Inclusive Growth, The Cordillera Corridor Tea Trade Treaty

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Inclusive Growth

THE CORDILLERA CORRIDOR TEA TRADE TREATY

The Williamson Tea Farm, Kenya


A spoonful of rooibos at the Malaya Tea Room in Almeda, California /The National Geographic

This instrument is dedicated to my grandfather Dennis Masa'ao Molintas —and his only son Dennis Sabaoan Molintas. Lolo Tatang was an agriculturist who introduced langka, cocoa, star apple, avocado and the Zamboanga coffee variety to the locality. A school master up until the war changed the course of his life, where the fame of leadership acts of courage in the final battles in the capture of Japanese General Tomoyuki Yamashita made him Statesman. For daddy, whose genius in mathematics and interest in science barely appreciated, executed fall from grace in a sudden tragic voyage to the ancestry.

I thank my family for such lifelong inspiration and thoughtful of my intellectual pursuits: Tchaika, Yanni and Tamiya; Sheryl, Risa, Sari, Isis and Glana; Rohan, Danilo and Bob; JP, Jesus and Lennin; Zeal, Gabriela, Gillian and Riva; Levy, Ryu, Zander and Ragnar.

I am humbled to learn the acumen by the finest mentors and absolutely fortunate to receive the confidence and closeness of trusted good friends.

Dominique Trual Molintas

Unless specified otherwise, the thoughts and abstractions in this manuscript are expressions of the author and do not represent institutions or organisations, insofar the limitation by methodology/2023.

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Content

Abstract

This manuscript posits the GCC equation to outline the parameters of the Cordillera Corridor, Tea Trade Treaty. A tea corridor is the strategy for resource use of rugged mountain terrain in the Cordillera, Philippines; and the GCC equation substantiates the rudiments for cross-border competence. GCC would mean the "Gateway to Cross-border Competence" defined in a mathematical construct. The equation has specific relevance in the conjectures of tea cultivation, for the empowerment of Accession.

$$\text{GCC EQUATION} = \chi\, y_0 \zeta$$

The equation is formulated by meta-analysis of cross-sectional case studies synthesized by stochastic abstraction to obtain the tangible limit of three rudiments: yield constant ratio— $y_{0;}$ land utilization— ζ and purchase value constant ratio—χ.

Yield constant ratio $y_{0;}$ is derived from yield-hectares y, yield-substrate y_1, yield-weed-slump y_2 and yield-weed-envelope y_3. Land utilization ζ is a dependent variable defined by the labour in agriculture divided by the mean persons per hectares. ζ in all instances is less than the total area to comprise the elevations ideal for tea growth, as determined by NAMRIA. Lastly, X is the purchase-value constant ratio determined through stochastic abstraction of 25 years tea auctions published by the London Tea Brokers of tea farmers in Africa and India.

The strategy significantly underscores trade as a function of equity. With reason of, the research is a manifestation of the theory of change by illustration of the theory of competition. Inclusion and facilitation are the mechanisms of development, construed though farm support infrastructure, investing in health and wellness. Facilitation introduces the earmarking of Tea Tariffs for compulsory university schooling of the generation next. Trade escalates Government liquidity and institutionalizes stable farmer earnings. Given so, good life for these smallholder farmers is achievable.

A special section captures the smallholder farmer opinion and sentiment in written and conversational exchange of ideas. Despite the uncalled hyperbole of a Cordillera Corridor intentions for manipulation, the section exposed the farmers' gung-ho to participate in tea cultivation for trade, that can only be curtailed by dearth of expertise and capital.

Chapter 1/ Introduction

This study appraises the plausibility of a trade treaty between an international organization and Local Government Units; entailing the cultivation and export of tea. Described as the Tea Corridor, the treaty is envisioned as a long-term strategic approach for structural transformation through resource use transition. The land resource in the Cordillera embraces ancestral lands of rugged mountain ranges, with plenty of it idle. The water runs dry half of the year and yet no systematic amass of the resource is done during the wet months.

The prospect to transition resource utilisation, optimising land productivity and the allocation water, dangles in the balance of a fifty-year partnership between the People's Republic of China, Belt & Road Initiative/ PRC-BRI[1]; and the towns of Kapangan and Bokod to pilot the programme. The international organisation is responsible for first seed provision and farm support infrastructure investment for water holdings and bridgeway; by far positioning as the exclusive exporter of all produce of these tea gardens, bought at set industry price[2].

Trade between the Chinese merchants and the smallholder farmers is foreseen to raise competitiveness and deepen sustainability[3]. This recounts for structural transformation. Lack of opportunity and failure to compete by world measure, are structural defects tackled through job creation or livelihood; inoculating capacity development of the local folk.

Trade integration provides the ease of Access to the world market for the smallholder farmer to move up the global value chain[4]. In the context of competition; the Tea Trade Corridor transforms an atomistic concentration amongst smallholder farmers into a monopoly[5] by way of community based farming[6], alongside the practice of international conventions for cross border trade[7]. In doing so, a single producer supplies the entire industry output, in order to command price without concern[8]. More importantly, the Tea Trade Corridor can enable innovative farm techniques[9], with direct growth opportunity; earnings and raised GDP[10]. If it is to note, the tradition of small-scale farming has narrow

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[1] Organisation for Economic Co-operation and Development (2018) China's Belt and Road Initiative in the global trade, investment and finance landscape, Paris: OECD Bushiness and Finance Outlook.

[2] Saul McLeod (2014) Carl Rogers Theory, Cambridge, United Kingdom

[3] Ricardo Hausmann, César Hidalgo, Sebastian Bustos, Michele Coscia, Alexander Simoes and Muhammed Yildirim. (2013). The atlas of economic complexity: Mapping paths to prosperity. Cambridge: Harvard University.

[4] Organisation for Economic Cooperation and Development (2021) Inclusive Growth, Paris: Organisation for Economic Cooperation and Development.

[5] Israel Kirzner. (1985). Discovery and the Capitalist Process. Chicago: University of Chicago Press.

[6] Guy Michaels, Ferdinand Rauch, and Stephen Redding (2012) Urbanization and structural transformation, The Quarterly Journal of Economics, 127(2)535-586.

10.1Justin Yifu Lin. (2016). The quest for prosperity: How developing economies can take off. Princeton: Princeton University Press.

7 Joe Bain. (2022). Monopoly and competition. Chicago: Encyclopedia Britannica.

[8] Susan Olzak and Joane Nagel . (1986). Competitive ethnic relations . Orlando: Academic Press

[9] Creative Commons Attribution. (2022). Principles of Economics. Houston, Texas: Rice University.

[10] The Editors of Encyclopaedia (2022, March 17), Britannica. Retrieved from https://www.britannica.com/topic/protectionism

economic significance in global markets and often times prevent a country to be agriculturally self-sufficient[11].

Inclusive growth is a concept that vindicates to have all at stake in growth[12]. A corridor affects the space economy of nations in a system of multiple components, including infrastructure, services, logistics and regulations[13]. Corridors provide opportunities to strengthen trade flows connecting to international markets[14]. This facility creates a structure of modern efficiencies set forth in a treaty and eventually involving various nations over time.

- Tea Corridor is defined as an assertion to balance resources and opportunities to disadvantaged groups with historical inequitable conditions in the sitios of Nawal, Karao and Pito of barrio Bokod and the sitios of Gadang, Pongayan and Sagubo of barrio Kapangan.

- Tea Corridor is defined as the facilitation for inclusive growth through trade and capacity development by unifying a competitive formation of the smallholder farmer and inculcating international conventions in farm practices.

- Tea Corridor is defined as the enactment of a Gateway for Cross-border Competence, in the accession of international market determined in a treaty between PRC-BRI and the LGU.

- Tea Corridor is defined as the North Farm Quadrangle, a single ultimate source of power and prestige of the modern day tribe; raising taxation efficiency and LGU capacity to provide welfare for its constituents as well as sufficient funding to discipline them.

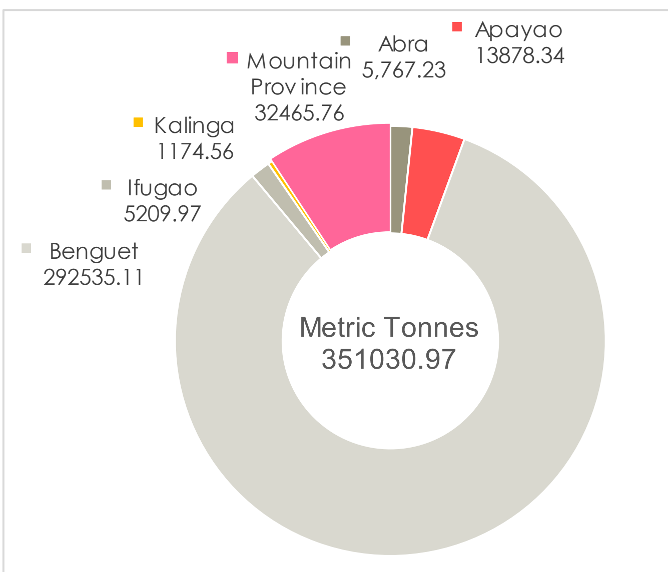
- A Tea Trade Corridor is consistent with the Philippine Development Plan, Pillar Two: Inequality-reducing transformation, '*pagbabago*'; and consistent with the pursuit of Philippines Development Plan, Pillar Three: Increasing Growth Potential '*patuloy na pag-unlad'*.

11 Soma Dutta. (2016). Top 25 Agricultural Producing Countries in the World. New York: Yahoo Finance.
12 Elena Ianchovichina and Susanna Lundstrom. (2013). Inclusive growth analytics: Framework and application. New York City: The World Bank Group.
13 Stephan Klasen. (2010). Measuring and monitoring Inclusive Growth: Multiple definitions, open questions, and some constructive proposals. Manila: Asian Development Bank
14 Charles Kunaka and Robin Carruthers (2014) Trade and Transport Corridor Management Toolkit. New York: World Bank Group.

Benguet farmers concentrate in vegetable production. The province sits throne for nearly 83 percent of vegetable production of regional production, with about 280 crop cover and for production volume of 292535 metric tons[15]. Vegetable trade utilizes the ancient Mountain Trail as the vegetable corridor across the province. Trade movements, mostly cabbage, carrots and potatoes are sent forward to the La Trinidad Trading Post for 41% of production; and the Baguio Hangar Market for 37% of production. About 17% of production is traded directly to large wholesalers[16].

In terms of trade; the deficit for the Philippines for 2019 for vegetables alone, amounts to 123.7614 billion pesos. Chart 1 presents the shares of the vegetable production in the Cordillera by province in metric tonnes. Vegetable export comprises okra and asparagus; chili and squash; which are mostly cultivated outside the Cordillera region. Importation includes potatoes, mushroom, broccoli, celery and lettuce; or locally produced crop[17]. As yet, the deficit in trade for vegetables recognizes poor quality and low yield that affect the capacity to enter the international market, or even sustain the local demand. Crop yield declined altogether with the hectares used in vegetable production. Between 2008 and 2017 potato yield is less 0.32%; cabbage production is less 0.54% and carrot harvest is less 1.06%. Land resource utilisation for vegetable production has dropped from 8596 hectares to 7912 hectares[18].

CHART 1/ VEGETABLE PRODUCTION[19]



[15] Philippine Statistics Authority (2021) 2021 Preliminary Cordillera Vegetables Situationer, Reference No. SR 2022 17 Manila: Republic of the Philippines.
[16] Maria Eden Piadozo (2013) Efficiency of Benguet vegetable price linkages, Los Banos: University of the Philippines.
[17] Japan International Cooperation Agency (2017) Final Report: Survey on issue analysis of food value chain in the Philippines. London: Price Waterhouse Coopers.
[18] Japan International Cooperation Agency (2017) Final Report: Survey on issue analysis of food value chain in the Philippines. London: Price Waterhouse Coopers.
[19] Philippine Statistics Authority (2021) 2021 Preliminary Cordillera Vegetables Situationer, Reference No. SR 2022-17, Manila: Republic of the Philippines.

Vegetable farming has churned a consistent income to most municipalities, still some are behind. Vegetable trade had also been quickly surpassed by other forms of resource utilisation with higher returns; such as energy generation for Bakun and Bokod; or rare earth mining for Itogon, Mankayan and Tuba. Crucially and specifically for a handful of deprived barrios that make a living out of farming; the need for a larger effort to introduce alternative high value crops suitable on idle rough elevated terrain, urgently and good enough for export—not pure subsistence.

The target areas to be introduced to tea cultivation belong to two fourth class municipalities of the Province of Benguet. Bokod has a population of 13,756 persons and the population of Kapangan is 19,297 persons. The barrios growth level and percentage composition to the municipal population is shown in Chart 2. Nawal, Gadang and Pongayan are on downward trends.

CHART 2/ POPULATION GROWTH RATE[20]

	Percentage	Population	Population	Change	Growth
	2015	**2015**	**2010**	**2010 - 2015**	**2010 - 2015**
Gadang	7.81%	1,513	1,534	(1.37%)	(0.26%)
Pongayan	4.06%	786	945	(16.83%)	(3.45%)
Sagubo	9.93%	1,923	1,697	13.32%	2.41%
Karao	7.19%	989	958	3.24%	0.61%
Nawal	4.22%	581	743	(21.80%)	(4.57%)
Pito	7.94%	1,092	838	30.31%	5.17%

Basing on the Department of Trade and Industry (2022) Cities and municipalities competitive index; Chart 3 outlines some of the competitiveness indicators. Between 2017 and 200, the local economy contracted in the town of Kapangan and yet scored higher in terms of productivity and transport competitiveness. The town of Bokod on the other hand had reactivated its Hydro-Electric Plant in Ambuklao, which contributes largely to the local economy.

CHART 3/ DTI INDICATORS OF ECONOMIC COMPETIVENESS[21]

	Local Economy		Productivity		Road Network		Transportation	
	2017	**2022**	**2017**	**2022**	**2017**	**2022**	**2017**	**2022**
Kapangan	0.206	0.008	0.010	0.087	0.000	0.000	0.055	0.003
Bokod	0.003	0.026	0.033	0.075	0.001	0.001	0.001	0.002

Chart 4 shows the ratings of both towns in the categories of health and education. Between 2017 and 2022 scores declined for both towns in these categories. In terms of cost of living, the localities were exposed to a higher cost of living in 2020, even higher than the cost of living in Baguio City, and in fact scored relatively close to the cost of living in Makati City.

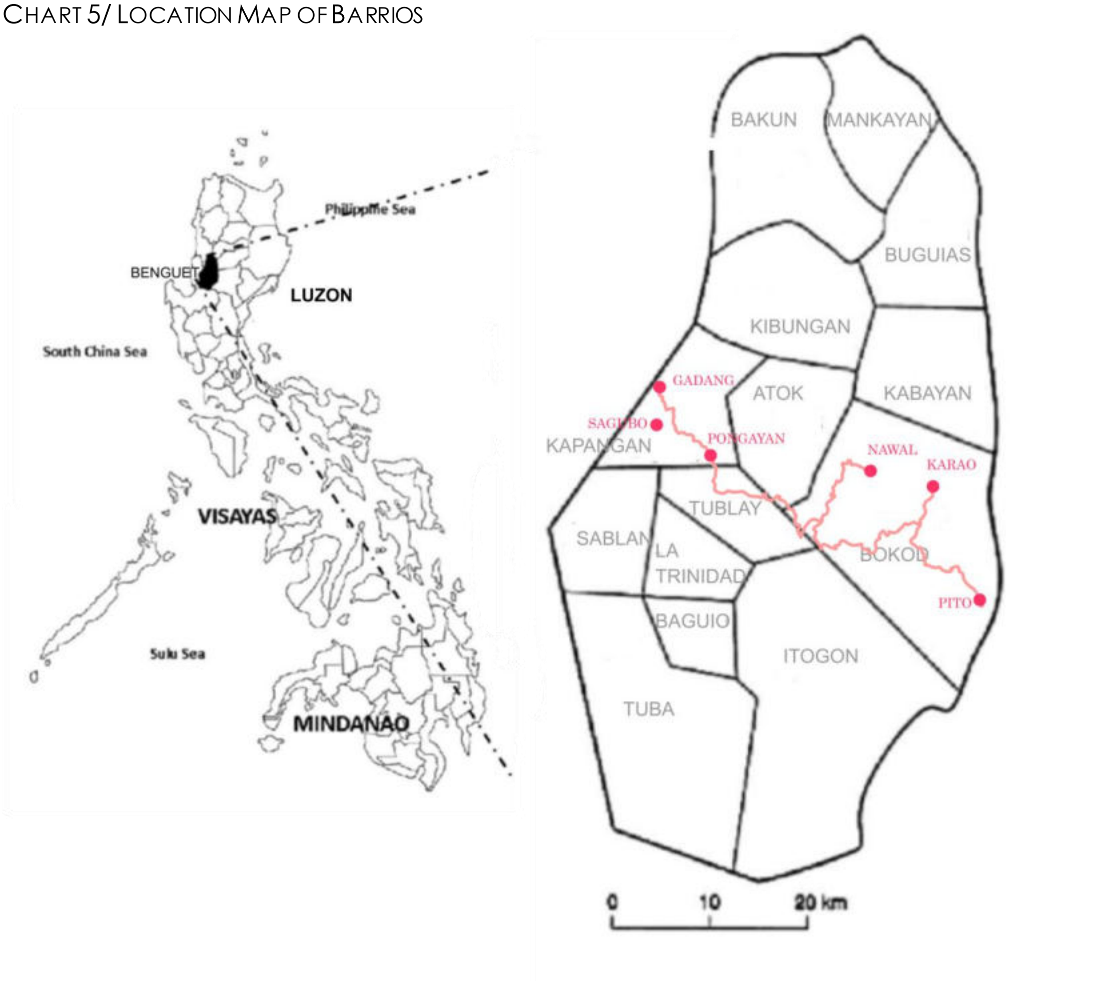
[20] Philippine Statistics Authority (2015) Report No 3, 2015 Population, land area and population density. Manila: Republic of the Philippines.
[21] Department of Trade and Industry (2022), Cities and municipalities competitive index, DTI Data Portal, Makati.

