull from work in the fields, and they are, after all, just moments to relax and socialize. But orality rules all activities in the village, from household affairs, to doing business, to farming training. The 'shop-floor,' incessant talking that underpins much collective (and constant) knowledge creation and sharing that Orr noticed among photocopy machine technicians in the US [12,31] finds a direct parallel among these farmers. Technicians' social gatherings were occasions where talk about work took place in an informal setting that promoted the almost imperceptible exchange of information essential for performing effectively one's job, that was not included in training manuals. The social gatherings of farmers see occasional talk of prices, traders, other visitors to the village, and various and sundry topics that may or may not be of immediate interest or use. Someone mentions something, others inquire further, or simply make a mental note for future reference. Among my interviewees, only one farmer read regularly a weekly county paper; otherwise, books, newspapers, and magazines were notably absent. The only places that sold books were shops in the county or the town, and the majority of these books were school texts. Most people can, at least to some extent, read and write, but neither is a widespread nor a favorite activity. In presence of plentiful oral alternatives, most farmers do not go to the written word to find answers regarding their farming. Ms. Cai, in Village C, had had a computer for a couple of years, and went online every day, but said:

*"We don't need the computer for (agricultural information). The agricultural extension worker comes to the village for all that we need to know about farming."*

Mrs. Yang, in the same village, was growing yellow lilies as cash crop, an unusual activity which I will discuss more in detail below. She also relied on training and the opportunity coming to her, rather than seeking it:

*"We heard about (the yellow lilies) from a training from the government, the official came to the village and showed us."*

Mr. Ding, an older farmer in Village A, is also up-to-date with the latest types of fertilizer and pesticide:

*"There is an agricultural extension worker, actually there is one in the county and one in the town, so we get the one from the town, he comes here to tell us*

*about fertilizer, or pesticide and all that. So we don't need to find out this information, because he tells us."*

While for Mr. Liu, in Village B:

*"I know the prices of crops and all those agricultural news from television. Also, there is a government official who comes to the village and tells us, he is from the agricultural office in the town."*

In other words, in the village what prevails is information exchanges based on the spoken language, or rather the *bias of oral tradition*, to borrow Innis definition [22]. Innis argued that different media (spoken language, or written language in different supports such as stone, clay, papyrus, parchment, and then paper and digital) have different inherent properties, which determine the attitude of a society towards space and time. Innis's thesis is deterministic and binary: a culture can be based on the oral or the written tradition, and when the latter starts expanding it will inevitably suppress the former. Much more nuanced views in this regard have been expressed in recent years [7] but what is still very actual in his approach is the emphasis on the fact that understanding the bias of a communication medium is necessary to understand what is lost and what is gained when the medium itself declines in favor of a new one, which gives rise to a new bias. Innis was particularly concerned with understanding oral cultures, which he saw as tradition-oriented and as emphasizing continuity and community over individualism and innovation. He did not see oral and written traditions as mutually exclusive, but rather recognized that the prevailing medium imposed its biases over the succumbing one. Writing on paper and even more on electronic media highlights an "obsession with the immediate" and is "concerned with the destruction of time and continuity" [13:187-188]. Dramatic overtones aside, the point is well reflected by the emphasis that agricultural websites and prices-over-mobile-phones services put on immediate market conditions and on the transmission of such data through the written word, in contrast with the farmers' behavior that is based on oral communication and on communal as well as individual considerations. There are two corollaries to this point. The first is that trustworthiness of information is a problem that the Chinese informatization system has not tackled yet—or rather, not in a manner that is compatible with long-standing village habits. In the villages, an oral system of 'checks and balances' has evolved to allow farmers to evaluate the information they get from different sources in a more general context, in order to decide its trustworthiness. Farmers are often aware that their agricultural extension officers might be getting kick-backs from companies that sell seeds or other agricultural products to promote their brand, but they evaluate this information within the context of their entire relationship with them. Knowing the agricultural extension worker in a more general context helped farmers make discrete decisions on his advice, indeed at times make different decisions in different cases even though they were dealing with the same person. The second corollary is that factors that seem crucial in the short term might not be so in the long term. For example, in selling wheat and maize, farmers in all three villages agreed that price was not a real issue in deciding whether to sell or not. Everybody knew prices, but there wasn't a single source for them. Farmers found them out from other farmers, from television, from traders, occasionally even from the Internet, and then kept on checking them, but the final decision was based on other factors such as convenience and risk, as much as on price:

*“For wheat and maize there is the national price, but we get less money here, you get the full price only in the cities. So we get whatever the man who comes to buy the crop in the village gives us. (Q: if the price is better at another market, why don't you sell the crop there?) No, no, it's not convenient! That's what people with a lot of land do, but here we're just small farmers, we just sell what we grow and that's the convenient way.”*

*Mr. Ding, Village A*

*“We sell to small traders. They come at harvest time and buy. They also have information about the prices, but every farmer decides on his own whether he wants to sell or not. It's different in different places, in some villages the village head also negotiates the price, because he might be connected with bigger and better companies and get a better price for everybody. In this village, it's every man on their own.”*

*Mr. Liu, Village B*

According to some farmers, the price offered by traders was in general slightly higher than the national index, according to others, slightly lower. The reason for this difference could be because of quality issues, or simply a reflection of the fact that convenience trumped the extra income. Mr. Cui was a farmer in his mid-50s, living in Village A and working full-time in the fields that belonged to him and to his brother who lived away. He had the lean and wiry body of someone used to outside labor, an open and easy smile, and an unusually self-reflexive attitude towards life and commerce in the countryside. He was particularly eloquent about the role that prices played in the decision-making of farmers such as himself:

*“(Q: How do you know the prices?) Everybody in the village knows them. (Q: How? From television?) No, not from television. (Q: From the Internet?) No, people don't use the Internet for that. There is a national index, but people don't look it up on the Internet, because the prices on the national index are lower than what sellers actually offer, so there's no point in looking those up. (Q: So how do people know prices?) Farmers just know, then sellers come and you ask and check what they say, then you go to the market and check again and decide where to sell. Every area has its own price, so the price you get in the county is different from what you get in the village. (Q: how do you know which is higher and where to sell?) You can't know that, because it always changes. Let's say that you know the price in the county is high, so you go there to sell, but everyone else goes there and then the price is low, isn't it? But there's no point in finding out beforehand anyway. The fair in the village is only every so often, so if you decide to go you just go. Prices depend on many things (he picks up a handful of corn) for example the quality: the buyer looks at the maize you have, and decides, this is good, this is not good, and then offers you a different price. You see, selling your crop is a bit like buying clothes. You might see something you like, but then you have to try*

*it on, and see if it fits you – some things look good, but don't fit you, others do fit you. So when you sell, you look at the buyer, at the price, at what would be the difference if you sold for 1 cent more or less, and then you decide.”*

Mr. Cui's quote illustrates two points. The first is that the price is a fit between the farmer's priorities and the buyers' offer. Given the characteristics of the local agriculture described above (older average age of farmers, alternative sources of income, small fields), one of the less visible facets of bargaining is convenience. The word 'convenience' (fāngbiàn 方便) was often used as a catch-all word, that could indicate that something was an easier, less complicated choice ('it's easier,' 'it's cheaper,' 'there's no point in going through the extra trouble), or that the extra step was not worth the expenditure of money and effort ('even if I earned more money, it wouldn't be guaranteed money, so the risk is not worth it'), or that there were reasons behind certain behaviors that would be difficult or not appropriate to explain to a stranger. Sometimes the context and careful observation of interviewees' behavior made it clear which was the intended meaning of the word, sometimes not. What is important to note, however, is that whatever meaning people gave to 'convenience,' it was clearly something that played an important role in their behaviors and decisions, something that depended on various factors, and that was difficult to quantify. The second point that Mr. Cui and the other farmers quoted illustrate is that there isn't an explicit awareness of the process needed to find out about prices. Prices for wheat and maize were stable, so the previous year's price was a good starting point for the current year; and they were constantly discussed in the casual gatherings, so that they became almost unconsciously part of the shared knowledge of the village, rather than of the individual, to the point that people could rarely identify with precision how they had found out the going price for what they were growing. One evening at the end of June 2010, when wheat buyers were coming to the village every day, a farmer commented that a trader offered CNY0.98 per jin (USD0.13). Ms. Yang, much more educated than her co-villagers but too removed from farming since she lived in Beijing most of the time, tried to calculate what was the difference between selling for CNY0.98 and CNY1 (USD0.13 – USD0.14) for the average crop, but all the people present already knew the answer: it was between CNY10 and 20 (USD1.4 and USD2.8), so not a big difference at all.

