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Understanding Farming Risks and Habitus in the Philippines' "Risk Environment": the Case of Upland Abaca Farming Community in San Miguel, Catanduanes

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Abstract Philippine agriculture is often associated with risk, owing to the country's frequent exposure to natural disasters and its vulnerability. However, few studies have been conducted to understand the risk disposition of farmers in such complex environments. To better understand this, we utilized Bourdieu's theory of practice to examine how upland abaca farmers in San Miguel, Catanduanes responded to disasters. Through in-depth interviews, focus group discussions, and surveys with 20 local farmers, we obtained qualitative and quantitative data to address our research questions. Our findings reveal that the "risk environment" in Catanduanes was predominantly triggered by strong typhoons, pests, diseases, and unstable fiber prices and income. These individual farming risks were interconnected, with one risk often being the result of another and/or exacerbated by another. Farmers consistently employed long-standing practices, such as planting alternative crops, working off-farm, availing cash and commodity loans, and continuing abaca farming to cope with different sources of risk. Farmers' decisions to implement these practices were influenced by their economic, natural, cultural, and social capital. This suggests that farmers' coping practices were unconsciously driven by their habitus as an outcome of the interaction between their "risk environment" and available capital. However, this long-standing habitus and reliance on available resources may limit conscious decisions and actions in employing long-term solutions, with reference to the intensifying impact of climate change in the near future.

Keywords: Bourdieu's theory, risk environment, capital sources, natural disasters

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1. INTRODUCTION

Risk is the interaction between a population's exposure to hazards or disasters and its vulnerability (UNDRR, 2022). This occurs when people are exposed to extreme natural events and are unable to cope with or adapt to these situations. The Philippines, geographically located in the western part of the Pacific Ring of Fire, is rich in natural agricultural resources that serve as the foundation for the livelihoods of 22% of Filipino workers (PSA, 2023). They mostly live in rural areas, and their major subsistence activities include farming, fishing, livestock farming, and forestry (PSA, 2024). The country's high exposure to natural disasters, such as typhoons, floods, and droughts, owing to its perilous location, as well as its current social structural condition, has contributed to its ranking as having the world's highest risk index (World Risk Report, 2023). Addressing this issue warrants immediate attention and calls for extensive research to develop effective management and adaptation strategies. Risk reduction measures should be tailored to the actual conditions of communities, depending on how people perceive and respond to risk. Understanding the dispositions of farmers with respect to pragmatic conditions is a prerequisite.

Studies in the Philippines have mostly focused on understanding climate-related risks, such as heavy rainfall and increasing temperatures (Lasco et al., 2016), floods and droughts (Agbay et al., 2023), unpredictable rainfall patterns (Ducusin et al., 2022), and stronger and more frequent typhoons (Landicho et al., 2015). Other studies have focused on non-climate-related risks, such as volcanic threats (Gaillard, 2008), income and expenditure risks (Fafchamps & Lund, 2003), personal and structural risks (De Jong et al., 1986), the high cost of fertilizer (Lucas, 2011), and environmental risks (Peria et al., 2016). Limited studies have been conducted to consider the interaction of these individual risks in the context of the country's "risk environment"[4].

Risk perception, contributing factors, and their influence on risk behavior have been the most extensively researched themes in the Philippines and other Southeast Asian countries (Arunrat et al., 2017; Dang et al., 2014; Lavigne et al., 2008; Llones & Suwanmaneepong, 2021; Reynaud et al., 2013). Although previous research has shed light on risk perception and behavior through an individual-centered approach, the unconscious aspect of risk behavior, influenced by wider external forces, has been underestimated. Very few studies have been conducted to understand farmers' disposition to adapt to their "risk environment" (Crawshaw & Buton, 2009). Because of this knowledge gap, we became interested in utilizing Bourdieu's

[4] Risk environment was first termed by Rhodes (2002) and was used in the medical field. He defined "risk environment" as the space, whether social or physical, where various factors interact to increase the chances of drug-related harm. Crawshaw and Burton (2009) explored the potential of Pierre Bourdieu's work in understanding how social structures influence individual behavior in "risk environments," focusing on the experiences and encounters with drug use in the everyday lives of young men.

(1972) concept of habitus[5] in a case study to explain how other elements such as power structures and available resources unconsciously influence individuals' risk dispositions. The concept of risk habitus[6] has been used previously in the context of natural disasters in Mexico (Aguilar & Rivera, 2016), the Vietnam Mekong Delta (Nguyen-Trung et al., 2023), and South Africa (Ncube et al., 2023). These studies provide suitable examples of practical applications in real-life scenarios.

Continuous exposure to risk can lead to the development of behavioral patterns among Filipino farmers. However, their ability to withstand the impact of these risks is often limited by their capacity to cope or adapt, which reflects their available resources and specific risk environments (Crawshaw & Buton, 2009). Given the country's characteristic exposure to natural disasters and vulnerable conditions, this study seeks to answer the question: how do farmers adapt to their particular "risk environment?". To answer this, the study examined the case of an upland abaca (*Musa textilis*) farming community in San Miguel, Catanduanes, Philippines, which has been exposed to numerous farming risks throughout their society's history, hence their "risk environment." The primary objectives of this study are to: (i) explain the type of "risk environment" the community have, (ii) recognize the habitus of farmers in response to farming risks, and (iii) explain how these habitus vary depending on farmers' available resources. By understanding farmers' behavior in their particular "risk environment," policymakers and development organizations can develop risk-informed policies, programs, and decisions that are more realistic, relevant, and effective.

2. THEORETICAL AND CONCEPTUAL FRAMEWORK

Bourdieu's (1972) theory of practice explains that a person's habitus is a produced disposition that results from the dynamic interaction between the field and capital. Bourdieu refers to this field as the social structure that holds power over individuals. A specific profession, industry, or social group may produce and reproduce certain discourses and practices (Crawshaw & Buton, 2009). The field offers regulations that give members of society opportunities and constraints regarding access to certain kinds of capital, such as economic, cultural, social, and symbolic. Capital, on the other hand, is a resource that can help individuals achieve their goals but can also limit their actions based on environmental

[5] Habitus is a system of dispositions, that is of permanent manners of being, seeing, acting, and thinking, or a system of long-lasting (rather than permanent) schemes or schemata or structures of perception, conception, and action (Rooksby, 2005, Chapter 2 p. 43). This long-lasting established concept of "way of doing things" is shaped by the social and natural condition of a particular group of people motivated by the available capital they have. These practices tend to replicate among people who belong to the same environment, and have the same experiences and resources.