CHART 4/ DTI INDICATORS OF EQUITY[22]

	Education		Health		Cost Of Living	
	2017	**2022**	**2017**	**2022**	**2017**	**2022**
Kapangan	0.240	0.038	0.491	0.173	1.810	1.999
Bokod	0.174	0.083	0.439	0.116	1.810	1.999

The location of these selected six barrios is depicted in Chart 5. The municipalities of Atok and Tublay are between and these barrios are also provincial borders.

CHART 5/ LOCATION MAP OF BARRIOS



[22] Department of Trade and Industry (2022), Cities and municipalities competitive index, DTI Data Portal, Makati.

Chapter 2/ Methodology

This study exploits the meta-analysis[23] technique for the extrapolation of pertinent data from a cross-sectional compilation of studies on smallholder tea gardens in Bangladesh, China, Japan, Hawaii, India, Indonesia, Iran, Indonesia, Sri Lanka and Scotland;—of verified field research work on tea cultivation, as tangible results obtained for specific cultivation objectives. These tangible results are assembled in a probability space of derivatives, to comprise the essential elements in the tea plant growth, such as substrate composition and weather conditions.

To establish strong predictions using these extrapolated derivatives, the stochastic abstraction modelling approach is applied to define tangible limits of the GCC Equation[24], the **Gateway to Cross-border Competence.** Stochastic abstraction is the random between maximum and minimum limits[25]. Randomness in this context simply means a random probability distribution or pattern analysed statistically to predict outcomes. The mathematical formula ensures reliability in simulation of the probable farm yield, land utilisation or level of accession to international market. Stochastic techniques are broadly used as mathematical systems in random manner, and interpret as a random element in a function[26].

The research philosophy applied is positivism. In positivism, the fundamental assumption is that the nature of reality is objective, tangible, and singular[27]. The research approach is deductive, as it examines theory or phenomenon to tests its validity within the specific circumstance. Deductive approach observes the most logical path to start the reasoning[28] with a theory that directs the study structure in compilations or meta-analysis to validate the equation.

A deductive reasoning is explained further as the discerning from a general perspective to the particular[29]. The compilation of case studies recognizes verified field research work as tangible results of specific tea cultivation objectives. These tangible results are collated as explanations that establish strong predictions, if not derivatives to validate the viability of tea production in the Cordillera under similar climatic condition. These derivatives are general, average, and representative of standardisation.

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[23] Christopher Armitage (2001) Efficacy of the theory of planned behaviour: a Meta-Analytic review. (D. Youngblood, Ed.) British Journal of Social Psychology, 40, 471-499.
[24] Oliver Knill (2009) Stochastic Processes, Selangor: Encyclopedia of Bioinformatics and Computational Biology.
25 Colin Robson (2002) Real world research: A resource for social scientists and practitioner-researchers (2nd Ed.). Oxford: Blackwell Publishers Ltd
10.1Mark Saunders, Philip Lewis, Adrian Thornhill, Alex Bristow (2019) Research Methods for Business Students, 5th Edition New Jersey: Prentice Hall
10.2 Yosef Jabareen (2009) Building a Conceptual Framework: Philosophy, Definitions, and Procedure. International Journal of Qualitative Methods, 8(4), 49-62.
26 Olav Kallenberg (2002) Foundations of Modern Probability, Berlin: Springer Science & Business Media.
11.1 William Hosch (2022 March 6) Stochastic Process Retrieved from Encyclopedia Britannica: https://www.britannica.com/ science /stochastic-process
27 Karen O'Reilly (2009) Sage Research Methods, New York: Sage Publications.
28 Jonathan Wilson (2010) Essentials of business research: A guide to doing your research project. New York: SAGE Publications.
29 Ashok Gulati (2009) Research management: Fundamental and applied research, New Delhi: Global India Publications.

The Case-study methodology is apt, as this research entails to elicit tangible, contextual, in-depth knowledge on specific real-world data on tea cultivation. The Case-study method explores the rudimentary characteristics, meanings, and inferences of the slump on tea yield by impact of weed dominance; among others. This is a complex case study because it looks into multiple case studies to associate and illuminate different aspects of a research problem. The approach is excellent for defining, comparing, evaluating and understanding various components the theoretical construct[30].

In this study, the compilation is totally cross-sectional and unique of the other. The work embeds the cross-sectional technique to compare samples at a single point in time. Typically thought as a snapshot, where the findings drawn prove apt derivatives to constitute this mathematical construct. A snapshot of a single moment in time, and do not consider occurrences before or after the snapshot is taken. The snapshot is construed as a conclusive event of each earlier work, where inferences, general and average data are then utilised to extrapolate tangible limits in the current analysis. Across-sectional study assumed time to have a random effect that produces only variance and not bias[31].

The illustration of an Impact Pathway helps envisage the Theory of Change[32][33] and shown in Chart 6. Whatever change brought forth by the Tea Corridor is linked to alterations resulting farm revenues[34] and farm sustenance infrastructure[35]. These are measurable change[36]. No matter how good the research replication pegged; the impact pathway is focused on a single industry and is location specific in this study.[37]

The study methodology adheres to standards of mathematical rigour and gives weight to proven experiments and observations. It construes fundamental physics of complex structures of competing elements and dependencies between variables. This research is labelled by Economist Christian Zimmerman, Editor of Econpapers University Library of Munich, for the application of *Heterodox Approaches* often emphasize non-market aspects of economic phenomena, such as social identity, cooperative collective action, power relations, and psychological biases.

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[30] Shona McCombes (2019) Case Study definition, examples and methods, London: Scribbr Knowledge Base

[31] Paul Lavrakas (2008) Cross-sectional data, Ontario: Encyclopedia of Survey Research Methods.

[32] Berthold Herrendorf, Richard Rogerson, and Ákos Valentinyi (2014) Growth and structural transformation. In S. D. Philippe Aghion, Handbook of economic growth, Volume 2 (pp. 855 – 941). Washington: Elsevier Publisher.

[33] Frederick Barth. (1963). The Study of Social Change. Plenary Address to the Anthropologist Association Meeting' 1966 Arlington, Virginia: American Anthropologist Association

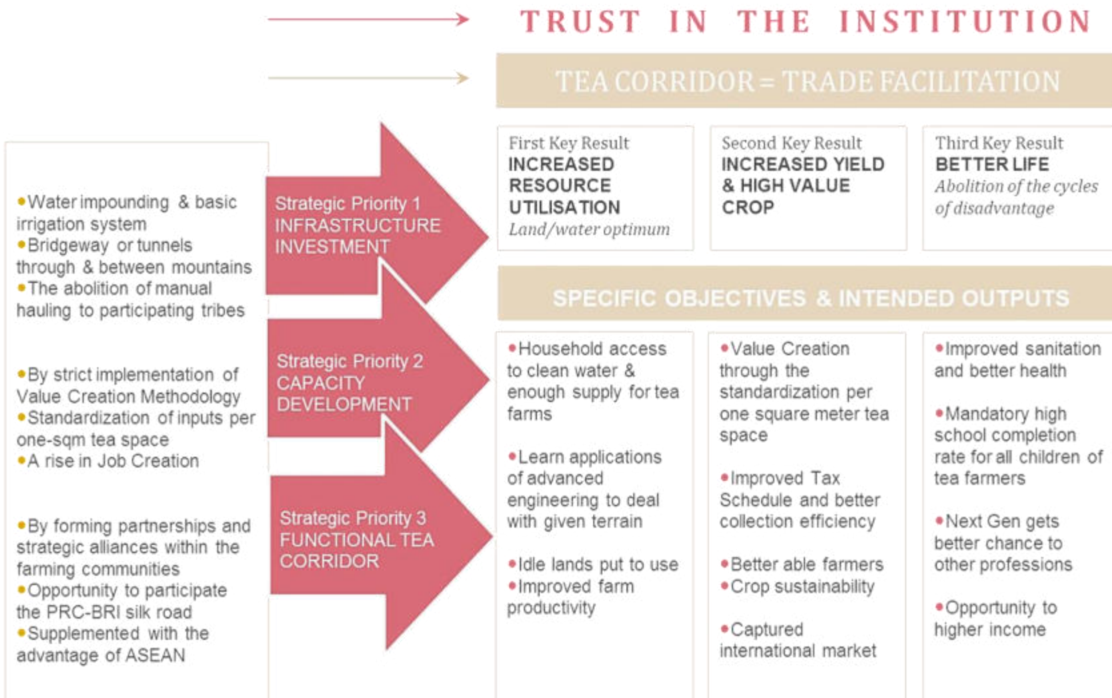
[34] Law Teacher. (2022). The Historical Development of Equity Law. Dubai: Law Teacher Net.

[35] Eduardo Fernandez-Arias, Charles Sabel, Ernesto Stein, and Alberto Trejos (2016). Two to tango: Public-private collaboration for productive development policies. Washington: Inter-American development bank.

[36] Jean Imbs and Romain Wacziarg (2003) Stages of diversification. American Economic Review, 93(1), 63-86.

[37] Malcolm Hawkesford, Walter Horst, Thomas Kichey, Hans Lambers, Jan Schjoerring, Inge Skrumsager Møller, Philip White (2012). Functions of macronutrients. In P. Marschner, Marschner's Mineral Mutrition of Higher Plants (pp. 135-189). London: Academic Press.

CHART 6/ THE IMPACT PATHWAY CONCEPTUAL FRAMEWORK



Verifiable indicators are outlined in Chart 7 to validate the impact pathway as the logical framework[38]. The priority levels for results are directed to the envisioned structural change[39] aimed at societal transformation.

[38] Eduardo Fernandez-Arias, Charles Sabel, Ernesto Stein, and Alberto Trejos (2016). Two to tango: Public-private collaboration for productive development policies. Washington: Inter-American development bank.
[39] Jean Imbs and Romain Wacziarg (2003) Stages of diversification. American Economic Review, 93(1), 63-86.

CHART 7/ THE IMPACT PATHWAY LOGICAL FRAMEWORK OF VERIFIABLE INDICATORS

	First Key Result. Increased Resource Utilisation, land/water optimum	Second Key Result. Increased yield High Value Crop	Third Key Result. Better Life. Abolition of the cycles of disadvantage
Objectively Verifiable Indicators	Change in idle land in the areas of Nawal, Pito & Karao; Gadang, Sagubo &Pongayan of elevation between 1000-1400 meters (Decrease) Change in number of registered small scale farmers (Increase) Change in hectares of land use for tea plantation (Increase) Change in road ratio than 22.4 km per 10,000 persons Change in cost of transportation after road (Decrease) Change in frequency of manual hauling (Abolition) Change in landslide frequency (Decrease) Change in volume of water distribution (Increase) Change in traffic volume in no of vehicles (Increase) Change in water-related health disease & deaths (Decrease)	Change in export volume in metric tons (Increase) Change in production volume in metric tons (Increase) Change in GDP capita (Increase) Change in number of active farmer organisations (Increase) Change in earmarked taxes for equity at local level (Increase) Change in GDP contribution for region & province (Increase) Change in municipal profile (Positive) Change in national Government revenue allocations (Decrease) Change in taxation collection efficiency of LGU (Increase) Change in voter participation (Increase) Change in farm technology (Improvement)	Change in earnings and minimum wages (Increase) Change in job creation (Increase) Change in living standards (Improvement) Change in number of enterprises in the municipality (Increase) Change in number of Out of School Youth (Decrease) Change in schooling completion (Increase) Change in number of persons living in poverty (Decrease) Change in political bashing (Decrease) Change in number of unemployed (Decrease) Change in worker protection contributions (Increase) Change in number of Professionals & skilled workers (Increase)
Means of Validation	Department of Health & WHO Reports LGU Profile NAMRIA maps on elevation contours NAMRIA maps on elevation contours Philippines Statistics Authority Reports	Bureau of Internal Revenue Reports DA RED Reports Department of Agriculture Reports Department of Trade and Industry Food Development Authority Reports PhilExport Portal Philippines Statistics Authority Reports	Bangko Sentral ng Pilipinas Reports Department of Education Reports Department of Labour & Employment Portal Department of Social Welfare & UN Reports Philippines Statistics Authority Reports Professional Regulations Report
Assumptions	International standard on built environments is observed Tea Corridor proceeds with least anomalous activity Trade Treaty of 50 years is observed	Farmers observe international conventions for tea growth Tea Corridor does not identify with any political party Philippine resilience in currency exchange volatility	A smallholder farmer is self-motivated and wants to improve the conditions of the industry Philippine resilience in World financial crisis
Risks	Climate change does not dry out the water source abruptly National Government takes over project ownership and develops the existing EPZA as the port of entry	Climate change does not reduce rainfall abruptly Cotabato Government forges better trade offer with PRC-BRI Political party clash on the priority locations of the Tea Corridor	Infiltration of leftist groups asserting to maintain the status quo to keep farmers poor Political party populism and hegemony is pursued rather than the pure logic of structural transformation

Chapter 3/ GCC Equation

Gateway to Cross-Border Competence

The purpose of this equation is to establish the parameters of Accession. GCC equation or "Gateway for Cross-border Competence" is the stochastic abstraction of tangible limit that substantiates the Tea Corridor as a significant strategy for resource use transition. The GCC equation defines the Tea Corridor parameters in three elements: Yield constant ratio— y_o; land utilization— ζ and cost of farm produce constant ratio— χ.

$$\text{GCC equation} = \chi y_o \zeta$$

The GCC equation has specific mathematical relevance in the theoretical construct, forecasting production levels of tea cultivation for the Cordillera.

The element Yield y_o is the designated symbol for yield; defined as a constant ratio with special mathematical relevance in the GCC equation. Yield y_o constant ratio is set at the significance of 1.928412 tonnes with intervals in terms of one hectare. Yield y_o is deduced by stochastic abstraction and verified by conventional theory. The weighting of the constant ratio yield y_o can change in the fact of occurring.

The element Land Utilization ζ is a dependent variable, with special mathematical relevance in the theoretical construct forecasting tea production for the Cordillera. Land utilization is at all instances less than the overall land area determined suitable for tea cultivation by DENR assessment $\zeta <$ NAMRIA orthoimage estimates, and places priority on the 1.2 percent indicative country derivative of idle land[40]. Land Utilization ζ is defined as,

$$\zeta = (0.23\text{n})/k$$

Where n is the forecast labour group, made up of the population between ages 20 and 59, k is the constant 3 tea farmers per hectares tea cultivation; 23 percent is the recognized labour in agriculture derived by stochastic abstraction.

The element χ as cost of farm produce χ is a constant ratio set at the significance of 163,680 pesos with intervals in terms of tonne. The value derived by stochastic abstraction of tangible limit, synthesized auction prices through 25 years, 1998 up to 2022 from the British auctions for Mombasa and Nairobi[41]. The cost of farm produce χ constant ratio is rudimentary in qualifying the farmer equity of stable earnings and an excellent hurdle rate for infrastructure investments.

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[40] Congressional Policy and Budget Research Department (2016), Idle land Tax: Implementation issues and challenges. Manila: House of Representatives, CPBRD Policy Brief No. 2016 - 02

[41] Tea Broker's Association of London; International Tea Committee; African Tea Brokers Ltd. (2022). Tea (Mombasa/Nairobi auctions), African origin, all tea, arithmetic average of weekly quotes// Unit: US Dollars per Kilogram//. New York: The World Bank.

Chapter 4/ Element Yield $\mathcal{Y}_0$

The element $\mathcal{Y}_0$ yield is determined at a constant ratio 1.928412 tonnes with intervals in terms of one hectare. This constant ratio is deduced by stochastic abstraction of yield per hectare, or yield-hectares.

$\mathcal{Y}_0$ is made up of four components; yield-hectares $\mathcal{Y}$, yield-substrate $\mathcal{Y}_1$, yield-weed-slump $\mathcal{Y}_2$ and yield-envelope $\mathcal{Y}_3$.

Yield-hectares $\mathcal{Y}$ is deduced from cross-sectional data of 86 tea-producing nations, synthesized through stochastic abstraction. Information on the overall land area for tea farming in hectares[42]; and the production level in tonnes that correspond these tea producing nations, constitute the origins of the forecast[43]. The resulting yield-hectares $\mathcal{Y}$ is expanded using studies on variables that enable increased levels in tea yield by nutritional inputs, such as lime to nurture PH content in soil. These yield enhancers are scrutinized as yield-substrate $\mathcal{Y}_1$.

The negative impact on yield when without weed control is adapted in the forecast as yield-weed-slump $\mathcal{Y}_2$ using a number of common weed varieties in terms of abundance, frequency and dominance[44]. The forecast is realigned by impact of ecology, and written as yield-envelope $\mathcal{Y}_3$. Precipitation underscored as the moisture of a rooting environment; if not a strong watering requirement referred as the yield-envelope. The yield-envelope is the forecast is based on the captured behaviour recorded in historical weather data for the past 11 years. Weather data covers the years 2010-2021 monthly detail on temperature, humidity and rainfall[45].

For substantiation of $\mathcal{Y}_0$ yield, the volume of tea harvest from the country averages is synthesized by stochastic abstraction; and defined as yield-hectares $\mathcal{Y}$ with an initial value of 2 tonnes at intervals of one hectares (see page19-20). By mathematical computation, it is raised by 37% by scrutiny of yield-substrate $\mathcal{Y}_1$ (page 21-22) which obtains the value of 2.74 tonnes. By mathematical analysis deduct (-) 0.8768 as the equivalent 32 percent yield-weed-slump $\mathcal{Y}_2$ (page 25-26) and the value 1.8632 tonnes are obtained.

This value is raised by half of yield-envelope ½ $\mathcal{Y}_3$ (pages 27-25) to equal 1.9241 tonnes; or –seven percent of the value 1.8632 is equal to 0.130424, which is divided by 2 to obtain 0.06521, and added to 1.8632, which equals 1.9241 tonnes. The value of yield-envelope $\mathcal{Y}_3$ is halved considering the ideal rainfall of 150-250 mm happens only half of the year.