### 3.2.2 Risk in Farmers' Lives

If we understand farming as a community of practice where acts and decisions of single households are shaped by those of the community at large, we can see how the community as a whole influences, among other things, the attitude farmers take towards risk and diversification of crops. Mrs. Yang in Village C and Mr. Cui in Village A are two interviewees who have tried to diversify their crops, with very different results. Mr. Cui tried to grow garlic and pepper in an area where he previously grew wheat and corn:

*“Prices for the basic commodities (wheat and corn) are quite stable, that's why we all grow them. (Q: Why don't you grow something that allows you to earn more money?) The problem with other crops is that they're not steady. This year the price of garlic is 5CNY per jin! (USD0.75 per jin) And I'm not growing any! I grew garlic four years ago, because they said I would make money. That year it sold for*

*0.02 mao per jin (USD0.03) and I lost money. Red pepper is same thing: one year the price is high, the next it's nothing, and you lose money. Now I just grow wheat and corn, at least it's safe."*

Although the fluctuation in prices described by Mr. Cui is likely exaggerated, the point is clear: any fluctuation is too risky compared to the predictability of grain prices. Mrs. Yang was the only farmer in her village in Village C to grow an unusual cash crop, a type of yellow lilies (*jīnzhēn* 金针) used in Chinese medicine or as a special dish for weddings. She grew them in a field where she had also planted trees, and said that she started because:

*"It was an easy thing to do where we had trees, and they don't require much work... They're not very popular, so don't sell for all that much money, it's not a food that people eat every day."*

The economic situation of Mr. Cui and Mrs. Yang, the economic as well as social opportunities (or lack thereof) in their villages, their family situation and life stages all influenced their decisions to try different crops, and to stick or not with them.

Mr. Cui had three children, all completely dependent on him: two were in middle school in the county, and one at university in Jinan, Shandong's capital. He had been a migrant worker in the past, but had come back to look after his children a few years earlier. He was getting old, and he had started looking after the land of his brother and parents, as well as his own, so he became a full-time farmer. Cash earned from the sale of crops was the only income of the family. Until the children were grown and working, he felt he could not afford to take risks, both because of the potential loss of income, and because he simply did not have time to experiment with new crops and find a buyer for them.

For Mrs. Yang, the situation was very different. Her two children were both grown and had good jobs in Beijing. Her husband had built a small iron smelter in their courtyard when the children were in school and the family desperately needed extra-income. He started producing wheel parts for bigger companies in the town, an activity that had become common in the village in the mid-90s, and for which there was a local logistics chain already in place. Now that the children were grown, he was working much less, but in an emergency he could always pick up more work as a sub-contractor – it was an easier, faster, and more reliable way to get extra income than anything related to agriculture. Moreover, even though the harvesting of the lilies is relatively labor-intensive, because the flowers must be picked by hand when they reach about 5 cm in length and before they bloom, it is over in three or four weeks. The harvesting takes a couple of hours every morning, before the flowers open, and is done by Mrs. Yang, her husband, her daughter if she's visiting from Beijing, and occasional neighbors or relatives who stop by to chat with Mrs. Yang and help her meanwhile – no outside help is required. The family had a small piece of land, around 0.7 mu, that was otherwise unutilized. Most importantly, Mrs. Yang had an uncle who sold produce wholesale at the city's market, so he could sell the lilies on their behalf without taking a percentage. Mr. Yang estimated that the yield was about 50-60 jin per day, or about 1,500 to 2,000 jin per season. In 2010, the wholesale price Mrs. Yang got was around CNY2.5 per jin (USD0.35), so the family was looking at getting between CNY3,750 and 5,000 (USD525 to USD700) in total. The price of lilies can change dramatically from

year to year, but Mrs. Yang thought that the crop was still a worthwhile investment because it did not require much labor, she could sell it easily, and it was almost a bonus for the family – if it was a good crop and a good year price-wise, they would make money, if not, they would not lose much. The bulk of the family's fields still grew wheat and corn.