[6] The concept of risk habitus was introduced by Aguilar and Rivera (2016) in studying risk behavior related to natural disasters. He explained how social conditions of vulnerability are produced and embodied in different aspects of life in a landslide-prone area in Mexico. Other researchers have also explored risk habitus in different contexts, such as saline intrusion (Nguyen-Trung et al., 2023) and water scarcity, floods, and fire (Ncube et al., 2023).

conditions. Nguyen-Trung et al. (2023) expanded Bourdieu's concept of capital through a practice-oriented risk habitus and multiple capital (P-HAC) models. In their model, they introduced natural capital to represent ecological resources and built capital to represent nonliving resources. Capital plays a crucial role in society, as it enables agents to maintain and improve their social status. In this sense, capital can be understood as a form of fuel that allows individuals or organizations to replicate or improve their positions within the social field (Paschos, 2020).

In Bourdieu's conceptualization, habitus is the produced and reproduced disposition that unconsciously guides individuals in forming long-lasting perceptions and decisions regarding every aspect of their activities. Habitus is not innate to individuals; rather, it is an acquired characteristic that may be completely or partially common to people who have been the product of similar historical social conditions (Bourdieu, 2016). Although habitus is long lasting because it is socially reproduced, it is not eternal. Thus, habitus may consciously change through history, new experiences, education, or training (Bourdieu, 2016).

Studies utilizing the concept of Bourdieu in a "risk environment" emerged in the medical research field (Crawshaw & Buton, 2009) and were subsequently utilized by other researchers in the environmental research field by associating habitus with natural disasters (Aguilar & Rivera, 2016; Ncube et al., 2023; Nguyen-Trung et al., 2023). In this study, the same concept was used to understand how farmers consciously and unconsciously adapt to their particular "risk environment" in San Miguel, Catanduanes. This study addresses the limited literature by exploring the unconscious aspect of risk behavior influenced by wider external forces, such as the interplay between the field and capital. In the first part of the paper, we describe the "risk environment" in the abaca farming community in Catanduanes. This refers to the pragmatic conditions of abaca farming, including changes in the farming environment and farmers' available resources in response to identified risks. The term "field" here refers to the "abaca farming community" and encompasses the natural, economic, cultural, social, and political structures that govern all farming activities. The second section describes the habitus of farmers in risky environments. Available capital is emphasized because of its direct impact on farmers' perceptions and decision-making in response to risks. Five types of capital (natural, economic, cultural, personal, and social) were identified as relevant to the respondents, based on their objective and subjective perceptions obtained during the preliminary interviews. These were classified into quantifiable scales to support the qualitative findings using correlational analysis. The definitions and categorizations of these capitals are discussed and tabulated in detail in Section 3.

3. MATERIALS AND METHODS

3.1 Study Area

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Catanduanes, an island located in the easternmost part of Luzon Province in the Philippines (Figure 1), is highly exposed to natural disasters, such as typhoons, floods, landslides, and storm surges. Rural communities in this area rely heavily on available abaca supplies to produce fiber. However, weather disturbances frequently disrupt production, leading to decreased farm earnings (Rañola, 2004). This in turn prevents farmers from investing in enhancements to improve their household and farm resilience activities (Giles, 2019). The village of Pacogon, in the San Miguel municipality of Catanduanes Island, is an ideal case study area because of its unique characteristics. Most of the population consists of upland abaca-farming households, which are highly vulnerable to extreme weather conditions. The area is heavily infested with abaca pests and diseases, which compounded existing risk factors. Pacogon is situated close to the San Miguel River and Catanduanes Natural Park, making it more precarious during the wet season, when flooding and landslides commonly occur. Of the 93 registered households, 82 (88%) were vulnerable to typhoons, 28 (30%) were at risk of flooding, and eight (8%) were at high risk of landslides. Vulnerability and frequent exposure to natural disasters are assumed to influence farmers' behavior and disposition toward risk.

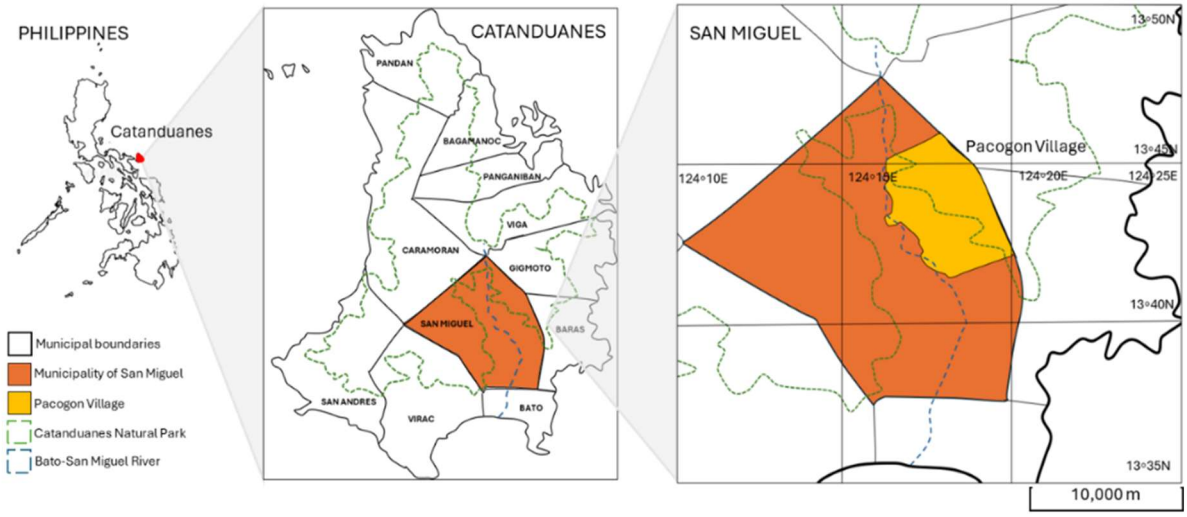

Figure 1. Map indicating the location of Catanduanes Island, San Miguel, and the study site, Pacogon Village

3.2 Data Collection and Analysis

This study used both qualitative and quantitative methods to evaluate data from focus group discussions (FGDs) and survey interviews conducted in March and June 2023 with 20 heads of abaca-farming households in Pacogon. The FGDs yielded valuable insights into villages' historical, cultural, and socioeconomic backgrounds, which aided in comprehending the conditions of the field and individual capital accumulation. Individual interviews were conducted using open-ended questions to understand the risk environment, impact of farming risk, and habitus. Semi-structured surveys were conducted to understand how habitus varied across socio-economic srata. Each interview lasted between 45 and 60 min, and to ensure

confidentiality, the information shared by the participants was processed using household number codes, such as HH1 for Household Head. The collected data were analyzed thematically using the method outlined by Braun and Clarke (2006). The themes generated from the codes were classified into two categories, data-driven and theory-driven, as shown in Tables 1 and 2, respectively.