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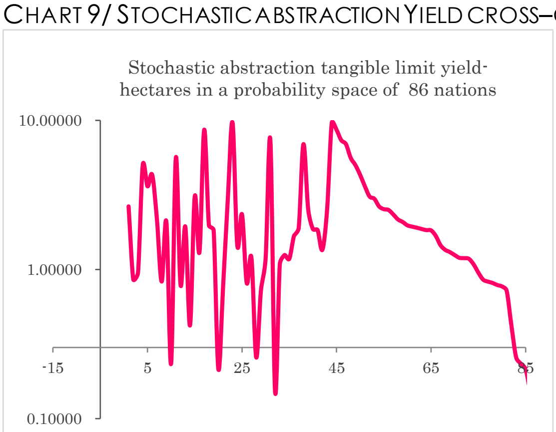
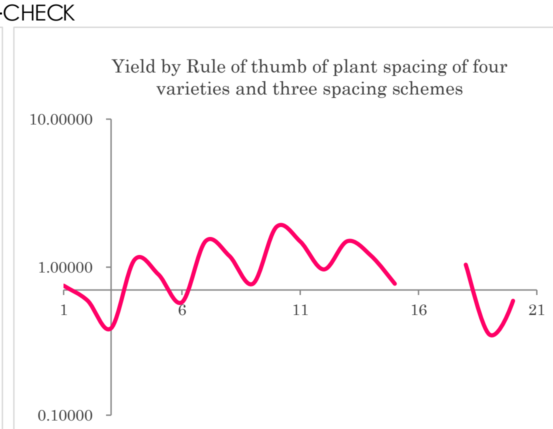
[42] Michael Chamberlain (2019) The Top 62 Countries, and Quantities. London: Tea How.
[43] Jordan G. Hardin (2017) List of Tea Producing Countries in the World, London: The tea engineer.
[44] Barua, J D (2015) Weed of tea field and therir control. National Seminar on plant protection in Tea, Tea research Association (pp. 55-56). Tocklai : Tea Research Institute India.
[45] DOST PAG-ASA, 2022

Yield by dint of physical space is characterised in this research as a constant for tea volume output, and defined as yield-hectares 𝓎. This constant is crafted using actual production volume averages for one hectare. 𝓎 does not define the quality of tea cultivation or market value.

Chart 8 is the stochastic abstraction of yield hectares across a probability space of 95 tea producing nations,[46] where the variable 𝓎 is expressed in yield-hectare in tonnes. Chart 9 is an illustration of the stochastic abstraction of the tangible limits in terms of yield using the conventional plant spacing way of thinking.

CHART 8/ STOCHASTIC ABSTRACTION YIELD-HECTARES[47]
CHART 9/ STOCHASTIC ABSTRACTION YIELD CROSS–CHECK





Mean, μ = 2.36269,
Standard Deviation, σ = 2.25430
Upper Limit, ∪ = 9.12560
Lower Limit, ∩ = (4.40021)
Stochastic Abstraction yield-hectares 𝓎 = 2.0 tonnes at intervals of one hectares

[46] Of the enlisted 43 nations, China is the leading tea-producer with 1.939 million tonnes per year and a gigantic land area dedicated to tea cultivation to produce 0.830 tonnes per hectare. The same goes for Bangladesh 0.955 tonnes, Azerbaijan 0.857 tonnes and Montenegro 0.813 tonnes. Similar that of China and Bangladesh, large tracts of land are turned into tea gardens to produce less than one ton every hectares: Russia 0.152 tonnes, Laos 0.215 tonnes, Myanmar 0.258 tonnes and Congo 0.234 tonnes. The majority of nations on the tea producer list churn out a tea production slightly over tonne but not over two tonnes: Georgia 1.939 tonnes, Indonesia 1.308 tonnes, Japan 1.979 tonnes, Kenya 1.831 tonnes, Mali 1.456 tonnes, Mozambique 1.198 tonnes, PNG 1.192 tonnes, Rwanda 1.084 tonnes, Sri Lanka 1.680 tonnes, South Korea 1.180 tonnes, South Africa 1.250 tonnes, Tanzania 1.907 tonnes, Uganda 1.871 tonnes, Vietnam 1.837 tonnes, Zambia 1.355 tonnes. Nonetheless, a highly efficient tea-yield per hectare production is identified with countries of very diverse settings: Malaysia 9.657 tonnes, Iran 8.652 tonnes, and Portugal 7.368 tonnes; followed by Thailand 6.927 tonnes, Ecuador 5.607 tonnes and Bolivia 5.015 tonnes.
[47] Daniel Workman (2021, May 30) Tea Exports by Country, Retrieved from World's Top Exports: https://www.worldstopexports.com/tea-exports-by-country
[47] Dan Bolton (2016, October 5) Global Tea Production 2015, Retrieved from World Tea News: https://worldteanews.com/tea-industry-news-and-features/global-tea-production-2015
[46.1] Soma Dutta (2016) Top 25 Agricultural Producing Countries in the World. New York: Yahoo Finance.
[47] Kaison Chang (2015) World tea production and trade Current and future development. Rome: Food And Agriculture Organization of the United Nations.
[47] Mahsa Shahbandeh (2021) Global production and exports of tea from 2004 to 2019, https://www.statista.com/statistics/264183/ global-production-and-exports-of-tea-since-2004/

The meta-analysis is presented in the cross-sectional data-set of historical yield per hectare across 43 tea producing nations is placed in Chart 10.

CHART 10/ CROSS-SECTIONAL DATA SET OF HISTORICAL YIELD

Country	Hectares	Yield	Labour Agriculture	Labour Force
Argentina	39,600	105,000	9.02%	18,000,000
Azerbaijan	663	568	36.00%	4,680,000
Bangladesh	67,045	64,000	38.30%	66,640,000
Bolivia	274	1,374	30.54%	4,992,000
Brazil	211	763	9.08%	104,200,000
Burundi	9,703	41,817	86.21%	4,245,000
Cameroon	2,168	4,700	43.49%	8,426,000
China	2,336,066	1,939,457	25.33%	791,483,000
Colombia	60	125	15.77%	25,760,000
Congo	12,410	2,900	33.53%	2,890,000
Ecuador	535	3,000	29.74%	6,953,000
Ethiopia	9,400	7,400	66.63%	52,820,000
Georgia	1,702	3,300	38.15%	1,959,000
Guatemala	1,209	510	31.30%	4,465,000
India	628,193	1,939,457	42.60%	476,670,100
Indonesia	113,215	148,100	28.50%	125,000,000
Iran	18,493	160,000	17.37%	30,500,000
Japan	42,858	84,800	3.38%	65,010,000
Kenya	236,200	432,400	54.34%	19,600,000
Laos	4,195	900	61.44%	3,337,000
Madagascar	779	600	64.12%	9,504,000
Malawi	18,094	54,000	76.36%	5,747,000
Malaysia	1,903	18,377	76.36%	13,190,000
Mali	103	150	62.44%	3,241,000
Mauritius	656	1,536	5.97%	1,318,000
Montenegro	123	100	7.15%	251,300
Mozambique	19,202	23,000	70.22%	10,550,000
Myanmar	89,127	23,000	48.85%	22,300,000
Nepal	28,595	20,588	64.38%	16,000,000
PNG	3,943	4,700	56.15%	4,077,000
Portugal	19	140	5.50%	5,395,000
Russia	594	90	5.83%	76,530,000
Rwanda	20,466	22,185	62.29%	4,446,000
South Africa	720	900	5.28%	22,190,000
South Korea	2,712	3,200	5.14%	27,750,000
Sri Lanka	202,540	340,230	24.98%	8,528,000
Tanzania	17,674	33,700	65.09%	24,890,000
Thailand	10,827	75,000	31.43%	38,370,000
Turkey	83,611	212,400	18.11%	31,300,000
Uganda	28,332	53,000	72.13%	17,400,000
Vietnam	116,633	214,300	37.22%	54,800,000
Zambia	664	900	49.64%	6,275,000
Zimbabwe	7,572	19,000	66.19%	3,939,000

Yield by dint of substrate or nourishment, is for consistency of plant growth and volume output improvement. A tea leaf has a chemical composition made up of about thousand components, which develops a unique phytochemical structure in a classification of types[48]. Positive variations between tea leaves of the same type result of the conditions of climate or altitude; and oxidation or soil[49]. Tea quality is determined during harvest, by selection of maturity in terms of the polyphenol content, or a secondary metabolite or sub group of the polyphenol called catechin[50].

The basic substrate requirement of a tea leaf is relatively high[51]. Substrate nourishment is obvious in the shoot extension length and regeneration pace[52]. Substrate nourishments add properties to raise yield; and replace biomass or plant foci depletion over sequential harvests[53]. Nutrient depletion in the tea plant is contingent on the intensity and duration of plucking rounds[54]. Consecutive leaf harvest empties the macronutrients and therefore replenishment is crucial[55].

Nitrogen[56], phosphorus[57], and potassium are of first level of importance; which is often supplemented with calcium, magnesium, sulphur and zinc. Low nitrogen content in the substrate, reduces the ability of feeder roots to take up nutrients[58], losing the potential 5800-6400 kg ha, year-on-year stimulated by constant shoots harvest[59]. Additionally, lime solutions improve fertility or oxygen levels, soil quality improved and increased pH level between 5 and 10.33[60]. Potassium deficiency is visible in thin, weak young plant branches affecting leaf fall[61]. Feeder roots are less developed feeder roots, including leaf margins

[48] Chi-Tang Ho, Jen-Kun Lin, Fereidoon Shahidi (2009) Tea and tea products: Chemistry and health-promoting properties. Boca Raton, FL, USA: Taylor & Francis Group.

[49] Alexandr Yashin, Boris Nemzer, Emilie Combet and Yakov Yashin (2015) Determination of the chemical composition of tea by chromatographic methods: a review, Journal of Food Research. vol. 4(3), 56-87

[50] Malcolm Hawkesford, Walter Horst, Thomas Kichey, Hans Lambers, Jan Schjoerring, Inge Skrumsager Møller, Philip White (2012). Functions of macronutrients, In P. Marschner, Marschner's mineral nutrition of higher plants (pp. 135-189). London: Academic Press.

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[52] Selvaraj Venkatesan, Subramanian Murugesan, Muthukumar Ganapathy, Dinesh Verma (2004) Long-term impact of nitrogen and potassium fertilizers on yield, soil nutrients and biochemical parameters of tea. Journal of the Science of Food and Agriculture vol. 84, 1939–1944.

[53] Joyce Kamande. (2021). Best tea fertilizer to increase yields. Nairobi: Safiorganic.

[54] Shahram Sedaghathoor, Ali Mohammadi Torkashv, Davood Hashemabadi and Behzad Kaviani Livani (2009) Yield and quality response of tea plant to fertilizers. African Journal of Agricultural Research 4(6), 568-570.

[55] Isaiah Masinde Tabu, Vivian Moroamoche Kekana and David Murathe Kamau (2015) Effects of varying ratios and rates of enriched cattle manure on leaf nitrogen content, yield and quality of tea (Camellia sinensis). Journal of Agricultural Science, 175-181.

[56] Kibet Sitienei, Patrick Home, David Kamau, John Wanyoko (2012) Nitrogen and potassium dynamics in tea cultivation as influenced by fertilizer type and application rates, Naroibi: Tea Research Foundation of Kenya and University of Agriculture and Technology, Biomechanical and Environmental Engineering Department.

[57] Chi-Feng Chen and Jen-Yang Lin (2016) Estimating the gross budget of applied nitrogen and phosphorus in tea plantations, Science Direct, Sustainable Environment Research Vol 26 (3), 124-130.

[58] Philip Owuor and Daniel Cheruiyot (2010) Effects of nitrogen fertilizers on the aluminium contents of mature tea leaf and extractable aluminium in the soil, Plant and Soil, vol. 119(2), 342–345

[59] Jianyun Ruan, Jóska Gerendás, Rolf Härdtez and Burkhard Sattelmacher (2007) Effect of Nitrogen form and root-zone pH on growth and Nitrogen uptake of tea plants, Annals of Botany, vol 99(2), 301–310.

[60] Tea Research Foundation (1997) Fertilizer use in tea: the case of nitrogen. Nairobi: Food and Agriculture Organization of the United Nations.

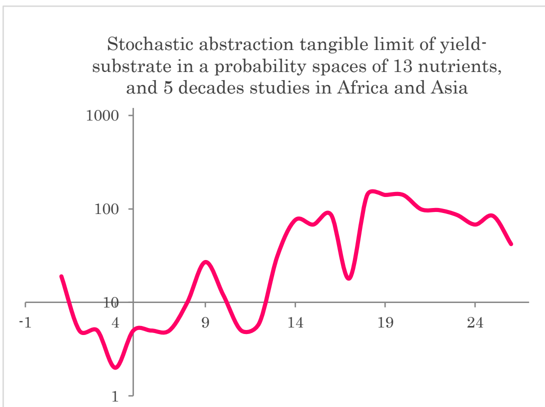
[61] Tea Research Foundation of Kenya (2012) Tea Cultivation Manual for Good Agricultural Practices, Nairobi: Tea Research Foundation of Kenya.

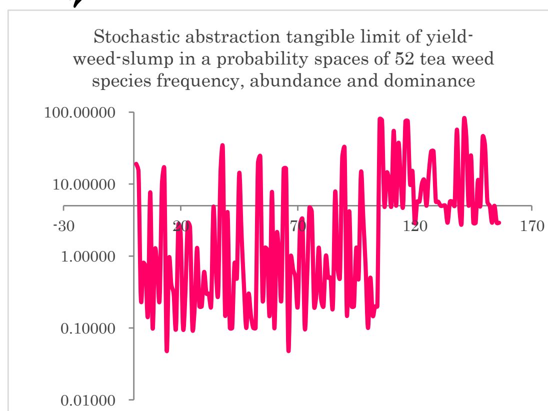
and tips[62]. Phosphorus deficiency is visible in leaves without its natural gloss and formation of new wood and roots in tea[63]. Sulphur deficiency is visible in yellowish leaf veins, before falling off the branches[64]. Nitrogen deficiency display short internodes and faint green colour, stunted development of buds and fewer shoots[65].

Chart 11 is the stochastic abstraction of yield-substrate in a probability space of five decades, and twelve African and Asian countries. The compilation of cross-sectional data-set of substrate nutrients' upper and lower limit for studied in twelve nations for a span of 50 years. Chart 12 is the stochastic abstraction of tangible limit of y_2 yield-weed-slump within the probability space of 52 weed species in terms of abundance, frequency and abundance.

CHART 11/ STOCHASTIC ABSTRACTION y_1 YIELD-SUBSTRATE

CHART 12/ STOCHASTIC ABSTRACTION YIELD-WEED-SLUMP y_2





For an overall 40 varying experiments and 11 different substrates
Mean, $\mu = 98.76923$
Standard deviation, $\sigma = 36.26558$
Upper Limit $\cup = 207.56597$
Lower Limit $\cap = -10.02751$
Stochastic Abstraction yield substrate $y_1 = (+)37\%$

The soil types suitable for teas is characterised as rich in humus, good amount of lime. Light loamy soil with porous subsoil; and acidic soil of pH between 4.5 and 5.0.The substrate quality in Bokod is characterised as Ambassador Silt Soil with pH level between 5.0 and 5.5 in Nawal; Guimbalaoan Annam Complex with pH level between 5.0 and 5.9 in Pito; and undifferentiated Mountain Soil having pH level between 4.6 and 4.9 in Karao. The substrate quality in Kapangan is described to contain soil types of Balakbak with pH between 4.9 and 5.7; Mountain Soil with pH level between 4.4 and 6.6; Puguis Gr L with pH level between 4.9 and 6.2; and Rough Mtn L having pH between 4.4 and 6.4.

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62 Jakia Sultana, Noor-E-Alam Siddiqus, Kamaruzzaman Halim and Abdul Halim (2014), Conventional to ecological: Tea plantation soil management in Panchagarh District of Bangladesh. Journal of Science, Technology and Environment Informatics, vol. (1)3, 27-35.

63 Günter Neumann and Volker Römheld (2012) Rhizosphere chemistry in relation to plant nutrition, In P. Marschner, Marschner's mineral mutrition of higher plants. (pp. 3347-3368), London: Academic Press.

64 Tanmoy Karak and Rajiv Bhagat (2010). Trace elements in tea leaves, made tea and tea infusion: A review. Food Research International, vol 43(9), 2234-2252.

65 Janendra De Costa, Anoma Janaki Mohotti and Madawala Wijeratne (2007) Eco physiology of tea. Brazilian Journal of Plant Physiology 19(4), 299-332.