Whether or not to grow alternative crops had been an individual decision, and individual conditions had determined how much risk Mr. Cui and Mrs. Yang were willing to deal with. However, for both farmers the absence of other households in their community growing the same unusual crops meant that they were alone in their experiments, and they could not count on other people helping them out with prices, with market forecast, with potential problems with the crop, or even on traders coming through the village to buy their crops. The 'infrastructure' necessary to make the challenge of growing a potentially lucrative crop a reasonable risk rather than a potentially devastating enterprise was entirely absent. For Mrs. Yang, the risk was worthwhile because she was not risking, literally, the food the family would eat the next year: it was a safe bet. For Mr. Cui, the risk could potentially be ruinous, and the disastrous experiment with garlic was enough to make him desist.

Finally, there are the usual risks associated with agriculture, that is how the weather, parasites, and other plant diseases affect crops. These are the inevitable problems of farming, and it is easier to deal with them as a community rather than as individuals (citation anonymized).

The final decision and the implementation of advice is the responsibility of the individual, but there is always a sharing of the problem and possible solutions in the community, and if one has an unusual problem because of an unusual crop, then she will be on her own. Growing the same crops is a way of distributing risk, and of having access to shared solutions. The biggest priority for the farmers was to have a certain degree of predictability rather than maximizing their earning potential, especially if the land was their only source of income, as well as a certain degree of convenience, especially when they could easily find other ways to earn money, possibly less fatiguing and certainly less irregular. They were aware of the limitations of small plots, and of the potential for cooperatives, bigger fields, and ICT. However, as Mr. Liu explained:

*"The Internet and computers are for young, ambitious people. I have enough, I don't need to go through the trouble to get more."*

Ms. Yang, who went back to her village from Beijing every few weeks, noticed that compared to the past:

*"Farming is a relaxed affair nowadays, between the small size of the plots and the mechanization, so everybody can have other small activities. The guy living in the house on the back of ours is a cab driver, another neighbor comes to collect trash and bring it to the city, two farmers have sheep, a number of people have small smelters, there are a couple of people who used to work in construction when they were migrant workers, and now that they don't go out anymore work on local construction projects in the village, when they feel like it."*

Most farmers, because of their age and/or general financial situation, showed a conservative attitude towards risk that was shaped by external factors (weather conditions, quality of crop), community behavior (is any other farmer selling or are they all waiting?), and individual circumstances (tolerance for risk, immediate need for cash). The combination of these factors can provoke decisions to sell at moments when economically it is not convenient. 'More information' on the most up-to-date prices and market conditions is all about the current situation and does not deal with future risks: the price of garlic might be very high today, but what about next year?

#### 4 CONCLUSION

Farmers learn farming as part of a community of practice, where young people learn alongside the more expert participants in their families and in the rest of the village. Orality constitutes the *bias of communication* of the village, from casual or topical conversations among villagers on prices, problems, timing, and techniques, to information delivered in person by agricultural extension workers, traders, etc. Knowledge is formed, interpreted and passed on as a collective effort, not an individualistic one. This is the real meaning of the "Everybody knows" answer that I kept on receiving when I asked farmers how they happened to know the price of crops. "Everybody knows" means that an individual might get the specific information she needs from a specific source: in June 2010, Mrs. Yang knew the going price of wheat from her neighbor, who said she had heard it from another co-villager who apparently had looked it up on the Internet. That price was then constantly checked and confirmed by other villagers in casual conversations during evening gatherings, by all the traders who came to buy the wheat, by acquaintances at the market, by newspaper reports relayed by the head of the village, etc. The community plays a fundamental part in the construction of the 'going price,' which then became "slightly higher than the national index" in Village C and "the traders never offer you as much as the national index" in Village A. It becomes the external validator of individuals' knowledge, so much so that it is hard to distinguish where one ends and the other begins. The community is also a source of distributed knowledge about farming in general, as well as a source of shared solutions to problems, and therefore a way to lessen individual farmers' risk. The informatization of the countryside, on the other hand, looks at ICT use for farming as one individual seeking one information point: Mr. Cui looking for the price of garlic, Mrs. Yang looking for tips to grow yellow lilies. ICT based around individual use do not fit the ingrained patterns of the community when it comes to farming.