Table 1. Themes of perceived farming risks and its impact (inductive)

Code	Theme (perceived farming risks)	Sub-theme (impact)
- Destruction of cultivated area	Typhoon	Natural field
- Recovery period		Economic field
- Low income		Economic field
- Government priority		Political field
- Decreasing productive area	Abaca bunchy-top disease (ABTD)	Natural field
- Recovery period		Economic field
- Government priority		Political field
- Disease awareness		Personal field
- Wet season and landslides	Prolonged and intense rainfall pattern during wet season	Natural Field
- Poor quality fiber		Economic field
- Fluctuating abaca fiber price		Economic field
- Social network		Social field

Source: FGDs and in-person interviews (March and July 2023)

Table 2. Themes of farmers' available capital and influence on habitus (deductive)

Theme (Capitals and meanings)	Effect on habitus	Code
Natural (provide alternate income source options)	Influence farmers decision to continue abaca farming	- Accessibility - Total landholdings - Diversified cropping - Scattered farms
Economic (motivation to continue abaca farming)	Influence farmers decision to cultivate alternate crops or work off-farm	- Other income sources - Labor movement - Financial capacity
Cultural (adherence to traditional and conventional mentality)	Influence farmers decision to continue abaca farming	- Local and scientific knowledge - Tradition and culture - Resistance
Social (social and political network)	Enable farmers to avail cash and commodity loans from traders and private institutions	- Family bond - Group/association bridging - Authority linkage

Source: FGDs and in-person interviews (March and July 2023)

The narrative findings were supported by a correlational analysis employed to determine the relationship between farmers' available capital and their habitus. In this paper, "natural capital" refers to the total size of respondents' farm landholdings. "Economic capital" refers to farmers' monthly income, classified according to the monthly income group of Filipinos in 2021. "Cultural capital" refers to the local knowledge of respondents, measured in terms of length of farming experience. "Personal capital" refers to the formal education level,

measured in terms of the number of years in school, and "social capital" refers to individual social networks, classified based on the framework of Fenenga et al. (2018). This includes bonding with family and friends, bridging groups and associations, and linking with authorities (i.e., local traders, government institutions, and private organizations). The first two groups represent horizontal social capital and the last group represents vertical social capital. A farmer with friends and family as their sole network is categorized as having type 1 capital. Farmers with bonds with both family and friends and membership in a group or organization are categorized as having type 2 capital, while farmers who have networks with all these groups are categorized as having type 3 capital. In this case, local traders belong to the vertical social capital group because they control local abaca trading activities, giving them power over the horizontal social capital groups. The parameters considered in this study are simplistic, as this was the primary topic of consideration, as well as the characteristics that define individual socioeconomic strata in Pacogon. However, the simplicity of each measure is critical for comparing individual capital distributions among Abaca farmers. Although the sample size was too small to draw a statistically sound conclusion, we performed a correlational test to complement the narrative findings. This was primarily done to support and confirm the story generated by the thematic analysis. Owing to the limited sample size used in this study, further research using statistically acceptable populations and tests is necessary. The household capital profiles and habitus are quantified and listed in Tables 3 and 4, respectively.

Table 3. Capital profile of abaca farming household respondents

Capital	Frequency (n=20)	Percentage (100%)
Natural Capital (Abaca farm size + other land resources)		
Less than 1 ha	3	15
1 to 2 ha	5	25
More than 2 ha	12	60
Economic Capital (Income group - monthly)		
Poor (< Php 12,000)	6	30
Low income but not poor (Php 12,030 to Php 24,060)	10	50
Lower middle income (Php 24,060 to Php 48,120)	4	20
Cultural Capital (Informal education - farming experience)		
Less than 20 years	4	20
21 to 30 years	5	25
31 years and above	11	55
Personal Capital (Formal education)		
Less than 6 years	7	35
7 to 10 years	11	55
11 years and more	2	10
Social Capital (Social network)		
Type 1 (family and friends)	4	20
Type 2 (family, friends, group/organization)	1	5
Type 3 (family, friends, group/organization, authorities)	15	75

Source: Household survey (June 2023)

Table 4. Habitus of abaca farming household respondents

Habitus	Frequency (n=20)	Percentage (100%)
Typhoon		
Planting alternative crop		
No	11	55
Yes	9	45
Off-farm work		
No	8	40
Yes	12	60
Abaca bunchy-top disease (ABTD)		
Continue abaca farming		
No	3	15
Yes	17	85
Conventional farming practices		
No	11	55
Yes	9	45
Unstable fiber price and income during wet season		
Continue abaca farming		
No	6	30
Yes	14	70
Avail cash and commodity loan		
No	11	55
Yes	9	45

Source: Household survey (June 2023)

Our initial idea was to gain insight into the village's background to clearly present the conditions of the field (abaca farming conditions) and individual capital accumulation (Bourdieu, 2016) in the first part of this paper. Next, we delved into understanding vulnerability (Cannon, 1994) or the "risk environment" (Crawshaw & Buton, 2009) by exploring the impact of individual farming risks (refer to Table 1) to the field and available capital. Cannon (1994) defined vulnerability as the extent to which a person's social status affects their exposure to natural disasters and the social processes that create and maintain that status. We then identified and explored themes related to the use of capital to drive risk-adaptive practices or habitus. The results of the correlation analysis are presented and discussed.

4. RESULTS

4.1 Life in an Abaca Farming Community

Through focus group discussions using participatory appraisal tools, we established the social norms and day-to-day activities of locals at our study site. This phase provides a detailed description of the natural and social structures that govern the fields and farmers' capital accumulation.

4.1.1 Natural Field

The locals mainly engage in farming and fishing because of the availability of forests, lowlands, and freshwater resources in the village. The village's forest resources cover an area of 3,341 ha, providing locals with non-timber resources, such as coconuts and abaca. Abaca is an economically important crop that is primarily grown by local farmers because of its strong natural fibers. Abaca farming in the village follows multistory cropping along with forest trees and root crops. Abaca is a shade-loving plant that is sensitive to strong winds. Therefore, forest trees are essential for shade and protection. The Abaca sites are scattered throughout the mountainous areas of Pacogon[7]. Most of these sites are located far from the village and require hours to reach them. Aside from farming abaca, local people also utilize available lowland resources to grow vegetables and rice, while freshwater resources provide them with freshwater fish as additional food. According to the 2018 Barangay Governance Automation System (BGAS) records, abaca fiber comprises 70% of the products produced in the village, while the remaining 30% comes from other crops such as rice, coconut, vegetables, and root crops.