CHART 13/ CROSS-SECTIONAL DATA SET $\mathcal{Y}_1$ YIELD-SUBSTRATE

Nutrition Impact On Yield	Source of Field Experimentation/Date
Ammonium (NH4) South Africa, Malawi, China & Japan 19-76%	Hilton, Palmer-Jones & Ellis (1973) Li,Wang and Stewart (2005) Okano, Chutani and Matsuo (1997) Sitienei, Home, Kanyiri & Kamau (2013)
Lime (CaO3) Japan, Iran , Bangladesh 5-68%	Ruan, Gerendás, Härdter and Sattelmacher (2007) Zheng, Xu, Li, Hui, Wu & Huang (2013) Zhu, Zhang, Meng, Zhang, Yang, Müller, & Cai (2014)
Magnesium (Mg) Iran, China & Japan 5-86%	Abe, Hashi, Masunaga, Yamamoto, Honna & Wakatsuki (2015) He, Chen, Zhang, Huang, Yin, Weng, Yang, Wu, Zhang and Wu (2023), Saha (2015) Sedaghathoor, Torkashv & Livani (2009)
Monosodium glutamate (MSG) Taiwan 2-18%	Ruan, Gerendás, Härdter & Sattelmacher (2007) Sedaghathoor, Torkashv & Livani (2009)
Nitrogen (N) Tanzania, Kenya, Iran, Vietnam, India, Bangladesh, Pakistan, Japan & Africa 5 -141%	Abe, Hashi, Masunaga, Yamamoto, Honna & Wakatsuki (2015) Dutta (2011), Wen-sheng (2007) He, Chen, Zhang, Huang,Yin, Weng, Yang, Zhang & Wu (2014) Hoang, Thang, Thu, Binh, Toan & Hoang (2021) Jianyun, Yanliang & Xun (2002) Owuor & Cheruiyot (2010) Sedaghathoor, Torkashv & Livani (2009) Tea Research Foundation of Kenya (2012)
Phosphorus (P) India, Tanzania & Vietnam 15-141%	Abe, Hashi, Masunaga, Yamamoto, Honna & Wakatsuki (2015) Liu, Jin & Mao (2021) Zaman, Islam, Hamid, Ahmad & Aslam 2016
Potassium (K) Africa, Iran, Vietnam, India, Japan, Tanzania 5-141%	Abe, Hashi, Masunaga, Yamamoto, Honna & Wakatsuki (2015) Hoang, Thang, Thu, Binh, Toan & Hoang (2021) Mukhopadhyay & Mondal (2017) Sitienei, Home, Kanyiri, & Kamau (2013) Venkatesan, Murugesan, Ganapathy & Verma (2004)
Sulfur (S) Africa, Vietnam, India 10-99	Hoang, Thang, Thu, Binh, Toan & Hoang (2021) Mukhopadhyay & Mondal (2017) Sedaghathoor, Torkashv a& Livani (2009)
Sodium Nitrate (NaNO3) China, Japan, India 27-97%	Abe, Hashi, Masunaga, Yamamoto, Honna & Wakatsuki (2015) Dutta (2011)
Urea (CH4N20) Japan, China, India 12-86%	Mukhopadhyay & Mondal (2017) Nookabkaew, Rangkadilok, Prachoom, Satayavivad (2016) Sitienei, Home, Kanyiri, & Kamau (2013) Zheng, Xu, Li, Hui, Wu & Huang (2013)
Zinc (Zn) Africa, Iran, Japan, China 5-68%	Okano, Chutani and Matsuo (1997) Ruan, Gerendás, Härdter & Sattelmacher (2007) Zheng, Xu, Li, Hui, Wu & Huang (2013) Zhu, Zhang, Meng, Zhang, Yang, Müller, & Cai (2014)
Organic Substances Hong Kong, China, Japan 6-84%	Ming-jua (2013), Mukhopadhyay & Mondal (2017) Sedaghathoor, Torkashv & Livani (2009) Venkatesan, Murugesan, Ganapathy & Verma (2004)
Fish flour , bone meal, oil cake Japan 31-42%	Abe, Hashi, Masunaga, Yamamoto, Honna & Wakatsuki (2015) Ye, Wang, Wang, Hong, Jia, Kang, Lin, Wu & Wang (2022)

Weeds form a critical biological constraint that curbs plant productivity[66]. Due to the increased competition on resources, tea yield can slump to about 31.5 percent; between 22.7 and 36.5 percent, over wet and dry months respectively[67]. Specifically for tea, a rather severe competition for nutrients and water uptake occurs when the young plant is congested with weed. Observations of adverse effects on the young tea growth include few primary branches and smaller sized tea leaves[68]. Tea weeds that have been repeatedly studied include: 240 species of plants as tea weeds from Java, examined by Backer and van Slooten as early as 1924[69]. In 1949 Ano and Nakayama listed 125 species from the temperate tea gardens of Japan; then again by Soedarsan et al in1974 scrutinized weeds found in tea estates at 690 and 1570 meters altitude[70].

Weeds that are aluminium accumulators[71] prove ideal tea locations[72]. Among these aluminium accumulator weeds common to tea gardens, the following are identified to be common to Benguet; serving as indicators of the suitability of tea: Ageratum conyzoides, Bidens pilosa, Crassocephalum crepidioides, Galinsoga parviflora, Paspalum conjugatum and Portulaca oleracea[73]. Chart 13 shows dominance in weeds that would mean the prevalence of the weed specie, frequency for the repeated appearance over a specific period of time; and abundance is the weed specie profusion.

The stochastic abstraction of tangible limits of the cross sectional dataset presented in Chart 13 is illustrated in the earlier Chart 12/ stochastic abstraction yield-weed-slump $\mathcal{Y}_2$ results in 32 percent.

Mean, $\mu = 25.89462$
Standard deviation, $\sigma = 35.44292$
Upper Limit, $\cup = 132.22338$
Lower Limit, $\cap = -80.43415$
Stochastic Abstraction yield-weed-slump $\mathcal{Y}_2 = (-)32\%$

66 Kapila Prematilake, Robert Froud-Williams and Punchi Ekanayake. (2004). Investigating of increasing glyphosate herbicide efficiency with nitrogen in control of tea weeds. Weed Biology and Management, vol. (4)4, 239-248.
67 Jayanta Deka and Iswar Barua (2015). Weed of tea field and their control. National Seminar on plant protection in Tea, Tea research Association (pp. 55-56). Tocklai : Tea Research Institute India.
68 Tigist Bidira, Tamiru Shimales, Melaku Adissu and Tadesse Eshetu (2021). Weed species dominance and abundance in Tea (Camellia sinensis L.) plantation of southwest Ethiopia. American Journal of Plant Biology, (6)4, 89-94.
69 Cornelis Andries Backer and Dirk Fok Van Slooten (1924) Javaansche Theeonkruiden. Bata- via Drukkerijen Ruygrok & Co.
70 Hidehiro Nagaki and Masashi Tsushi (2020) Intraspecific variation in Sonchus Oleraceus, a biennial weed species, inside and outside of tea gardens, Annals of Ecology and Environmental Science, Vol. 4(3), p. 26-30
71 Shigeki Konishi,Sobun Miyamoto and Takayuki Taki . (1985). Stimulatory effects of aluminum on tea plants grown under low and high phosphorus supply. Soil Science and Plant Nutrition Volume 31(3), 361-368.
72 Masahiko Ohsawa. (1998). Weeds of tea plantations. In E. G. Camarasa, Temperate rain forests. Biosphere. Vol 6. Tokyo: Temperate rain forests. Biosphere. Vol 6.
73 Jones Napaldet, Jhunedy Antonio, Margarette Bacate, Jackson Butag, Sheinalene Ladoan and Gina Vicente (2020) Vascular plant diversity in Benguet State University La Trinidad main campus, Philippines: A status report and a database to support the attainment of sustainable development. Journal of Wetlands Biodiversity, vol.10, pp. 21-42

CHART 14/ CROSS-SECTIONAL DATA SET OF TEA WEEDS

Species	Frequency (%)	Abundance	Dominance
Ageratum conyzoides	80	19.1	19.4
Ageratum conyzoides	77.2	14.9	24.2
Amaranthus debius	5	0.3	0.3
Amaranthus dubius	14.3	0.8	1.3
Amaranthus hybrids	11.4	0.7	1.2
Amaranthus hybridus	5	0.2	0.2
Biden spilosa	55	7.7	7.8
Bidens pachyloma	5	0.1	0.1
Bidens pilosa	37.2	1.2	2.0
Bidens polychyma	11.4	0.7	1.1
Caylusiaabyssinica	5	0.3	0.3
Commelina benghalensis	74.3	10.1	16.4
Commelina benghalensis	75	16.2	16.4
Commelina subulata	10	0.1	0.1
Coniza albida	15	0.9	1.0
Convolvulus arvensis	2.9	0.4	0.7
Conyza albida	5.7	0.3	0.5
Corchorus olitorius	5.7	0.1	0.2
Crassocephalum crepidioides	10	2.7	2.7
Cynodon spp	11.4	2.0	3.3
Cynodon spp.	5	0.1	0.1
Cynoglossum lanceolatum	14.3	0.3	0.5
Cyperus cyperoides	28.6	2.9	4.7
Cyperus erectus	28.6	2.5	4.1
Cyperus esculentus	5.7	0.1	0.2
Cyperus rotundus	5.7	0.2	0.3
Cyprus cypriodes	5	1.3	1.3
Cyprus rotundus	5	0.2	0.3
Datura stramonium	5	0.2	0.2
Datura stramonium	2.9	0.6	1.0
Digitaria abyssinica	5.7	0.3	0.5
Echinochloa colona spp	5.7	0.3	0.5
Echinocloa colona	5	0.2	0.2
Galinsoga parviflora	57.2	4.8	7.8
Galinsoga parviflora	5	0.7	0.7
Guizotia abyssinica	2.9	0.3	0.5
Hydrocotyle american	77.2	14.2	23.1
Hydrocotyle Americana	45	31.3	31.7
Hygrophila auriculata	5	0.2	0.2
Kyllinga bulbosa	25	4.1	4.2
Nicandra physalodes	2.9	0.1	0.2
Paspalum conjugatum	2.9	0.1	0.2
Plantago lanceolata	11.4	0.8	1.3
Plantago laneolata	5	0.5	0.5
Polygonum nepalense	45	14.1	14.3
Polygonum spp	34.3	2.0	3.3
Portulaca oleracea	5.7	0.4	0.7
Rumex abyssinicus	5	0.1	0.1
Solanum incanum	2.9	0.3	0.5
Solanum nigrum	5	0.2	0.2
Solanum nigrum	2.9	0.1	0.2
Xanthium strumarium	2.9	0.1	0.2

The weed aluminium accumulators that evidence that suitability of tea in the Cordillera, in the report of Agricultural scientists Dr. Peter Bagawen and Gracelyn Marcos of the Kapangan Municipal Agricultural Office

Ageratum conyzoides

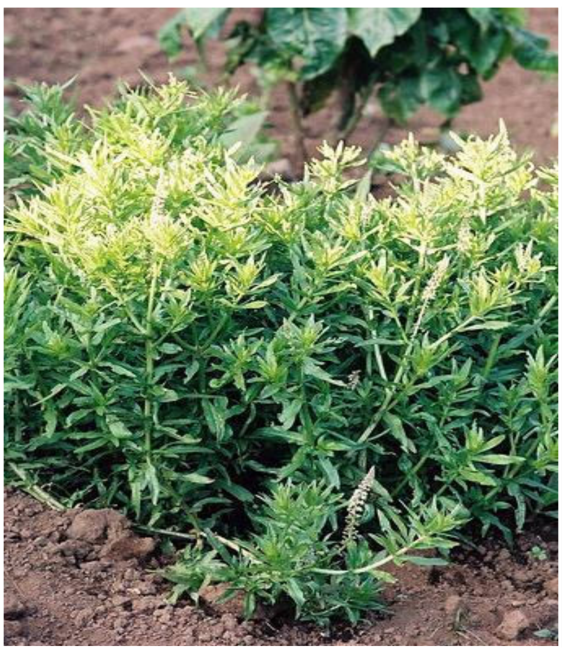
Amaranthus dubius

Biden spilosa

Cyperus erectus

Commelina benghalensis

Hydrocotyle Americana



Caylusia abyssinica

Cynodon spp.

Corchorus olitorius

Amaranthus hybrids

Cyperus cyperoides

Cyperus rotundus

Cynoglossum lanceolatum

Digitaria abyssinica

Cyperus esculentus

Echinocloa colona

Datura stramonium

Crassocephalum crepidioides

Echinochloa colona spp

Coniza albida

Hygrophila auriculata

Kyllinga bulbosa

Paspalum conjugatum

Polygonum nepalense

Polygonum spp

Portulaca oleracea

Solanum incanum

Solanum nigrum

Galinsoga parviflora

Guizotia abyssinica

Tea bush growth is robust in atmospheric conditions between 20°C and 30°C. Temperatures above 35°C and below 10°C are harmful for the bush. Tea yield and quality are excellent under heavy rainfall between 150 cm and 250 cm; and in substrate rich in humus, typically a mixture of lime[74] and iron[75]. Tea is a water-loving plant commonly grown on the windward side of the mountain range, granting cultivation areas are well drained land and without water residue. Tea grown in higher altitude tends to exhibit many desirable traits and often fetch a higher price as compared to teas grown in lower altitudes. Some conditions become too cold to grow tea especially above 2400m elevation[76].

Yield-envelope establishes probable climatic conditions in the localities for the determination of an overall effect on yield, if any. The stochastic abstraction for tangible limit computed across a probability space of 120 months for temperature, relative humidity and rainfall as recorded from the DOST PAG-ASA data for the past ten years, 2010-2020[77].

The atmospheric temperature ideal for tea growth is within 20 and 30 degrees Celsius. No temperatures should go above 35 degree Celsius and below 10 degrees Celsius. For the past 20 years, monthly climatic data provided by DOST PAG-ASA state there has been no incidence of these localities to have temperature outside the ideal ecological envelope.

Altitude or elevation largely affects regional or local climate. Rainfall increases at higher elevations, temperatures generally is variable and humidity becomes less. This can be attributed to a wide range of processes such as orographic lift. At higher altitudes, air pressure is low and air expands as it rises, making it unable to hold all its water vapour resulting to the formation of clouds. This occurrence often effects precipitation in the form of snow or rain, defined as the orographic lift. It explains why the wind facing or windward side of a mountain has high precipitation, and the leeward side tends to be dry[78]. Seasonality of precipitation is another important factor in determining the tea variations, and leaves harvested during different seasons produce a finished product with different characteristics. This clarifies why many regions that are well-known for tea production have strongly seasonal climates[79].

In terms of the ecological apt; barrio Bokod averages humidity between 75 and 81 percent; and in barrio Kapangan humidity averages between 78 and 88 percent. Temperature in Bokod is between 14oC and 25oC; in Kapangan is between 18oC and 25oC. Rainfall in Bokod averages 140 cm, while Kapangan averages 232 cm. These vicinities under study experience the most rainfall in the month of August, with the highest recorded rainfall over the past ten years, in August 2012 for 2021 mm. The compilation of linear data set on DOST weather data from 2012 is located in Chart 15. Strong rains between 1003 mm and 2021 mm extend into the months of September and October; and had recorded to

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start out early in the month of July in years 2019, 2016 and 2013. Rainfall is below the ideal volume for tea cultivations at 150-250 mm of the past ten years, months of October, November and December. Between January and April, rainfall is below 150 mm for the past ten years; averaging for the month of January 19 mms, February 21 mms and March 44 mms. The other months with averages of low rainfall are November 91.5 mm, December 63.1 mms and April 109 mms.

CHART 15/ CROSS-SECTIONAL CLIMATE DATA SET

Rainfall	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
January	0.0	96.0	17.5	11.4	0.0	11.3	5.2	0.0	15.2	3.4	14.4
February	0.0	13.8	80.8	26.8	0.0	7.3	4.2	71.5	1.2	0.0	4.4
March	15.3	93.4	151.9	63.6	5.9	57.1	9.4	4.7	5.8	12.8	20.6
April	148.6	11.9	72.6	70.3	126.3	122.0	62.0	61.3	204.0	97.4	113.0
May	242.6	462.5	187.7	338.7	213.0	245.5	213.3	570.1	283.2	393.5	293.2
June	254.0	529.1	659.0	232.8	401.7	282.5	176.3	208.5	552.6	274.1	336.0
July	543.7	427.5	1,020.0	368.2	444.2	1,493.9	426.8	751.0	1,002.5	437.7	345.6
August	536.6	1,096.3	2,200.7	1,220.4	531.9	1,031.6	955.6	449.6	1,822.6	1,525.2	398.8
September	296.8	619.7	288.3	590.1	985.4	263.6	412.1	206.9	1,219.6	739.9	226.2
October	920.1	332.4	72.4	240.0	107.1	1,212.2	583.2	230.0	268.6	136.6	282.9
November	226.4	81.6	57.8	53.5	39.2	8.0	23.2	120.0	17.8	121.2	166.5
December	47.4	67.4	10.8	23.6	9.5	167.1	82.0	28.4	22.8	16.5	155.6

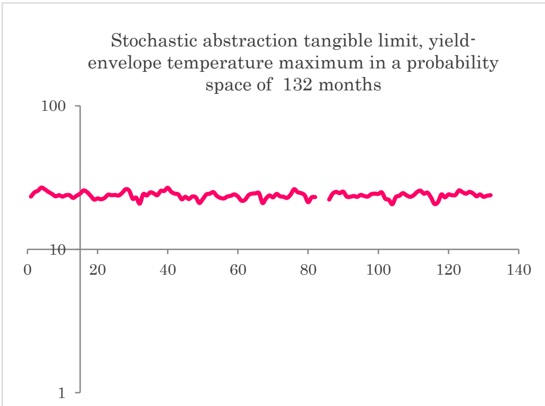
Temp-Max	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
January	23.3	22.8	23.9	23.8	21	21.8	23.2	0	23.3	23.2	23.8
February	24.9	23.6	23.7	25.5	22.4	22.1	22.8	22.2	24.2	23.7	23.9
March	25.6	24.4	24.7	25.5	24.1	23.8	24	24.4	24.4	25	25.7
April	26.9	25.7	26.2	26.8	24.4	24.4	26.2	25.1	24.3	25.6	25
May	26.1	25	25.6	25.1	25	24.5	25	24.6	24.9	24.4	24.4
June	25.1	23.6	22.5	24.4	23.5	24.6	24.6	25.2	22.5	24.8	25.1
July	24.3	22.2	22.9	24.1	22.8	21	23.8	23.3	22.1	23	24.5
August	23.4	22.6	20.8	22.3	22.6	22.6	21.3	23.2	20.6	20.7	23.4
September	23.8	22.3	24.2	23.2	23.3	23.7	23	23.5	23.1	21.3	24.1
October	23.3	22.8	23.7	22.4	23.6	23	23.1	23.2	23.6	24.1	23.2
November	23.8	24	24.9	23.3	24.1	24.3	0	23.9	24.6	23	23.6
December	23.8	23.8	24.5	23	23.3	23.4	23.8	23.5	23.8	24.1	23.8