By this, I do not imply that people are more prone to sharing ICT and/or knowledge. On the contrary, personal, individual property is very much valued and very much defended: people distinguish clearly who is the owner of a computer or a mobile phone in the rare cases of shared use. It is rather the manner of usage that does not fit the model implicitly suggested by informatization efforts: the individual in front of her screen, looking up information. Farmers do compete against each other, and do not shy away when they have a chance to sell at a higher price than a neighbor. However, for many farmers these individual successes cannot come at the cost of isolation from the community. Conversely, the way farmers learn how to use ICT, and what they learn to use them for, does not fit the way they farm. ICT is brought in by family members, who show farmers how to play cards, to communicate with their grandchildren, to watch tv. ICT is about

leisure and communication, it is not about farming nor information about markets. The importance of a community of peers in easing the circulation of agricultural knowledge is a long-standing theme in rural sociology [36], and has recently become more fully appreciated in the ICTD community [33]. Such perspectives, however, are for now completely absent from the Chinese State's informatization policies. Writing about documents, their forms and their changes through time, Brown and Duguid remark that "Changes in technology make it clear that we can no longer take for granted a correspondence between social purpose and technological resources." [4]. The current nature of Chinese agriculture is a good example of this mismatch, as the demographics of rural areas and the distributed way in which farmers build and share knowledge within the community create a continuum that is not easily modified nor modifiable by a stand-alone element like a mobile phone, or a price point, or the potential opening of a new market. This is not even an example of the design-actuality gap theorized by [18], which explains the failure of ICT projects for development by measuring the distance between initial expectations and actual implementation: the (urban-based, educated, elite) technologists behind rural informatization projects create systems that are built on premises that simply do not hold true for the smallhold farmers I discussed in this paper. Technology in general is playing a key role in the modernization of Chinese agriculture, and in fact some scholars credit technological improvements and investments for most of the increases in productivity since 1985—but just not information technology [20]. Moreover, the grain market liberalization that has effectively taken place alongside the minimum procurement price imposed by the government has expanded the freedom of farmers in deciding what to grow [2,32]. The sector is not static, and bigger scale operations will undoubtedly become more common. In the three villages, there were several farmers taking care of plots belonging to migrant relatives; other migrants leased their land to commercial farms. These bigger farms tend to be professional entities, often with professional agronomists on staff who do use computers and ICT for farming purposes. I visited one such farms near Village B, and it was a well-run commercial operation that leveraged economies of scale and that employed a full-time director of operations with a university degree in agronomy. She did use the computer to organize work, and the Internet to look up issues she might have with crops, although interestingly she said that she would try queries on a regular search engine rather than look up specialized websites. The informatization policies are geared also, or perhaps mostly, towards this kind of users, and the government has on several occasions expressed the goal to transform the countryside toward this more efficient model. However, there are still millions of smallhold farmers like Mr. Liu, Mrs. Yang, Mrs. Feng and Mr. Cui, for whom farming is a part of life in a different way than farming as a business: it is a source of food and of spare cash, of subsidies that provide money for unbudgeted expenses, and also an important part of their identity and social lives, as many farmers worried to lose their land and houses to advancing urbanization and to the policies to 'rationalize' the countryside [19,28]. Farming represents a safety net for people who are left in the countryside and do not have a pension or other sources of income, but also for migrant workers who take risks in urban areas, but always have a place to go back to if things fail. For all these farmers, informatization of the countryside means bringing their mobile phones to the fields to listen to the radio while working, or in case their children call. Checking prices or market conditions, given the constraints, habits, structural organization of

agriculture in the village described above, for now is simply irrelevant.

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