4.1.2 Economic Field

According to the villages' primary livelihood map[8], abaca farmers make up 69% (64/93) of the total household heads (farm laborers, farm owners, tenants, and administrators), 28% (26/93) are engaged in non-abaca activities (housekeepers, cooks, construction workers, fishing, rice farmers, government employees, and drivers), and 0.3% (3/93) are local abaca traders. Aside from their primary income source, family members are involved in multiple occupations, such as construction work, rice/vegetable farming, and fishing, providing minor income contributions to the family. The village food supply is highly dependent on the time of the year. Rice, fruits, and vegetables are typically produced seasonally from March to April, whereas abaca and coconuts are available throughout the year. The village is yet to achieve full food sufficiency, and during lean months, its diet typically comprises root crops, fish, and vegetables.

Food prices in the village tend to increase from August to February and decrease from March to April as the major food crops follow seasonal trends. Conversely, the selling price of abaca fiber remained steady from March to July during the dry season and decreased from Php 5.00 to Php 2.00 during the wet season, following the price regulation of abaca buying

[7] Land ownership in the village is either acquired thru sale, inheritance, or gift. Some agricultural lands were acquired through Land Acquisition and Distributions of the Comprehensive Agrarian Reform Law and were collectively owned and tilled by farmer beneficiaries. Legal farm owners: either till, administer, and/or have tenants to make profit from it in exchange for harvest sharing. Shared tenure between farm owner and farm tenant is usually bonded by strong social relationships (i.e., relative, or very close family friends). Harvest from the land parcel is shared by the tenant and the landowner depending on their agreed percentage (e.g., 50:50 or 60:40).

[8] The livelihood map was created based on information gathered from 8 key informants through focus group discussions and workshops. It focuses on the primary source of income for each household head, which is the main source of income for their day-to-day activities. While some household members have multiple occupations, they have minimum contribution to the family's income.

stations. Unfavorable drying conditions during the wet season further reduced the income from August to February. In summary, the village economy depends largely on abaca and food crop farming, both of which are highly vulnerable to climate variability. Farmers employ diverse cropping systems to buffer income losses caused by seasonal price changes and unfavorable climatic conditions.

4.1.3 Cultural Field

a. Land preparation, planting, and pest management

Abaca farming is a prevalent agricultural activity in villages, and farmers commonly employ conventional farming practices, ranging from land preparation to pest management. Abaca farming is considered a family activity and its practices have been passed on through generations. Abaca grow naturally and do not incur fertilizer or pesticide input costs. Farmers are familiar with the infectious Abaca bunchy-top disease (ABTD) locally known as *cadang-cadang*. This viral disease inhibits sucker growth, rendering the plants unharvestable. Therefore, farmers regard it as a serious disease. Insect pests, such as root and corm weevils, are also prevalent, whereas *Ipomoea triloba* (*balagon*) is regarded as a noxious weed. To control and minimize pests and diseases, farmers use cultural approaches, such as traditional roughing (cutting infected plants), manual pest control (regular weeding), and burning.

Although abaca cultivation is considered natural and has low input costs, crop maintenance and harvesting are laborious and time consuming. To offset labor costs, farmers practice weeding and harvesting simultaneously, once or twice a year.

b. Harvesting and primary processing

The average harvest per cycle reported by Cortez et al. (2015) was 830.3 kg, although most farmers in the village harvested less than 800 kg of abaca fiber per cycle. Traditional methods such as tumbling, tuxying, and stripping are used to harvest abaca, aided by simple farm tools such as tuxy knives and hand stripping devices. The separation of the toppled abaca stalks, leaf sheets, and tuxies based on size and length is recommended to ensure that the resulting fibers are of excellent quality and uniform size[9]. Manual stripping of the abaca, coupled with the farm-to-village distance (between 1 h and over 2 h travel time by foot), poses significant challenges to farmers. Consequently, many farmers choose to practice "all-in" to simplify the process. "All-in" or mixing all abaca tuxies and extracted fibers during the stripping process yields relatively lower grade fibers that are thicker and have a medium to medium-soft texture.

Harvesting abaca fibers from sites located far from villages requires several days; hence, trading is usually performed weekly (Araojo, 2020). Low-income farmers often borrow capital from local abaca traders or farm owners to finance their weekly operational expenses

[9] Excellent grades of abaca fibers have a strand thickness ranging from 0.20–0.50 mm, good grades are between 0.51–0.99 mm, and fair grades are 1.00–1.50 mm (BAFS, 2016).

(Toyado, 2010), daily food allowances, and materials for building *tugod*s or temporary shelters (see Figure 2). Abaca is typically harvested twice a year and usually takes three to four abaca strippers approximately one and a half months to harvest a one-hectare abaca farm. After harvesting at one site, the farmer moves to another site and continues to harvest for the next few months. This sustains the farmers' subsistence goals throughout the year.

Figure 2. a) Tugod shelter house; b) hand stripping device for manual abaca stripping; c) sun-drying of abaca fibers; d) bundled dried fiber. (Photos taken during the field visit)

c. Marketing

The local value chain of dry fiber emphasizes the role of farmers as producers and village traders as transporters, consistent with Talan's (2016) findings. Village traders collect dried fibers weekly, transport them, and sell them in bulk to buy stations (BSs) and/or grading and baling establishments (GBEs) located in the Bato and Virac municipalities. The price per kilogram of fiber is regulated by the buying stations and is set according to the fiber grade and quality. Shrinkage losses of approximately 10–15% were deducted from the delivered fiber depending on the fiber color, uniformity, and moisture content. The buying station/grading and balling establishment performs balling and certification of dry fibers prior to transport to manufacturers, who process the abaca into pulp and paper.

4.1.4 Social and Political Field

Local people typically have strong social ties, particularly with relatives and friends. This is observed in their culture of *bayanihan* or *doksoy*, the expression of their sense of a shared community that guarantees support during times of personal travail and hardship (Bankoff, 2007). Relationships among farm owners, tenants, and abaca strippers are embedded in their rich culture and social ties. Farm owners either till, administer, or have farm tenants profit

from their land in exchange for a share of the harvest. In contrast, abaca strippers are employed by land-rich groups in exchange for harvest sharing, as per their usual customs. Thus, this relationship is beneficial for the survival of the lowest group in the pyramid, namely abaca strippers.