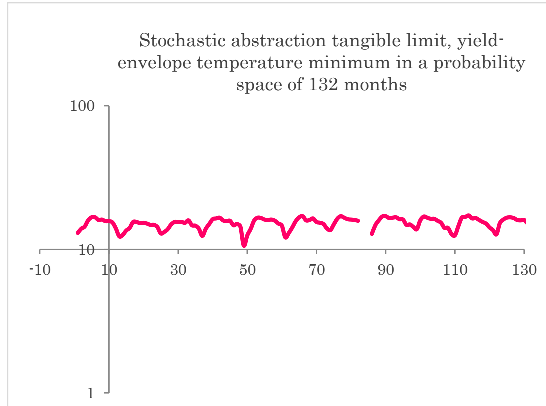
Temp-Min	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
January	13	12.3	12.9	12.4	10.6	12.1	14	-999	14.9	12.8	13.6
February	13.9	12.6	13.2	13.9	12.5	13	13.6	12.8	14.3	12.5	12.7
March	14.4	13.5	13.8	15	13.9	14.2	14.9	14.7	13.8	14.5	15.2
April	15.9	14.1	14.9	16.2	15.9	15.7	16.3	15.9	15.9	16.6	16.1
May	16.7	15.5	15.5	16.4	16.6	16.7	17	16.9	16.9	16.8	16.6
June	16.7	15.5	15.5	16.6	16.5	17	16.6	17	16.6	17.2	16.7
July	16	15.2	15.5	15.9	16.1	15.9	16.2	16.5	16.3	16.4	16.5
August	16.1	15.3	15.3	15.7	16	16	16.1	16.6	16.3	16.5	16
September	15.7	15.1	15.9	15.8	16.1	16.4	16	16.7	15.8	16	15.9
October	15.7	14.8	14.7	14.7	15.8	15.5	15.8	16.2	15.3	15.5	16
November	15.4	14.8	14.6	15	15.1	15.3	0	16.1	14.1	15.1	15.2
December	14	14.3	13.9	14.4	14.6	15	14.8	14.8	14.1	14.2	15.3

Rel. Hum	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
January	85	84	87	87	85	84	82	0	82	84	80
February	83	84	90	83	87	83	83	86	84	82	77
March	81	84	89	86	87	79	84	83	81	81	80
April	80	83	87	84	90	83	82	85	86	86	87
May	85	88	88	89	88	85	87	90	88	89	91
June	89	90	94	92	92	89	88	89	93	90	91
July	90	92	93	92	94	92	90	90	94	93	92
August	91	92	97	93	92	93	95	93	96	96	92
September	89	93	91	92	92	91	91	92	92	95	92
October	90	91	89	91	89	88	89	89	88	86	91
November	88	88	87	86	85	78	0	86	81	87	87
December	86	88	87	88	83	84	84	86	81	83	88

Tangible limit for yield-envelope minimum temperature by stochastic abstraction is stated in Chart 16 and Chart 17 for $_3$ yield-envelope maximum temperature within the probability space of 132 months, obtained from the random between upper and lower limit

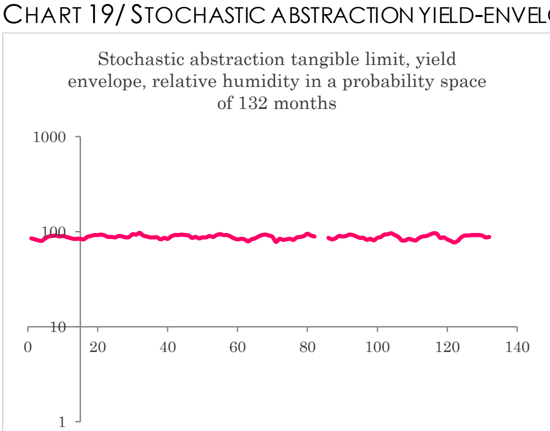
CHART 16/ STOCHASTIC ABSTRACTION YIELD-ENVELOPE $\mathcal{Y}_3$ TEMPERATURE-MAX
CHART 17/ STOCHASTIC ABSTRACTION YIELD-ENVELOPE $\mathcal{Y}_3$ MINIMUM TEMPERATURE

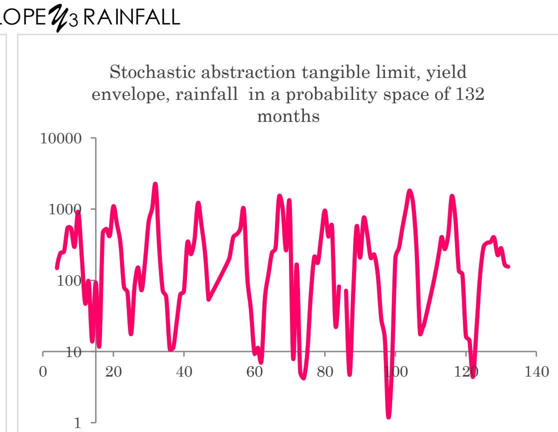




In the context of tea gardens[80], precipitation had been reviewed and the findings published in the Journal of Applied Geography[81]; which concludes the impact of drought on tea gardens is negligible. Chart 18 states the stochastic abstraction for tangible limit for yield-envelope relative humidity and Chart 19 for yield-envelope rainfall within the probability space of 132 months, obtained from the random between upper and lower limit

CHART 18/ STOCHASTIC ABSTRACTION YIELD-ENVELOPE $\mathcal{Y}_3$ RELATIVE HUMIDITY
CHART 19/ STOCHASTIC ABSTRACTION YIELD-ENVELOPE $\mathcal{Y}_3$ RAINFALL





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[81] John Duncan, Sukanya Saikia, Niladri Gupta and Eloise Biggs (2016) Observing climate impacts on tea yield in Assam, India Journal of Applied Geography, vol. (44), 64-71.

Chart 20 summarizes the forecast monthly Mean μ, Standard deviation σ, the Upper Limit ∪, the Lower Limit ∩, and stochastic abstraction of tangible limit for yield-envelope $\mathcal{Y}_3$ on rainfall, relative humidity, minimum and maximum temperature.

CHART 20/ SUMMARY OF FORECAST YIELD-ENVELOPE $\mathcal{Y}_3$ IN MONTHLY BREAKDOWN

Minimum Temperature

	Mean, μ	Standard Deviation, σ	Upper Limit, ∪	Lower Limit, ∩	Stochastic Abstraction Y_3
January	12.9	1.2	16.4	9.4	13.0
February	13.2	0.6	15.1	11.3	13.0
March	14.4	0.6	16.0	12.7	13.0
April	15.8	0.7	17.9	13.7	17.0
May	16.5	1.0	19.7	13.4	18.0
June	16.5	0.6	18.2	14.9	15.0
July	16.0	0.4	17.3	14.8	16.0
August	16.0	0.4	17.3	14.7	15.0
September	15.9	0.4	17.2	14.7	17.0
October	15.5	0.5	17.0	13.9	16.0
November	15.1	0.5	16.6	13.5	15.0
December	14.5	0.4	15.8	13.2	15.0

Maximum Temperature

	Mean, μ	Standard Deviation, σ	Upper Limit, ∪	Lower Limit, ∩	Stochastic Abstraction Y_3
January	23.0	0.9	25.8	20.2	23.0
February	23.5	1.1	26.8	20.3	21.0
March	24.7	0.7	26.7	22.7	25.0
April	25.5	0.9	28.3	22.7	28.0
May	25.0	0.5	26.5	23.4	26.0
June	24.2	1.0	27.2	21.2	23.0
July	23.1	1.1	26.3	19.9	23.0
August	22.1	1.1	25.4	18.9	22.0
September	23.2	0.8	25.7	20.7	25.0
October	23.3	0.5	24.7	21.9	23.0
November	24.0	0.6	25.7	22.2	24.0
December	23.7	0.4	24.9	22.5	24.0

Relative Humidity

	Mean, μ	Standard Deviation, σ	Upper Limit, ∪	Lower Limit, ∩	Stochastic Abstraction Y_3
January	84.0	2.21	90.63	77.37	80
February	83.8	3.25	93.57	74.07	93
March	83.2	3.16	92.65	73.71	85
April	84.8	2.79	93.18	76.46	85
May	88.0	1.84	93.53	82.47	93
June	90.6	1.91	96.37	84.90	92
July	92.0	1.48	96.45	87.55	93
August	93.6	2.29	100.50	86.77	93
September	91.8	1.47	96.23	87.41	88
October	89.2	1.54	93.79	84.57	91
November	85.3	3.27	95.10	75.50	82
December	85.3	2.41	92.51	78.04	92

Rainfall

	Mean, μ	Standard Deviation, σ	Upper Limit, ∪	Lower Limit, ∩	Stochastic Abstraction Y_3
January	19	29	107	(69)	(4)
February	21	30	112	(70)	58
March	40	47	182	(102)	113
April	99	52	255	(56)	211
May	313	119	671	(44)	396
June	355	160	834	(124)	(38)
July	660	368	1763	(443)	(285)
August	1070	592	2845	(705)	630
September	532	337	1541	(478)	(211)
October	399	363	1487	(690)	(586)
November	83	69	289	(123)	(121)
December	57	56	227	(112)	(45)

For verification of the constant ratio $\mathcal{Y}_0$ constant ratio, the conventional analysis of plant growth, by rule of thumb is reviewed against the mathematical construct.

Seed maturation is accomplished in nurseries until cuttings or clones are mature enough to be planted out[82]. A cutting is a section of the tea plant developed enough for transplant when a root system extends to the bottom end of the sleeves and about 14 to 16 healthy mature leaves are showing. The stem at the collar region should be about pencil thick and brown. Soil and water conservation measures must be adopted while new planting is taken up[83].

The spacing between plants is set at 1.5 meters with the distance between rows set at 1 meter. It takes five years for the tea plant to fully develop[84]. One hectare fits 6800 plants for up and down system spacing between plants at 1.2m x 1.2m. One hectare fits 10,800 plants for single hedge system spacing between plants at 1.2m x 0.75m. One hectare fits 13,200 plants for double hedge system spacing between plants at 1.35m x 0.75m x 0.75m[85].

The tea plant height is stunted at one meter and contoured into flat tops of 1x1.5 metres, nominated as the plucking plateau. When auxiliary root sprouts begin to bud, harvesting typically occurs after around 60 to 90 days[86]. Tea plants are plucked at 7-14 day intervals. Taken off the plucking plateau sprigs are just the top two leaves and a bud. The plucking are collected in back baskets of the farmer then brought forward to a collection point for weighing[87]. Lung pruning is the terminology for severe cropping of the bush prior to an initial plucking. Rejuvenation pruning is for chopping the full bush to 30 cm height. Hard pruning is shaping the spread of the bush by pruning the plant to 45 cm from its base. Medium pruning is for new wood growth stimulation by pruning the plant down to a level of 60 cm from its base. Light pruning is pruning the plant to a level of 65 cm from its base. Skiffing is the removal of fresh growth on the tea shrub at about 5 to 8 cm[88].

A tea stem of the Indian variety of tea plant can reach a height between 6 and 18 meters or 20-60 feet and the multistemmed tea bush varieties grown in China can reach a height of 2.75 metres or 9 feet. Tea plant varieties grown in Cambodia that are crossed with other varieties can reach a height of five meters or 16 feet[89].

A single tea bush grown in China is observed to produce 3 ounces of dried tea. A tea bush grown in Japan is observed to produce 2 ounces. A tea bush grown in India is observed to produce 4 ounces of dried tea. A tea bush grown in Sri Lanka is observed to produce 5 ounces of dried tea. A tea bush grown in high ground is observed to produce 4 to 5 ounces

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[82] Milton Yamasaki, Randall Hamasaki, Dwight Sato and Stuart Nakamoto. (2008). In-Ground Procedure for Rooting Tea Cuttings - ctahr. Honolulu: University of Hawaii.

[83] Campbell Ronald Harner (2022) Tea Production. New York: Encyclopaedia Britannica, Inc.

[84] Mis Sule and Sy Siswanto (2019)Feasibility studies of intensively tea plantation on West Java. IOP Conference Series: Earth and Environmental Science. Bristol: Institute of Physics Publishing Limited.

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[89] Campbell Ronald Harner. (2022). Tea Production. New York: Encyclopaedia Britannica, Inc

of dried tea[90]. Following the discussion, with the variety of Japanese bush, yield is between 0.38556 and 0.74845 tonnes per hectares. With the Chinese bush, yield is between 0.57835 and 1.12267 tonnes per hectares. With India bush, yield is between 0.77113 and 1.49690 tonnes. With the Sri Lanka bush, yield is between 0.96391 and 1.87112 tonnes per hectares. On high ground, yield is between 0.77113 and 1.49690 tonnes per hectares.

Chart 21 does not apply Stochastic Abstraction methodology. Chart 24 states by rule of thumb estimation, the methodology Stochastic Abstraction of Tangible Limit of yield $\mathcal{Y}_0$ constant ratio of 1.928412 tonnes in intervals of hectares is slightly more. While the varieties in Japan or China are the lucrative teas, the abstraction is slightly above conventional calculations of the variety in Sri Lanka.

Stochastic abstraction for tangible limit: Where the variable $\mathcal{Y}_0$ yield constant ratio uses the probability space of 15 spacing samples, mean (μ) = $\sum\mathcal{Y}_0$^=Random $\binom{\cup}{\cap}$ limits

Mean, μ = 1.03762
Standard deviation, σ = 0.59162
Upper limit, ∪ = 2.81247
Lower limit, ∩ = (0.73723)
Stochastic Abstraction Tangible Limit of Yield $\mathcal{Y}_0$ = 2 tonnes in

[90] Campbell Ronald Harner (2022) Tea Production, New York: Encyclopaedia Britannica, Inc.

Chapter 5/ element ζ land utilization

ζ is the forecast land utilization that consumes the Geospatial data from the National Mapping and Resource Information Authority /NAMRIA, derived from 2014 World View 2 Acquisition and 2013 Interferometry Synthetic Aperture Radar Digital Terrain Model /InSAR DTM at ten meters interval to capture the elevations within 1000 meters and 2400 meters. Therefore the value of ζ cannot exceed total area in hectares identified as depicted in the orthoimage estimates of the overall land area determined suitable for tea cultivation by DENR-NAMRIA assessment $\zeta =<$ NAMRIA orthoimage estimate.

ζ places a priority level on the 2016 Policy Brief by Congressional Policy and Budget Research Department that estimate the country derivative of idle land at 1.2 percent of all idle land. In other words, the estimated 1.2 percent by Congress situates that for every 83 hectares of good elevation only one hectare is most likely idle land[91].

The overall estimated area of these six localities with elevations ideal to tea cultivation is determined: Gadang 1197.7 hectares, Pongayan 1060.2 hectares, and Sagubo 949.8 hectares; Karao 2628.0 hectares, Nawal 3822.3 hectares and Pito 6,989.9 hectares (NAMRIA 2022). An optimal pilot region for Kapangan is estimated at 3207.7 hectares and Bokod 13440.2 hectares; with ration of 83:1 on idle land. The indicative idle land estimates Gadang 14.372 hectares, Pongayan 12.722 hectares and Sagubo11.398 hectares; Karao 31.536 hectares, Nawal 45.868 hectares and Pito 83.879 hectares. These elevations are shown in Chart 21 up to Chart 26 which are the NAMRIA defined orthoimages. An overall 161.282 hectares covering all six localities are presumed idle land.

ζ is a dependent variable, with special mathematical relevance in the GCC equation for the theoretical construct forecasting tea production for the Cordillera, defined as

$$\zeta = (0.23n)/k$$

Where n is the forecast labour group of population between ages 20 and 59, k is the constant 3 tea farmers per hectares tea cultivation; 23 percent is the recognized labour in agriculture. Land utilization ζ is a dependent variable on labour in agriculture and population growth, therefore the measure of 23 percent can change in the fact of occurring because it is a controllable variable; such as in instances of labour mobility is the temporary direct hires for plucking seasons, and industry shift for worker movement from other sectors. With this constraint, the optimum utilisation of land resource is not achieved.

[91] Congressional Policy and Budget Research Department (2016) Idle land Tax: Implementation issues and challenges. Manila: House of Representatives, CPBRD Policy Brief No. 2016 - 02.