Existing farmer groups in the village were organized by the Municipal Agriculture Office (MAO) for the easy dissemination of information among members. Existing farmer group associations include coconut and integrated farmers who produce rice and high-value crops, including abaca. Local traders, on the other hand, were tagged as power holders in the community, as they regulated most of the abaca trading transactions in the village, while government agencies were also involved with locals through occasional projects that were mostly top-down. Private lending companies also provide important financial services, such as cash loans, savings accounts, and insurance, to local farmers at reasonable interest rates to help them finance both farming and household needs. Relationships among local people, groups, and authorities help them to effectively use existing resources, make money, and earn a living.

4.2. Abaca Farmers and Their “Risk Environment”

In this phase, the "risk environment" is described with reference to farmers' perceived vulnerability to farming risks experienced throughout history. The practices employed by farmers to cope with the impacts of individual farming risks are also discussed. The results are based on the data codes and themes summarized in Tables 1 and 2 and are presented in detail using data extracted from actual interviews.

4.2.1 Frequent Damage of Super-Typhoons

Strong typhoons have occurred frequently in the Philippines over the past three decades, with an average interval of six years. Farmers recalled typhoons that caused significant damage to the villages' forest resources, affecting their natural resources, employment, livelihoods, and available capital. Supertyphoons in 1995, 1998, 2006, 2016, and 2020 caused significant damage to available resources. Farmers shared their views on the effects of these storms on abaca production.

Typically, it took approximately two–three years for our abaca farms to fully recover (HH10, male, 42).

The impact of powerful storms on the abaca created a significant financial burden on farmers (HH3, male, 54).

Abaca is a shade-loving succulent plant that requires forest trees for partial sun cover. Therefore, the destruction of forest trees by strong typhoons has a significant impact on abaca regrowth. Supertyphoons are followed by temporary income losses for most locals who rely

solely on abaca. Employment opportunities for abaca strippers have become scarce, forcing farmers to adopt coping strategies.

Since our primary source of income was temporarily unavailable, we sought alternative ways of survival. However, our options were limited because of resource scarcity (HH6, male: 59).

I utilize my lowland fields and plant alternative cash crops such as rice and vegetables (HH20, male, 38).

Farmers like me, with no lowland farms and limited financial resources, usually leave our village and work until the abaca plantations have recovered (HH1, male, 43).

Some farmers temporarily shifted to producing alternative crops during the recovery period to achieve their subsistence goals, until they returned to normal abaca farming activities. However, options are relatively limited for resource-poor farmers; hence, off-farm work is a common practice congruent with the adaptation strategy employed by rural households in Bangladesh (Alam et al., 2017). Moreover, the government's priorities for support services shifted with changes in the political landscape after typhoons. Immediate relief assistance, such as goods and dole-out projects, was provided to help affected residents recover.

Usually, governments provide relief supplies immediately after a natural disaster. These were extremely helpful while reconstructing our homes. (HH5, male, 31).

The government, through the Department of Agriculture, granted pig and poultry stocks to selected farmers after the most recent typhoon in 2020. (HH8, male, 44).

As practiced by local farmers, abaca rehabilitation (i.e., weeding and replanting) becomes necessary three months after a storm to ensure the optimal regrowth of abaca suckers. However, most farmers face financial constraints in carrying out abaca rehabilitation activities because of their low incomes and lack of basic employment opportunities, leading to the neglect of most farms. This often leads to an increase in weed, pest, and disease incidences, causing a reduction in the expected fiber yield for the next cycle.

4.2.2 Abaca Bunchy-Top Disease (ABTD)

Local farmers have observed an increasing incidence of ABTD since 2000, with the disease sporadically occurring on farms near villages, as reported by Raymundo and Bajet (1998). Disease-infected zones decreased the natural productive area, causing a decline in farmers' incomes from abaca. Farmers attribute this to poor farming practices, neglected farms after typhoons, and weed infestations.

Poor farming practices such as the indiscriminate cutting of infected and uninfected plants facilitate the spread of ABTD (HH8, male 45).

ABTD became very evident after recent typhoons, and I believe that insect-carrying disease was transported through the wind, and weed infestation exacerbated its effect on abaca growth (HH18, male, 54).

I was severely affected by ABTD. Almost half of my plantation was infected, which decreased my expected yield and income from the abaca for some time. (HH9, female, 56).

This prompted the government to shift its political priorities through the Philippine Fiber Industry Development Authority (PhilFIDA). Through the implementation of the Abaca Disease Management Project (ADMP), PhilFIDA attempted to control the increasing number of ABTD infestations in 2015

PhilFIDA personnel visited ABTD-infected farms, injected herbicide-soaked bamboo sticks into infected plants, and sprayed green-labeled insecticides to eradicate the disease (HH14, male 67).

The project covered a total of 49.5 ha of abaca sites and benefited 18 farm owners. However, despite the risks posed by the ABTD infestation, farmers have maintained their practice of farming abaca.

I continue farming abaca because the disease has only spread near the village, and I have a farm located relatively far away. (HH11, male, 55).

I continue abaca farming because I have learned to recognize unharvestable plants based on their symptoms. (HH14, male, 67).

Despite PhilFIDA's recommendation to use herbicides, local communities continue to harvest abaca from uninfected zones while employing conventional measures (i.e., traditional roughing) as their way to minimize the spread of the disease. This practice is grounded in the deep cultural farming structures of local communities. As such, the community places significant value on traditional methods of disease control that align with its cultural beliefs and practices.

4.2.3 Unstable Fiber Prices and Income from Abaca Fiber during Wet Season

The harvest of abaca occurs twice per year and typically coincides with the dry and wet seasons. Once a site is harvested, farmers often move to another harvesting site to meet the annual needs of their families. Although abaca is available throughout the year for harvesting, income can be unstable for various reasons.

During the dry months, from March to July, buying stations offer higher and more consistent prices per kilogram of dried fiber. Conversely, during the rainy season, buying stations set price set back for fiber prices from Php 2.00–Php 5.00 (HH2, 56, female).

The income fluctuations of abaca are subject to various factors that affect the quality and quantity of the fiber produced. Although buying-station regulations play a significant role in

price changes, abnormal weather patterns, including prolonged and intense rainfall, can also lead to decreased fiber quality. Furthermore, pest and disease infestations can stunt growth and reduce fiber length, resulting in poor quality and lower market value.

Owing to unfavorable weather conditions for sun drying, the harvested fiber may change color during storage, which can affect its overall quality and tensile strength (HH12, male, 67).

Weeds and diseases affect the growth of abaca. It yields stunted suckers; the expected fiber is relatively shorter; thus, it is considered unharvestable. (HH16, male, age 57).

Poor-quality fibers result in higher shrinkage loss and lower income (HH12, male, 67).