CHART 21 ORTHOIMAGE OF ELEVATION CONTOURS OF BARRIO GADANG, KAPANGAN

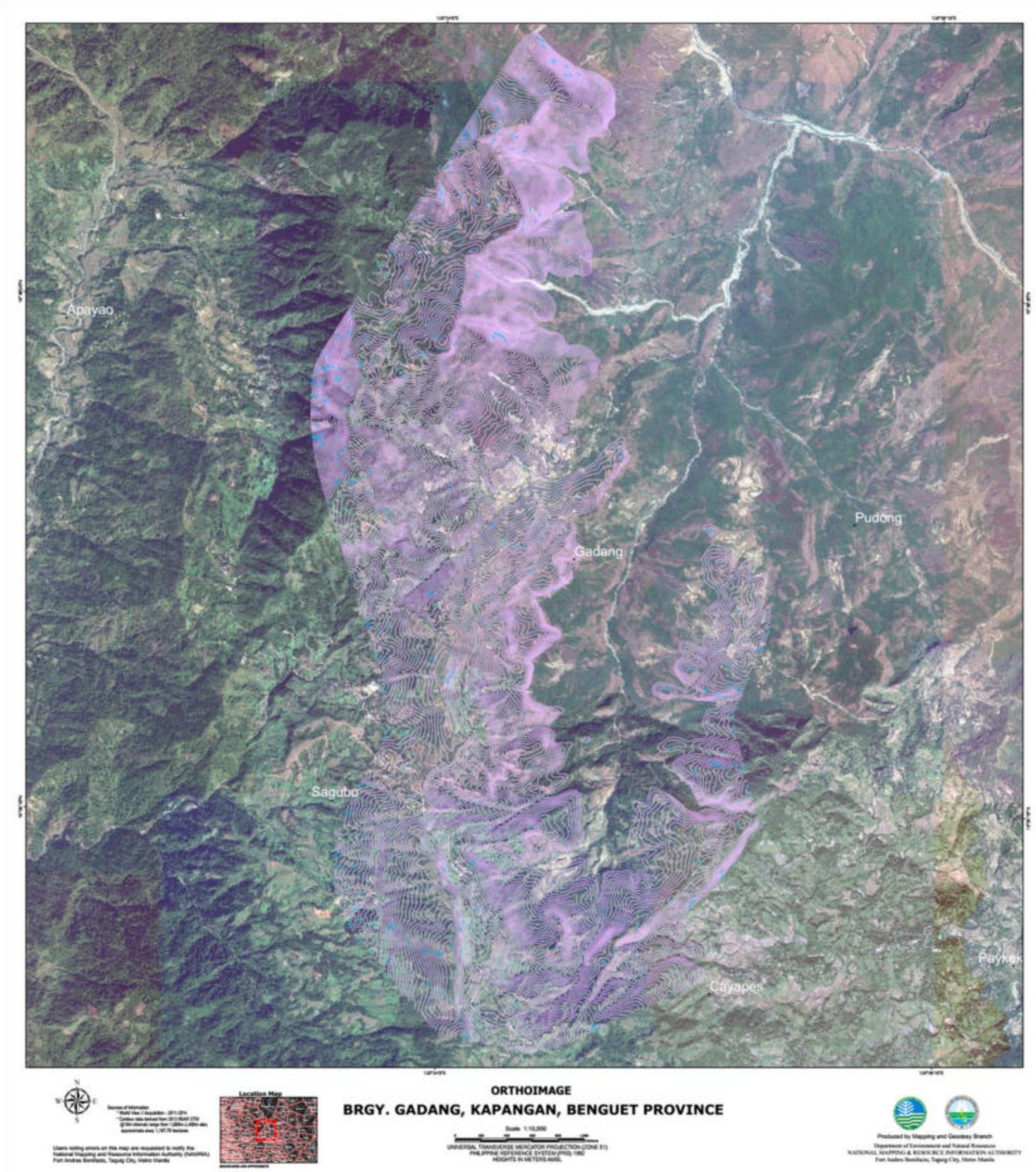


CHART 22/ ORTHOIMAGE OF ELEVATION CONTOURS OF BARRIO PONGAYAN, KAPANGAN

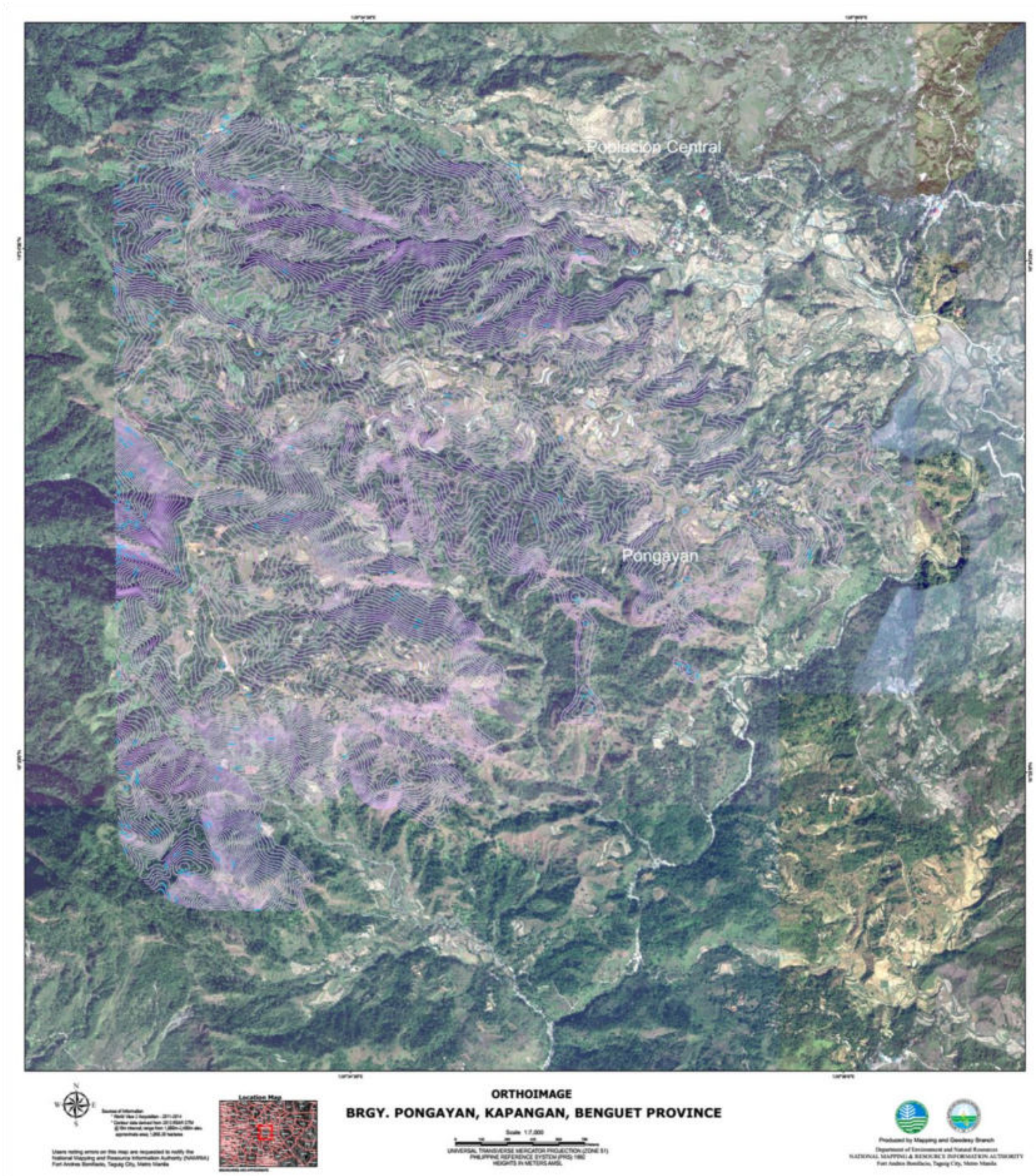


CHART 23/ ORTHOIMAGE OF ELEVATION CONTOURS OF BARRIO SAGUBO, KAPANGAN

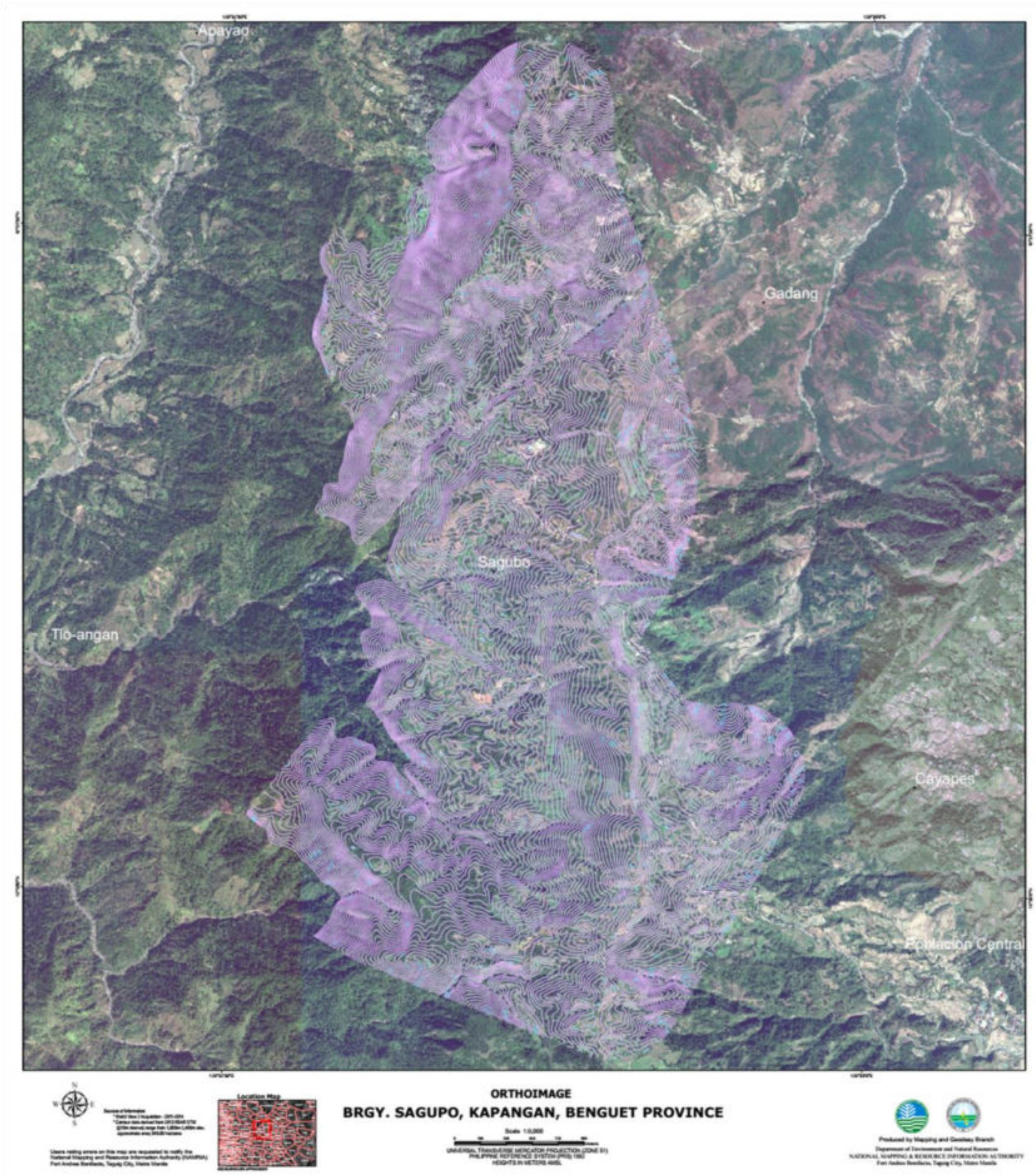


CHART 24/ ORTHOIMAGE OF ELEVATION CONTOURS OF BARRIO KARAO, BOKOD

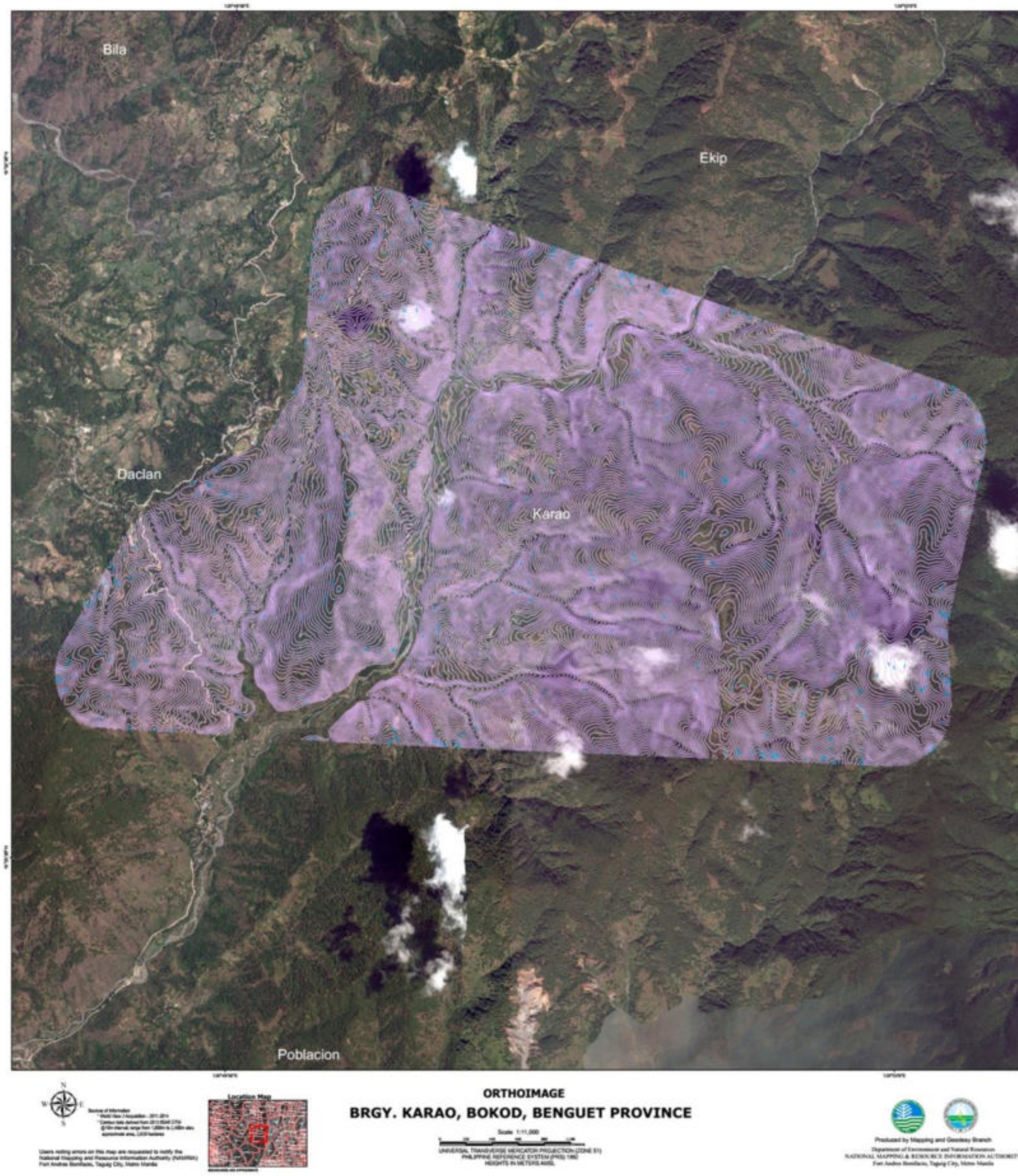
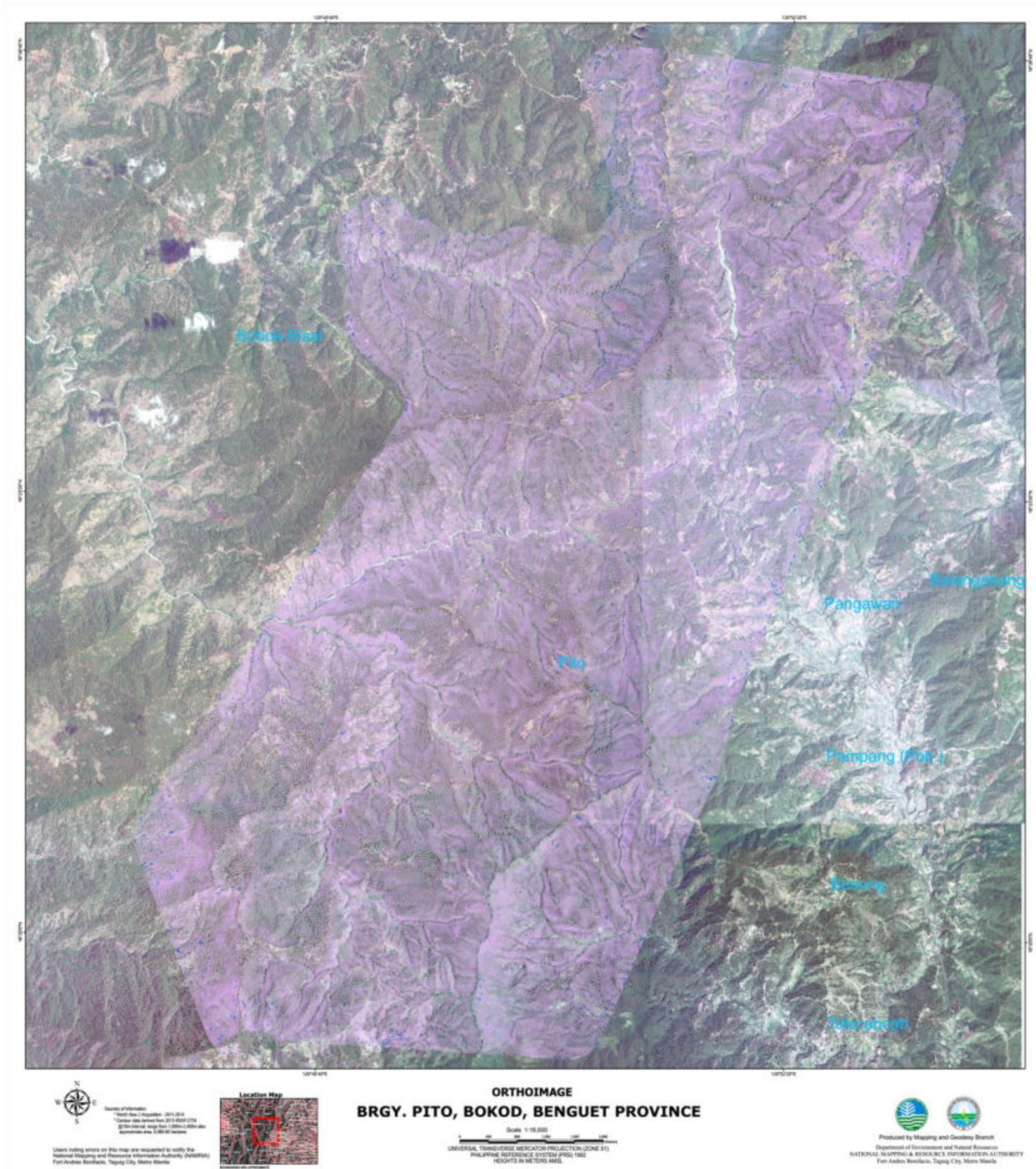


CHART 25/ ORTHOIMAGE OF ELEVATION CONTOURS OF BARRIO NAWAL, BOKOD

CHART 26/ ORTHOIMAGE OF ELEVATION CONTOURS OF BARRIO PITO, BOKOD



EMPLOYMENT IN AGRICULTURE

Tea cultivation is a labour extensive industry, principally for tea plucking. Four among the top ten tea-producing nations have most efficient farmers: Kenya 40.6 kilogram-capita, Japan 38.59 kilogram-capita, Turkey 37.47 kilogram-capita; and the super human tea farmers of Sri Lanka with 159.71 kilogram-capita. Two nations outside the top ten lists with high production per capita are Argentina 64.67 kilogram-capita and Iran 30.20 kilogram-capita. Counties with tea production levels between 11-20 kilograms for every farmer are as follows: Malawi 12.31kilogram-capita; Mauritius 19.52 kilogram-capita and Burundi 11.43 kilogram-capita.