Unfavorable weather conditions also pose a high risk to the health of older farmers, leading to decreased workdays and productivity. Moreover, rainfall-induced landslides, which are common in steeply sloped abaca sites, reduce the productive areas for farmers.

During the wet season, especially since I am old, I rarely go to the mountains to harvest abaca because of the potential danger. The number of working days is usually reduced, which directly affects income (HH12, male, 67).

Landslides are often caused by prolonged rainfall, particularly in sloping areas, where abaca plants typically grow. Despite the risk of landslides, we continued to harvest abaca. However, owing to soil instability, affected areas are often left uncultivated (HH8, female, age 51).

Unstable fiber prices and income from abaca fibers disrupt farming activities in the community for various reasons. Farmers may have depleted their fiber stocks to take advantage of high prices during the dry season. However, they usually opt to save stocks as part of their consumption-smoothing strategy to ensure income for the entire year.

I save part of my fiber stock when the condition is favorable and deplete all my stock when the situation becomes tough (HH17, 44, male).

Despite these financial risks, most farmers continue to practice the habitus of farming abaca throughout the wet season to meet their subsistence needs. To maintain this habitus, farmers use cash and commodity loans to cover their harvest expenses.

I ask my (regular) trader for commodities or cash advances to finance my harvest since the income from abaca is less than expected. After a week of harvest, I will deliver my harvested fiber to him; he will then deduct a part of my loan from my income. (HH3, male, 54).

It has been found that farmers often borrow capital from local abaca traders or farm owners, which is in line with Toyado's (2010) findings. This borrowing allows farmers to continue their abaca farming activities while accumulating financial capital from traders. This

relationship between farmers and local traders helps sustain their farming habits despite the financial risks during the wet season.

4.3. Farmers' Habitus and Available Capital

The Spearman's correlation test was used to validate the results of the qualitative assessment by examining the link between farmers' habitus or coping practices and available capital. Only the variables with significant correlations at the 0.05 (*) and 0.01 (**) levels are highlighted to narrow the focus of the discussion. Despite the relatively small sample size, it is important to conduct a correlation test to complement the narrative findings. According to Bourdieu's conceptualization, habitus is shaped by the conditions of the field and capital distribution. Therefore, the mixed approach used is essential for explaining the research findings, offering significantly more in-depth insights into farmers' habitus, as supported by the quantitative findings.

4.3.1 Frequent Damage of Super Typhoon

The findings showed a positive correlation (0.555) between farmers' decisions to plant alternative crops and their economic capital (see Table 5). Thus, lower-middle-income farmers were more capable of financing alternative crops during the recovery period. The culture of diverse cropping has been a long-established agricultural system in the village, similar to the study by Bankoff (2007); local farmers also practice such systems to minimize financial losses from the destruction of their main crop. The frequent occurrence of super-typhoons on the island made the locals accept, normalize, and adapt to this threat, as shown in their existing agriculture system. However, only higher-income farmers are prepared to plant alternative cash crops when conditions are not favorable for abaca farming.

A negative correlation (-0.559) was found between farmers' decision to work off-farm and their economic capital (Table 5), indicating that poor farmers were more likely to seek labor instead of planting alternative crops during the recovery period. These findings are similar to those of farmers in Tanauan, Batangas, where technical coping strategies for climate risk are limited due to insufficient financial capacity, especially among traditional and subsistence farmers (Acosta-Michlik & Espaldon, 2008).

To understand this decision pattern, we correlated farmers' economic capital with other available capital and found a significant relationship (0.606) between economic and natural capital (see Table 6). This implies that higher-income farmers have relatively larger total farmland holdings. This supports our claim that financially capable farmers are more prepared to plant alternative crops after typhoons because of their available natural capital, relative to poor-income, land-poor farmers. These poor-income farmers were typically abaca strippers who worked as laborers for the resource-rich farmers. Employment opportunities during the recovery period are scarce; thus, working off farm is an immediate subsistence practice.

Table 5. Habitus and economic capital

Habitus/ Practice	Economic capital (Income group - monthly)			Total	Spearman corr.	Sig.
	Poor (<₱12,030)	Low income (₱12,030-₱24,060)	Lower middle income (₱24,060-₱48,120)			
Plant alternative crop						
no	6	4	1	11	0.555*	0.001
yes	0	6	3	9		
Labor migration						
no	0	5	3	8	-0.559*	0.010
yes	6	5	1	12		

Source: Household survey (June 2023)

Table 6. Correlation between farmers' economic and natural capital

Capital	Economic capital (income group)			Total	Spearman corr.	Sig.
	Poor (<₱12,030)	Low income (₱12,030-₱24,060)	Lower middle income (₱24,060-₱48,120)			
Natural (total landholdings)						
Less than 1 ha	2	1	0	3	0.606**	0.024
1 to 2 ha	3	2	0	5		
More than 2 ha	1	7	4	12		

Source: Household survey (June 2023)

The correlation between farmers' habitus and social capital was tested, but no significant correlation was found for farmers who chose to plant alternate crops (0.334) and engaged in labor migration (-0.281) despite the government's efforts to provide services after the typhoon. This lack of a correlation may be due to the type and frequency of support provided by the government. According to farmers, government support after a typhoon is limited to food and housing assistance received by all households in the community. Therefore, government support is felt by all people, regardless of their social network type. Additionally, the farmers noted that government assistance after typhoons, such as dole-out projects, was irregular and selective. Government assistance after a typhoon did not significantly impact farmers' habits. This suggests that farmers rely more on individual-level adaptation strategies than on the government and other social support structures, which is consistent with the practices of hazard-prone rural households in Bangladesh (Alam et al., 2017). The findings showed no correlation between social capital and farmers' habitus, and the narrative findings provided a reason for this relationship. However, owing to the limited sample size and skewed distribution of social capital networks (see Table 3), a more sophisticated analysis is advised to address the statistical inadequacy of this study.

4.3.2 Abaca bunchy-top disease (ABTD)

The results showed significant correlations between farmers' habitus to adapt to ABTD and their natural and cultural capital. The positive correlation (0.596) between farmers' habitus and natural capital, as shown in Table 7, implies that farmers who continue abaca farming despite the threat of ABTD have higher total farmland holdings. Because of the known extent of disease infestation, farmers are able to harvest from uninfected farms, especially from isolated sites far from the infected zones. The established agricultural system of planting in small and scattered sites within the mountainous areas of Pacogon allows these farmers to continue harvesting abaca. This is congruent with the cultural agricultural system documented by Bankoff (2007), in which Filipino farmers practice the culture and history of land fragmentation or planting scattered parcels of land to minimize losses. This long-established farming system unconsciously guided local farmers' decisions to continue abaca farming despite the ABTD.