Labour market volatility specific to employment in agriculture is further synthesized in the forecast land utilization. Labour force data is retrieved from CIA World Fact Book[92] and examined by the shares of employment in agriculture for the level of country[93]. Farmers per hectare in Asian nations range between 5.1 and 0.1 depending on terrain and level of industrialization, averaging out at about 1.4; and the Philippines takes up an average of 1.2[94]. Of the top ten tea-producing countries, the number of farmers per hectares range between 3.7 and 0.1: China, India, Kenya, Sri Lanka, Vietnam, Turkey, Indonesia, Japan, Iran and Argentina[95]. Specifically for tea cultivation, the ideal number of farmers per hectares is between 3.7 and 4.5 and particularly for tea gardens between 3.5 and 4.9[96]. Crucially, the percentage of labour in agriculture worldwide is on a downward trend.

For conjectures of land utilisation, the equivalence of ķ or the number of farmers per hectares is determined alongside the mean percentage of the labour force in agriculture by stochastic abstraction. These ratios are critical inputs in the conjectures of land utilisation.

From data retrieved of the CIA World Fact Book, the cross-sectional data-set of the labour percentage in agriculture is shown in Chart 27 and the resulting stochastic abstraction for the value of N is illustrated in Chart 29.

The meta-analysis on the number of farmers per hectares is presented in the cross-sectional data-set in Chart 28, with stochastic abstraction shown in Chart 30[97].

[92] https://www.cia.gov/the-world-factbook/field/labor-force/
[93] Hannah Ritchie. (2022). Employment in agriculture: Data sources and definitions. South Wales: Our World in Data Global Change Data Lab.
[94] Nation Master (2000) Agriculture Workers per hectare: Countries Compared.
[95] Jordan G. Hardin (2017) List of Tea Producing Countries in the World, London: The tea engineer
[96] Campbell Ronald Harner (2022) Tea Production, New York: Encyclopaedia Britannica, Inc.
[97] Nation Master (2000) Agriculture Workers per hectare: Countries Compared.

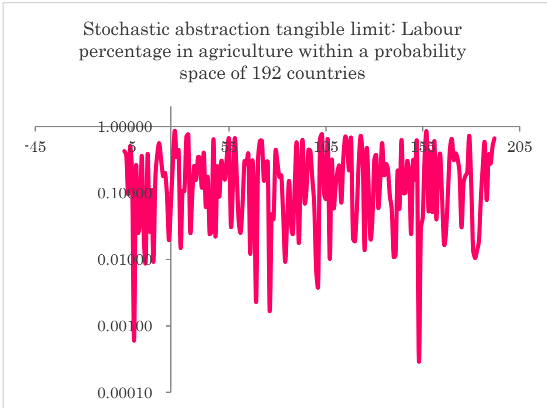
CHART 27/ CROSS-SECTIONAL DATA SET ON LABOUR IN AGRICULTURE

Country	Percent	Country	Percent	Country	Percent
Afghanistan	42.5%	Georgia	38.2%	Oman	4.0%
Albania	36.4%	Germany	1.2%	Pacific island small states	31.3%
Algeria	9.6%	Ghana	29.8%	Pakistan	36.9%
Angola	50.7%	Greece	11.6%	Palestine	6.1%
Arab World	18.7%	Guam	0.2%	Panama	14.4%
Argentina	0.1%	Guatemala	31.3%	Papua New Guinea	56.2%
Armenia	24.1%	Guinea	60.7%	Paraguay	18.7%
Australia	2.6%	Guinea-Bissau	60.5%	Peru	27.4%
Austria	3.7%	Guyana	15.4%	Philippines	22.9%
Azerbaijan	36.0%	Haiti	29.0%	Poland	9.2%
Bahamas	2.2%	Honduras	29.5%	Portugal	5.5%
Bahrain	0.9%	Hong Kong	0.2%	Puerto Rico	1.1%
Bangladesh	38.3%	Hungary	4.7%	Qatar	1.2%
Barbados	2.7%	Iceland	4.0%	Romania	21.2%
Belarus	11.1%	India	42.6%	Russia	5.8%
Belgium	0.9%	Indonesia	28.5%	Rwanda	62.3%
Belize	16.8%	Iran	17.4%	Saint Lucia	10.0%
Benin	38.3%	Iraq	18.3%	Saint Vincent & Grenadines	10.1%
Bhutan	55.8%	Ireland	4.4%	Samoa	30.2%
Bolivia	30.5%	Israel	0.9%	Sao Tome and Principe	19.1%
Bosnia and Herzegovina	18.0%	Italy	3.9%	Saudi Arabia	2.4%
Botswana	19.9%	Jamaica	15.2%	Senegal	30.1%
Brazil	9.1%	Japan	3.4%	Serbia	15.6%
Brunei	2.0%	Jordan	2.5%	Sierra Leone	54.5%
Bulgaria	6.6%	Kazakhstan	14.9%	Singapore	0.0%
Burkina Faso	26.2%	Kenya	54.3%	Slovakia	2.8%
Burundi	86.2%	Kuwait	1.8%	Slovenia	4.3%
Cambodia	34.5%	Kyrgyzstan	19.3%	Solomon Islands	37.3%
Cameroon	43.5%	Laos	61.4%	Somalia	80.3%
Canada	1.5%	Latvia	7.3%	South Africa	5.3%
Cape Verde	10.6%	Lebanon	11.3%	South Asia	41.8%
Caribbean Small States	10.7%	Lesotho	44.3%	South Korea	5.1%
Central African Republic	69.9%	Liberia	42.6%	South Sudan	60.4%
Chad	75.1%	Libya	16.4%	Spain	4.0%
Channel Islands	2.6%	Lithuania	6.4%	Sri Lanka	25.0%
Chile	9.0%	Luxembourg	0.7%	Sudan	38.4%
China	25.3%	Macao	0.4%	Suriname	8.1%
Colombia	15.8%	Madagascar	64.1%	Sweden	1.7%
Comoros	34.4%	Malawi	76.4%	Switzerland	2.6%
Congo	33.5%	Malaysia	10.3%	Syria	10.1%
Costa Rica	12.0%	Maldives	8.3%	Tajikistan	44.7%
Cote d'Ivoire	40.2%	Mali	62.4%	Tanzania	65.1%
Croatia	6.2%	Malta	1.0%	Thailand	31.4%
Cuba	17.4%	Mauritania	30.8%	Timor	39.3%
Cyprus	2.4%	Mauritius	6.0%	Togo	32.4%
Czech	2.7%	Mexico	12.5%	Tonga	19.4%
DR Congo	64.3%	Moldova	21.0%	Trinidad and Tobago	3.0%
Denmark	2.2%	Mongolia	25.3%	Tunisia	13.8%
Djibouti	24.6%	Montenegro	7.2%	Turkey	18.1%
Dominican Republic	8.8%	Morocco	33.3%	Turkmenistan	20.7%
Ecuador	29.7%	Mozambique	70.2%	Uganda	72.1%
Egypt	20.6%	Myanmar	48.9%	Ukraine	13.8%
El Salvador	16.3%	Namibia	21.9%	United Arab Emirates	1.4%
Equatorial Guinea	39.5%	Nepal	64.4%	United Kingdom	1.1%
Eritrea	63.1%	Netherlands	2.1%	United States	1.4%
Estonia	3.2%	New Caledonia	1.9%	United States Virgin Islands	1.9%
Eswatini	12.2%	New Zealand	5.8%	Uruguay	8.4%
Ethiopia	66.6%	Nicaragua	30.6%	Uzbekistan	25.7%
Fiji	17.6%	Niger	72.5%	Vanuatu	56.8%
Finland	3.8%	Nigeria	35.0%	Venezuela	7.9%
France	2.5%	North America	1.4%	Vietnam	37.2%
French Polynesia	6.8%	North Korea	43.8%	Yemen	27.6%
Gabon	30.0%	North Macedonia	13.9%	Zambia	49.6%
Gambia	27.0%	Norway	2.0%	Zimbabwe	66.2%

CHART 28/ CROSS-SECTIONAL DATA SET ON WORKER PER HECTARES

Country	Person/Hectare	Country	Person/Hectare
Afghanistan	0.70	Latvia	0.10
Albania	1.10	Lebanon	0.10
Algeria	0.30	Lesotho	1.00
Angola	1.30	Liberia	1.30
Argentina	0.10	Libya	0.00
Armenia	0.40	Lithuania	0.10
Australia	0.05	Madagascar	1.60
Austria	0.10	Malawi	2.00
Azerbaijan	0.50	Malaysia	0.20
Bangladesh	4.60	Mali	1.00
Belarus	0.10	Mauritania	1.20
Belize	0.30	Mexico	0.30
Benin	0.70	Mongolia	0.30
Bhutan	5.90	Morocco	0.40
Bolivia	0.70	Mozambique	1.90
Bosnia and Herzegovina	0.10	Myanmar	1.70
Botswana	0.80	Namibia	0.40
Brazil	0.20	Nepal	3.40
Bulgaria	0.10	Netherlands	0.30
Burkina Faso	1.30	New Zealand	0.10
Burundi	2.40	Nicaragua	0.10
Cambodia	1.20	Niger	1.00
Cameroon	0.50	Nigeria	0.50
Canada	0.05	North Korea	1.70
Central African Republic	0.60	Norway	0.10
Chad	0.80	Oman	3.20
Chile	0.40	Pakistan	1.10
China	3.80	Panama	0.40
Colombia	0.80	Papua New Guinea	2.00
Costa Rica	0.60	Paraguay	0.30
Cote d'Ivoire	0.40	Peru	0.70
Croatia	0.10	Philippines	1.20
Cuba	0.20	Poland	0.30
Czech Republic	0.10	Portugal	0.20
Democratic Republic of the Congo	2.30	Republic of Macedonia	0.20
Denmark	0.00	Romania	0.20
Dominican Republic	0.40	Russia	0.10
Ecuador	0.40	Rwanda	3.20
Egypt	2.60	Saudi Arabia	0.20
El Salvador	1.00	Senegal	1.30
Equatorial Guinea	0.60	Serbia and Montenegro	0.30
Eritrea	2.80	Sierra Leone	1.80
Estonia	0.10	Singapore	3.00
Ethiopia	2.10	Slovakia	0.20
Fiji	0.50	Slovenia	0.10
Finland	0.10	Solomon Islands	2.70
France	0.00	Somalia	2.50
Gabon	0.40	South Africa	0.10
Georgia	0.50	Spain	0.10
Germany	0.10	Sri Lanka	2.00
Ghana	0.90	Sudan	0.50
Greece	0.20	Suriname	0.40
Guatemala	1.00	Sweden	0.10
Guinea	2.30	Switzerland	0.40
Guinea-Bissau	1.30	Tajikistan	0.90
Guyana	0.10	Thailand	1.20
Haiti	2.40	The Gambia	2.20
Honduras	0.50	Togo	0.40
Hungary	0.10	Trinidad and Tobago	0.40
Iceland	1.90	Tunisia	0.20
India	1.60	Turkey	0.50
Indonesia	1.50	Turkmenistan	0.40
Iraq	0.10	Uganda	1.30
Ireland	0.20	Ukraine	0.10
Israel	0.20	United Arab Emirates	0.30
Italy	0.10	United Kingdom	0.10
Jamaica	1.00	United States	0.05
Japan	0.60	Uruguay	0.10
Jordan	0.40	Uzbekistan	0.60
Kazakhstan	0.10	Venezuela	0.20
Kenya	2.60	Vietnam	3.70
Kuwait	0.90	Yemen	1.70
Kyrgyzstan	0.40	Zambia	0.60
Laos	2.10	Zimbabwe	1.10

CHART 29/ STOCHASTIC ABSTRACTION, PERCENTAGE OF LABOUR IN AGRICULTURE
CHART 30/ STOCHASTIC ABSTRACTION, NUMBER OF FARMER PER HECTARES



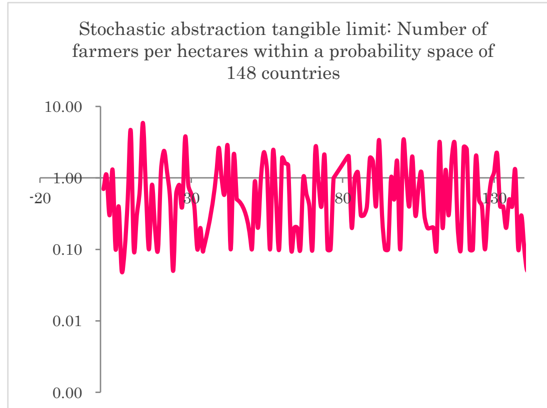


Chart 29 states the stochastic abstraction of tangible limit using a probability space of 192 countries, the mean (μ) = labour percentage of the total work force in Agriculture =Random $\binom{\cup}{\cap}$ limit

Mean, μ = 0.23256
Standard deviation, σ = 0.87573
Upper Limit, ∪ = 30.21439
Lower Limit ∩ = (0.41061)
Stochastic abstraction tangible limit labour percentage in agriculture = 29

Chart 30 states the stochastic abstraction of tangible limit using the probability space of 148 countries, the mean (μ) = labour per hectares =Random $\binom{\cup}{\cap}$ limit

Mean, μ = 0.90101
Standard deviation, σ = 1.02465
Upper Limit, ∪ = 3.97497
Lower Limit ∩ = (2.17295)
Stochastic abstraction tangible limit labour per hectares = 2.0

Using PSA (2015) Report Number 3, the age group breakdown of these localities recognised as the labour group of ages 20-59, and the change in the 2022 PSA Standard Geographic Code; farmers per locality are forecast[98] and presented in Chart 31. These demographics are crucial in the forecast of the labour-intensive tea industry. In fact, it is sufficient to state that the population size of these localities can curtail the actual farmer uptake and land utilisation; without labour shifts of livelihood and actual labour mobility over the long run. As an example, Gadang has about 200 persons in farm work and the initial idle land of 14.372 hectares would mean, with the entire working age group of Gadang focused on tea cultivation, the land utilisation uptake would amount to 571 hectares, or just 47 percent of the total area ideal for tea cultivation. Pongayan has the smallest population and roughly about 45 hectares can be properly maintained; and Pito had the largest swathe with elevations ideal for tea growth, yet roughly seven percent can be utilized considering the demographics of the locality and lack of technology in a harsh terrain.

CHART 31/ FORECAST LABOUR GROUP BY BARRIO

[98] Philippine Statistics Authority (2015). Report No 3, 2015 Population, land area and population density. Manila: Republic of the Philippines.

	Gadang	Pongayan	Sagubo	Karao	Nawal	Pito
Population (2022)	1378	869	1982	1111	605	1065
Population (2015)	1513	786	1923	989	581	1092
Change	-8.92%	10.56%	3.07%	12.34%	4.13%	-2.47%
Age group 20-59	63.12%	57.52%	60.37%	66.33%	67.12%	61.08%
Labour in agri 23%	200	115	275	169	93	150

$Pn = Po + n\bar{x}$,
where
Pn - population (predicted) after 'n' number of decades,
Po - last known population
n - number of decades between Po and Pn
$\bar{x}$ - the rate of population growth

Forecast Labour Group	Gadang	Pongayan	Sagubo	Karao	Nawal	Pito
2030	216	131	291	185	109	165
2035	231	146	306	201	125	181
2040	247	162	322	216	140	196
2045	262	177	338	232	156	212
2050	278	193	353	247	171	228
2055	294	209	369	263	187	243
2060	309	224	384	279	203	259
2065	325	240	400	294	218	274
2070	340	255	416	310	234	290
2075	356	271	431	325	249	306

The succeeding section presents a synthesis of the land utilisation by restraint of the prevailing demographics. It can be said that this is a marginal approach, rather conservative forecasting.

The slow uptake using actual growth patterns states that land utilisation is not at optimal. Notwithstanding, labour mobility is attainable whereby suggested, either from nearby barangays or regional pooling for plucking routines up to an intensity of 18 day intervals after growth of 5 years.

A rule of thumb is land resource utilisation that is poorly, loses an equivalent nine percent of respective GDP. Present day Asia critically absorbed the cost of idle land at about 4.6998 trillion pesos.

$$\zeta = (0.23n)/k$$

By definition of the value ζ the barrio forecast of utilisation is detailed below

Land area ideal for tea cultivation	Gadang 1197.700	Pongayan 1060.200	Sagubo 949.800	Karao 2628.000	Nawal 3822.300	Pito 6989.900
2030 ζ =	*hectares* 72 6.00%	*hectares* 44 2.46%	*hectares* 97 6.12%	*hectares* 62 1.41%	*hectares* 36 0.57%	*hectares* 55 0.47%
2035 ζ =	*hectares* 148.97 12.44%	*hectares* 92.24 8.70%	*hectares* 199.07 20.96%	*hectares* 128.60 4.89%	*hectares* 77.86 2.04%	*hectares* 115.34 1.65%
2040 ζ =	*hectares* 231.25 19.31%	*hectares* 146.17 13.79%	*hectares* 306.40 32.26%	*hectares* 200.69 7.63%	*hectares* 124.60 3.26%	*hectares* 180.82 2.59%
2045 ζ =	*hectares* 318.74 26.61%	*hectares* 205.29 19.36%	*hectares* 418.94 44.11%	*hectares* 277.99 10.57%	*hectares* 176.53 4.62%	*hectares* 251.49 3.60%
2050 ζ =	*hectares* 411.42 34.35%	*hectares* 269.61 25.43%	*hectares* 536.67 56.50%	*hectares* 360.49 13.71%	*hectares* 233.66 6.11%	*hectares* 327.36 4.68%
2055 ζ =	*hectares* 509.31 42.52%	*hectares* 339.13 31.99%	*hectares* 659.61 69.45%	*hectares* 448.19 17.05%	*hectares* 295.99 7.74%	*hectares* 408.43 5.84%
2060 ζ =	*hectares* 612.39 51.13%	*hectares* 413.85 39.04%	*hectares* 787.74 82.94%	*hectares* 541.08 20.58%	*hectares* 363.53 9.51%	*hectares* 494.70 7.08%
2065 ζ =	*hectares* 677.36 56.56%	*hectares* 461.81 43.56%	*hectares* 867.74 91.36%	*hectares* 599.94 22.82%	*hectares* 407.17 10.65%	*hectares* 549.59 7.86%
2070 ζ =	*hectares* 790.84 66.03%	*hectares* 546.93 51.59%	*hectares* 949.80 100.00%	*hectares* 703.24 26.75%	*hectares* 485.10 12.69%	*hectares* 646.26 9.25%
2075 ζ =	*hectares* 909.53 75.94%	*hectares* 637.25 60.11%	*hectares* 949.80 100.00%	*hectares* 811.74 30.88%	*hectares* 568.23 14.87%	*hectares* 748.13 10.70%

Chapter 6/ element χ cost of farm produce

The cost of farm produce χ is a straightforward stochastic abstraction for a constant ratio set at the significance of 163,680 pesos with intervals in terms of tonne. The value is derived by stochastic abstraction of tangible limits of the auction prices through 25 years, 1998 up to 2022 from the British auctions for Mombasa and Nairobi[99] as written in Chart 32. The cost of farm produce χ is rudimentary in qualifying the hurdle rate of farm support infrastructure and the smallholder farmer equity.