Table 7. Habitus and available natural capital

Habitus/ Practice	Natural capital (total landholdings)			Total	Spearman corr.	Sig.
	Less than 1 ha	1 to 2 hectares	More than 2 ha			
Continue abaca farming						
no	2	1	0	3	0.596**	0.001
yes	1	4	12	17		

Source: Household survey (June 2023)

There was also a positive correlation (0.606) between the farmers' decisions to continue abaca farming and their cultural capital (see Table 8). Thus, farmers with more farming experience, particularly those over 31 years old, are more likely to continue abaca farming despite the threat of ABTD. These groups were relatively older and were characterized as traditional farmers. These farmers preferred traditional roughing as a conventional control measure and were resistant to the PhilFIDA recommendations for herbicide use. Their farming experience and cultural customs have given them confidence to harvest abaca despite the outbreak, as they place high emphasis on traditional disease management procedures that are consistent with their cultural beliefs and practices.

Table 8. Habitus and available cultural capital

Habitus/ Practice	Cultural capital (farming experience)			Total	Spearman corr.	Sig.
	<20 years	21 to 30	>31 years			
Continue abaca farming						
no	3	0	0	3	0.606**	0.001
yes	2	4	11	17		

Source: Household survey (June 2023)

A correlation test was performed to explain this decision pattern and the results are presented in Table 9. The findings show a significant correlation (0.502), indicating a positive relationship between farmers' cultural capital and natural capital. This implies that farmers with more than 31 years of experience accumulate more landholdings over time. Their relative abundance of experience and landholdings allow them to strategize their harvest practices and continue abaca farming despite ABTD infestations. Moreover, cultural capital showed a negative correlation (-0.592) with farmers' personal capital, confirming that farmers with relatively more abaca farming experience are traditional farmers with low education levels. This supports our claims about abaca farmers' resistance to following the scientific measures recommended by PhilFIDA to control the spread of ABTD because of their rich cultural knowledge, which is consistent with the determinants of decision-making among wheat farmers in Yongqiao, China, in adapting to climate risks (Jianjun et al. 2015). The significant influence of cultural capital on farmers' risk habitus suggests a resistance to ABTD control in a scientific and effective manner.

Table 9. Correlation between farmers' natural, personal, and cultural capital

Capital	Cultural capital (farming experience)			Total	Spearman corr.	Sig.
	<20 years	21 to 30	>31 years			
Natural (total landholdings)						
Less than 1 ha	2	1	0	3	0.502*	0.024
1 to 2 ha	1	2	2	5		
More than 2 ha	2	1	9	12		
Personal (formal education)						
Less than 6 years	0	1	7	8		
7 to 10 years	4	2	4	10	-0.592**	0.006
11 years and more	1	1	0	2		

Source: Household survey (June 2023)

Our research highlights positive and negative relationships between farmers' habitus and their natural and cultural capital. However, we did not find any correlation between the farmers' habitus and other forms of capital. Despite this, the positive correlation between farmers' natural capital and economic capital (see table 6) indirectly suggests that the inclination to continue farming abaca and practice culturally accepted disease control methods is influenced by the perceived value of their natural capital, specifically, their abaca landholdings. The Pacogon farmers rely heavily on natural capital as their primary source of wealth. This dependency explains why abaca farmers strongly opposed the proposal to eradicate abaca under the Abaca Disease Eradication Project. Consequently, they chose to continue cultivating abaca, despite the risk of disease, as it is essential for their livelihood. The interrelatedness of capital directly and indirectly influences farmers' decisions to consistently employ the same habitus. Although our study draws a logical story to explain the deployment of capital, a more sophisticated analysis is required to confirm our findings.

4.3.3 Unstable fiber prices and income from abaca fiber

The findings show a positive correlation (0.468) between farmers' decisions to take out cash and commodity loans and social capital (Table 10). This suggests that farmers with vertical social networks (i.e., partner traders) are more likely to avail cash and commodity loans when their income is relatively low. This is inconsistent with the case of rural households in the Cordillera Mountains, where most loans to address income shocks were between family and friends (Fafchamps & Lund, 2003). As explained in the first part of this paper, village traders belong to a vertical social network (i.e., authorities) because they possess power over local abaca trading activities in the village. Because of this social power, abaca farmers and local traders have established a patron-client relationship. Abaca traders had regular supplies of dry fiber from partner farmers, and farmers were able to avail themselves of financial assistance from traders. This finding is consistent with Toyado (2010). Pacogon farmers' decision to choose vertical social networks (i.e., village traders) as loan providers is due to the reciprocal benefit and repetitive transactions between parties, which is quite similar to that of Cordillera farmers. Local farmers use pre-existing social structures, allowing them to continue generating money from the abaca despite the potential for further income losses. Hence, availing cash and commodity loans from traders became part of farmers' habitus when confronted with financial risks.

Table 10. Habitus and social capital

Habitus/ Practices	Social capital (social network)			Total	Spearman corr.	Sig.
	Type 1	Type 2	Type 3			
Cash and commodity loan						
no	4	1	6	11	0.468*	0.037
yes	0	0	9	9		

Note: Social Capital Network Type 1: limited to family and friends; Type 2: family, friends, group/organization; Type 3: family, friends, group/organization, and authorities.
Source: Household survey (June 2023)

5. DISCUSSION

According to Bourdieu, habitus is the long-standing, accepted idea of a "way of doing things" that unconsciously directs people to make long-lasting perceptions and choices about every aspect of their lives. Habitus is influenced by a field's natural and social conditions, and is driven by the distribution and accumulation of accessible capital. Thus, people sharing the same environment, experiences, and resources tend to reproduce these practices. For us to explain how abaca farmers' habitus have been developed in this particular setting, we first tried to investigate the conditions of abaca farming (the field) and the capital distribution in Catanduanes' risk environment".

We found that most farmers perceived themselves as vulnerable to super typhoons, abaca bunchy-top disease (ABTD), and unstable fiber prices and income during the wet season. It was also found that individual farming risks present in Catanduanes' "risk environment" are

interconnected, with one often being the result of another and/or exacerbated by another. For example, when super typhoons damage abaca farms, farmers tend to seek off-farm employment, leaving farms unattended during the recovery period. Consequently, weeds and diseases grow, causing further losses during the next cycle. In addition, the inherently adverse climatic conditions on the island from August to February trigger tropical storms and typhoons, which further exacerbate financial losses.

To understand the formation of farmer habitus within this high-risk environment, our study examines the coping mechanisms employed by farmers in response to individual farming risks. Our findings indicate that abaca farmers exhibit consistent coping practices that mitigate farming losses, with disparities observed among the various groups. For example, higher-income farmers tend to resort to coping practices such as planting alternative crops following a super-typhoon, leveraging their long-established culture of diverse cropping. In contrast, lower-income, land-poor farmers are more inclined to seek off-farm work in response to frequent disruptions in abaca production caused by super-typhoons, which perpetuate their financial hardship and reinforce their existing habitus. This observation underscores the stability of habitus, shaped by the normalization of typhoon risks, prevailing agricultural systems, and unequal resource distribution among farmers. Habitus in response to typhoons varies between income groups, yet remains consistent owing to shared ways of life, allowing practices to harmonize unconsciously. This can be attributed to the farmers' similar living conditions, enabling adjustments to be made without direct interaction or explicit planning.

The consistent habitus of abaca farmers is also evident in their informal loan practices, despite the possibility of financial loss. Abaca farmers often borrow capital from local traders or farm owners to finance weekly operational expenses. This patron-client relationship developed due to socioeconomic inequality among resource-rich and resource-poor farmers. Patron-dependent farmers are compelled to harvest abaca during the wet season to pay accumulated debt while availing additional cash or commodity loans because of inadequate income during the wet season. This cycle of repetitive borrowing from the past continues into the present and becomes part of the habitus. Although this relationship alleviates short-term vulnerability among patron-dependent farmers, it appears to increase local farmers' vulnerability to future risks because of their dependence on and indebtedness toward patrons (Drury O'Neill et al., 2019). Instead of innovating, farmers reproduce the same habitus of borrowing and rely on customers for short-term solutions. This habitus has become the normal practice of abaca farmers when faced with financial risks as they perceived this as "sensible" and "reasonable," despite the possibility of further financial losses.

Habitus is a long-lasting disposition that is subject to change over time, especially when existing practices are no longer suitable because of new crises, experiences, education, and training (Bourdieu, 2016; Sutherland & Darnhofer, 2012). However, when abaca farmers faced a major crisis in abaca due to invasive bunchy top disease in the early 2000s, their culture of managing and harvesting abaca persisted. These findings suggest that the

established culture of abaca farming and the farmers' cultural knowledge of abaca farming unconsciously facilitated their intention to consistently deploy their usual habits. For example, the long-established scattered planting pattern that is common in abaca farming systems helps farmers harvest abaca from disease-free zones. Furthermore, farmers' extensive farming experience helps them visually recognize disease-infected plants, enabling them to distinguish diseased plants from harvestable ones. In this case, farmers' coping practices to address abaca diseases is consistent to their "way of doing things." This shows that the reproduced habitus is still perceived as suitable for the current situation, despite the recognition of a new and invasive disease in the abaca. Although farmers' available natural and cultural capital enable them to earn income from abaca, despite the risk of ABTD, their habitus unconsciously limits their decisions and actions in choosing more scientific and effective ways to address the disease. This consistency in habitus could lead to a more serious incidence of disease infestations in the future, owing to their resistance to scientific control measures.

Every person acts as both a producer and reproducer of objective meaning (Bourdieu, 1972) and in this case, abaca farmers' knowledge and familiarity with their "risk environment" help them accept, normalize, and adapt to these conditions; and instead of innovating long-term solutions to farming risks, they tend to cope with long-standing solutions by consistently reproducing habitus. The findings suggests that farmers' habitus is more likely shaped and reflexively steered by their "risk environment" and the existing social and natural structures such as diversified cropping system, scattered plantations, rich farming culture, and established patron-client relationship in the farming community. Furthermore, a disparity in habitus was also evident in this case, which highlights how farmers developed a specific habitus between different socioeconomic strata.

Understanding a community's "risk environment" is crucial for discerning how people respond to farming risks and developing sustainable long-term solutions (Aguilar & Rivera, 2016; Crawshaw & Buton, 2009). Program development officers must consider the habitus of the local people in relation to various socioeconomic strata, each of which has distinct perceptions, conceptualizations, and practices concerning threats and hazards. This consideration is essential to effectively align existing principles with the formulation of relevant and adaptable risk-reduction innovations. Recognizing habitus could also open communication and dialogue with rural communities to gradually change their habitus, making them more adaptable to changing environmental conditions.

6. CONCLUSIONS

The aim of this study was to understand the habitus of abaca farmers in the context of their "risk environment" and available capital. Focus group discussions and in-person survey interviews were conducted to collect data from abaca-farming households. We then analyzed

the data using thematic and correlational analyses by applying Bourdieu's practice theory. The main outcomes of our research are: Firstly, by understanding the pragmatic conditions of the field and capital accumulation, we found the interrelatedness of farming risks particular in their "risk environment." The frequent occurrence of super typhoons triggers many other farming risks, causing further losses among farmers, and because of this frequent exposure to disasters, farmers have unconsciously produced and reproduced resilient habitus bound to their natural and social structure and available capital. Second, we conclude that farmers' practices to address individual farming risks were part of the long-standing habitus and influenced by their economic, natural, cultural, and social capital, which has been acquired throughout history within the farming community. These practices were consistently reproduced because of their collective conceptualization of threats and practices. Finaly, although farmers may have been resilient to the frequent occurrence of natural disasters normal in their "risk environment" so far, findings suggests that the habitus is locked-in to a short-term and individual-level coping practices derived from their available resources.

The habitus of local abaca farmers to address various farming risks could have been in place for a long time. However, this dependence on their available resources and attachment to habitus may lead to greater vulnerability in the future, especially during times of climate change. According to PAGASA, the Philippines is now experiencing climate change due to an increasing trend in the mean temperature and baseline seasonal rainfall recorded from 1971 to 2000. They projected that by 2050, the usual wet season in the Philippines will become wetter and the dry season will become drier (PAGASA-DOST). This raises the question of the extent of local farmers' preparedness for unforeseen uncertainties. Therefore, future research is needed to understand the drivers and barriers associated with abaca farmers' resistance to change their behavior despite the threat of present farming risks. This is essential for effectively designing a behavior change intervention for local-level farming risk adaptation and management in preparation for the projected threats of climate change.

This case study provides evidence that the context of Bourdieu's fields, capital, and habitus is a useful tool for studying farming risks and risky behavior. Researchers and academic institutions studying this theme are encouraged to conduct in-depth case studies using more sophisticated statistical analyses to gain a comprehensive understanding of habitus based on the underlying field and capital structures unique to their risk environment. While our study provides valuable insights into understanding this research gap in the high-risk environment of Catanduanes, it is important to note that this may not apply to all upland abaca farming communities in the Philippines. Because habitus is the product of people's unique structures and available capital, empirical studies are necessary.

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