CHART 32/ CROSS-SECTIONAL DATA SET 25 YEARS AUCTION PRICE

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	2.55	2.81	2.29	1.95	1.56	1.56	1.68	1.70	1.75	1.74	1.59	1.61
1999	1.75	3.06	1.890	1.87	1.71	1.68	1.67	1.66	1.98	2.00	1.81	1.83
2000	1.88	2.11	2.06	2.03	2.01	2.05	2.11	2.10	2.11	1.97	2.01	1.92
2001	1.87	1.72	1.67	1.44	1.46	1.43	1.54	1.48	1.39	1.38	1.40	1.43
2002	1.46	1.51	1.54	1.49	1.39	1.45	1.48	1.50	1.56	1.55	1.52	1.47
2003	1.51	1.43	1.51	1.50	1.52	1.50	1.55	1.55	1.58	1.67	1.62	1.59
2004	1.63	1.65	1.59	1.54	1.52	1.51	1.53	1.57	1.64	1.51	1.45	1.51
2005	1.51	1.48	1.49	1.47	1.41	1.39	1.45	1.50	1.52	1.54	1.47	1.51
2006	1.68	2.35	1.96	1.96	2.07	2.13	2.15	2.09	1.87	1.74	1.72	1.71
2007	1.70	1.65	1.63	1.59	1.55	1.66	1.64	1.61	1.77	1.75	1.71	1.73
2008	2.14	2.42	2.10	2.20	2.14	2.31	2.41	2.60	2.57	2.23	1.73	1.77
2009	2.19	2.12	2.14	2.21	2.22	2.41	2.67	2.81	2.97	2.61	2.91	2.98
2010	2.85	2.94	2.80	2.60	2.33	2.24	2.32	2.51	2.46	2.49	2.52	2.69
2011	2.89	2.79	2.74	2.67	2.62	2.71	2.80	2.80	2.67	2.69	2.66	2.61
2012	2.63	2.64	2.73	2.78	2.80	2.88	2.99	3.08	3.04	2.88	3.04	3.08
2013	3.05	2.91	2.66	2.37	2.39	2.31	2.28	2.28	2.12	2.00	2.09	2.33
2014	2.56	2.22	2.09	2.09	1.96	1.91	2.10	2.03	1.89	1.91	1.90	1.88
2015	2.32	2.42	2.72	2.77	3.09	3.27	3.39	3.17	3.10	3.24	3.06	3.03
2016	2.72	2.48	2.30	2.11	2.21	2.41	2.43	2.31	2.33	2.39	2.68	2.67
2017	3.05	3.06	2.92	2.87	2.94	3.14	2.99	2.90	2.96	3.06	2.98	2.79
2018	2.96	2.99	2.81	2.69	2.62	2.52	2.49	2.40	2.41	2.42	2.36	2.30
2019	2.29	2.16	2.13	2.26	2.39	2.19	2.17	2.13	2.21	2.34	2.26	2.21
2020	2.29	2.11	1.99	2.10	1.97	1.86	1.78	2.00	2.03	1.98	1.99	1.94
2021	2.03	2.02	2.00	1.92	1.92	1.82	1.76	2.16	2.22	2.42	2.48	2.62
2022	2.68	2.73	2.54	2.53	2.38	2.11	2.37	2.36	2.36	2.46	2.49	2.39

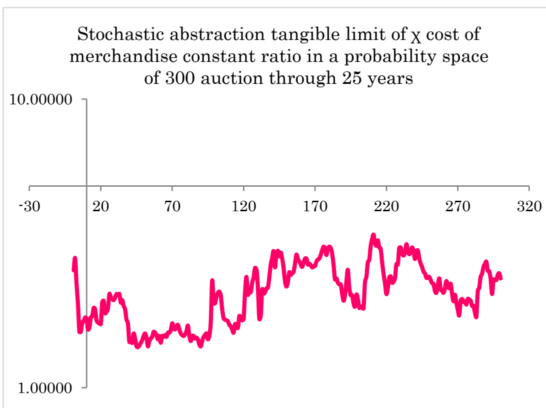
[99] *Tea Broker's Association of London; International Tea Committee; African Tea Brokers Ltd. (2022). Tea (Mombasa/Nairobi auctions), African origin, all tea, arithmetic average of weekly quotes// Unit: US Dollars per Kilogram//. New York: The World Bank*

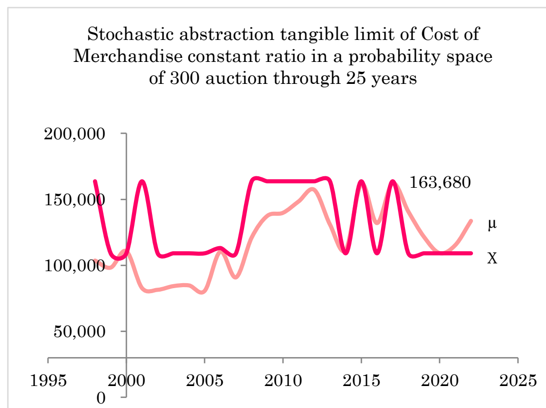
Chart 33 states the stochastic abstraction for tangible limit, where the variable χ constant ratio uses the probability space of 300 auction set prices over 25 years.

Mean, μ = 103,618
Standard deviation, σ = 22,990
Upper Limit, ∪ = 172,588
Lower Limit ∩ = 34,648
Stochastic Abstraction Tangible Limit of χ = 163,680

Chart 34 validates the constant ratio χ is set value of 163,680 pesos at intervals of one tonne, and is the buying price determined based on the available data through point of intersection of the mean cost of farm produce χ and the random between upper and lower limit χ.

CHART 33/ STOCHASTIC ABSTRACTION OF COST OF FARM PRODUCE X
CHART 34/ INTERSECTION WITH MEAN COST OF FARM PRODUCE X



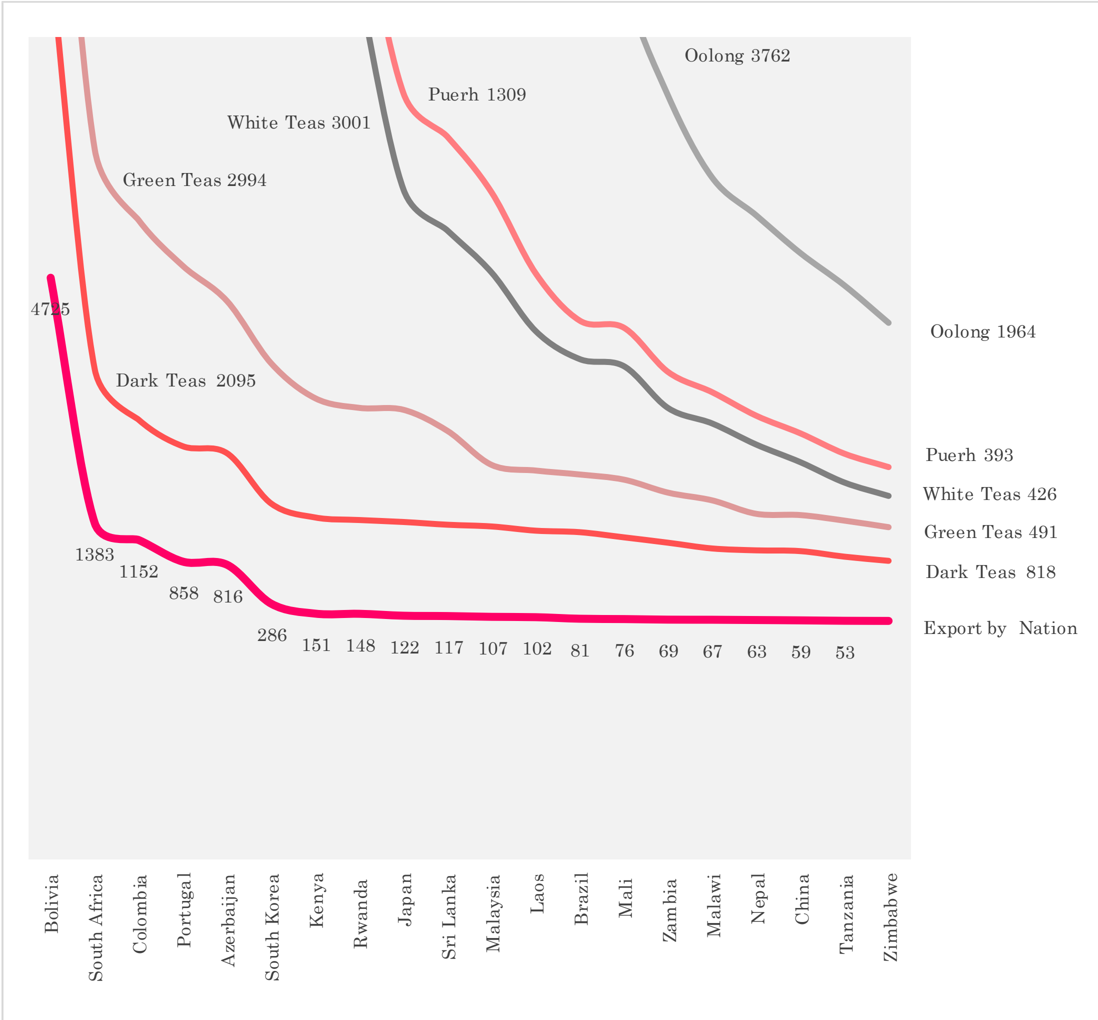


The value of the cost of farm produce χ is a constant ratio in the GCC equation for determining the plausibility of the Tea Trade Corridor.

For appreciation of the tea industry to include the retail and manufacturing components; there are about 295 brands and exotic tea. Dark tea or commonly called black has an average retail price at 802 pesos a kilo and about 104 brands. Green tea has 43 brands identified with an average retail of 922 pesos a kilo. Herbal tea has 21 brands with an average retail of 1113 pesos a kilo; and white tea with another 22 brands with an average retail of 5182 pesos a kilo. Matcha tea with about 24 brands has an average retail of 8905pesos a kilo. Puerh tea with 24 brands has an average retail of 1902 pesos a kilo. 41 Oolong teas with an average retail of 5033 pesos a kilo. Just four tea cakes with an average retail of 2824 peso-kilo worth. Exotic teas are obscenely priced and have higher historical and cultural functions.

Chart 35 is an illustration of the dataset compilation of retail prices of various tea brands originates from Misty Mountain Tea Shop, Tea Vivre by Chris Yang of China and Encore Teas LLC in Washington USA, The Harbor Tea in Boston and Coffee Shop in Hawaii. The conversion to peso from USD 1:54.56, from British pounds to peso 1:66.53 and Euro to Peso 1:58.186. Weights conversion from ounces to kilogram as needed.

CHART 35/ TRENDING WORLD TEA RETAIL PRICES PER KILOGRAM USD



Chapter 7/ Anticipated World Accession

Accession is the manifestation that a nation is accepted as integral to a treaty of another country[100]—that had been formerly signed and in force by a group of countries. The legal effect of Accession is equal to ratification. Accession can mean adherence or adhesion in reference with a treaty; wherein a nation does not necessarily sign into the treaty but becomes party to it and expressed free will and consent to be bound by the rules of that treaty[101]. Accession is the rationalisation of barriers to international trade that arises from tariffs or the formation of trade blocks. Accession is with reference to a specific trade block and the impact of getting past that barrier[102].

As an example, the PRC Belt and Road Initiative is a trade corridor, initially launched in contradiction of two Trade Blocks with the United States as centerstage: the Trans-Pacific Partnership and the Transatlantic Trade and Investment Partnership[103]. The Trans-Pacific Partnership/ TPP, or Trans-Pacific Partnership Agreement, was the biggest trade deal of Head of State Obama which was opposed down right by both political parties[104]. TTP included the economies of Singapore, Vietnam, Australia, Brunei, New Zealand, Peru, Canada, Malaysia, Mexico, Chile, Japan and the United States. TTP had been signed on February 2016 but had not been ratified; thus never came into force[105].The Transatlantic Trade and Investment Partnership /TTIP is an on-going negotiation for the assertion of a high-standard trade and investment treaty between the European Union /EU and the United States; for the accession of American product to European markets through increased access[106].

The Belt and Road Initiative, BRI, or common within China as the OBOR: "One Belt One Road" is the Silk Road economic strategy that utilizes physical infrastructure on land corridors. BRI is considered as linchpin of the Chinese leader Xi Jinping's foreign policy. The BRI deploys an infrastructure development strategy in 150 countries and international organizations, mostly in Asia and Europe, continuing since 2013.

Belt and Road Initiative, Philippines Chairperson George Chua Cham initiated action for a Tea Trade Corridor for the Cordillera smallholder farmers. FFCCCII\ Federation of Filipino-Chinese Chambers of Commerce & Industry Incorporated is country host for PRC–BRI. The FFCCCI[107] is the umbrella organisation of Chinese businesses in the Philippines; representing to the China Council for the Promotion of International Trade,

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[100] Merriam-Webster American Dictionary Publisher (2023) New York

[101] Henry Ballantines (2015) Accession, International Legal Research, Washington.

[102] British Broadcasting Corporation (2023) Barriers to international trade – tariffs and trading blocs, Business and Globalization.

[103] The Economist (2016); Our bulldozers, our rules. Way back Machine.

[104] Zachary Carter (2017). Trump, Democrats and the left killed Obama's biggest trade deal. Here's how it happened. The Huffington Post. New York

[105] Rebecca Howard (2016). Trans-Pacific Partnership trade deal signed, but years of negotiations still to come. Thomson Reuters.

[106] Office of the United States Trade Representative (2023). Transatlantic Trade and Investment Partnership (T-TIP). The White House, Washington.

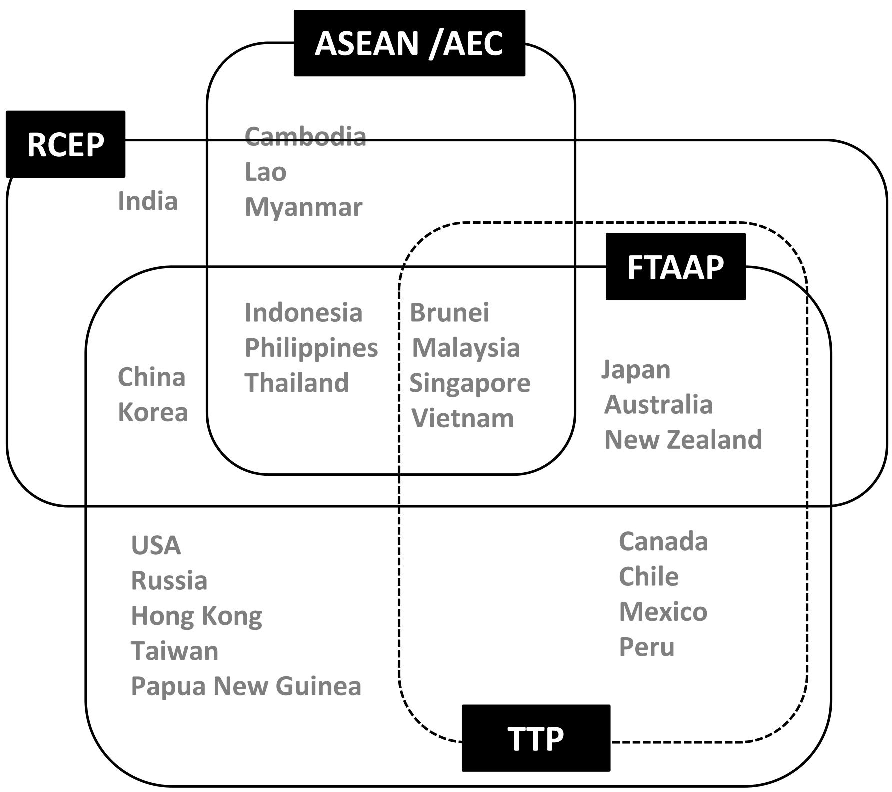
[107] Ramon Pacheco Pardo (2019) Europe's financial security and Chinese economic statecraft: The case of the Belt and Road Initiative. Asia-Europe Journal, 237–250.

known as the CCPIT[108]. FFCCCII is the forerunner of trade or innovation initiatives; apart from humanitarian and cultural efforts[109].

The Treaty considers a fifty-year partnership between the People's Republic of China, Belt and Road Initiative/ PRC-BRI[110] and the towns of Kapangan and Bokod, for the cultivation and export of tea. The international organisation is responsible for the initial seed provision and farm support infrastructure investment for water holdings and bridgeway. In return, the international organization is the exclusive trader of the produce of these tea gardens, bought at a set industry price[111]. By so, the anticipated accession of the towns of Benguet is delimited to production volumes and quality assurance. For purpose of this study, the anticipated accession of the Tea Corridor forms a synopsis of the arguments stated on the previous pages. Land utilisation ζ is a dependent variable quantifying land utilization by restraint of the prevailing demographics.

Chart 36 outlines various trade blocks and how these overlap the other.

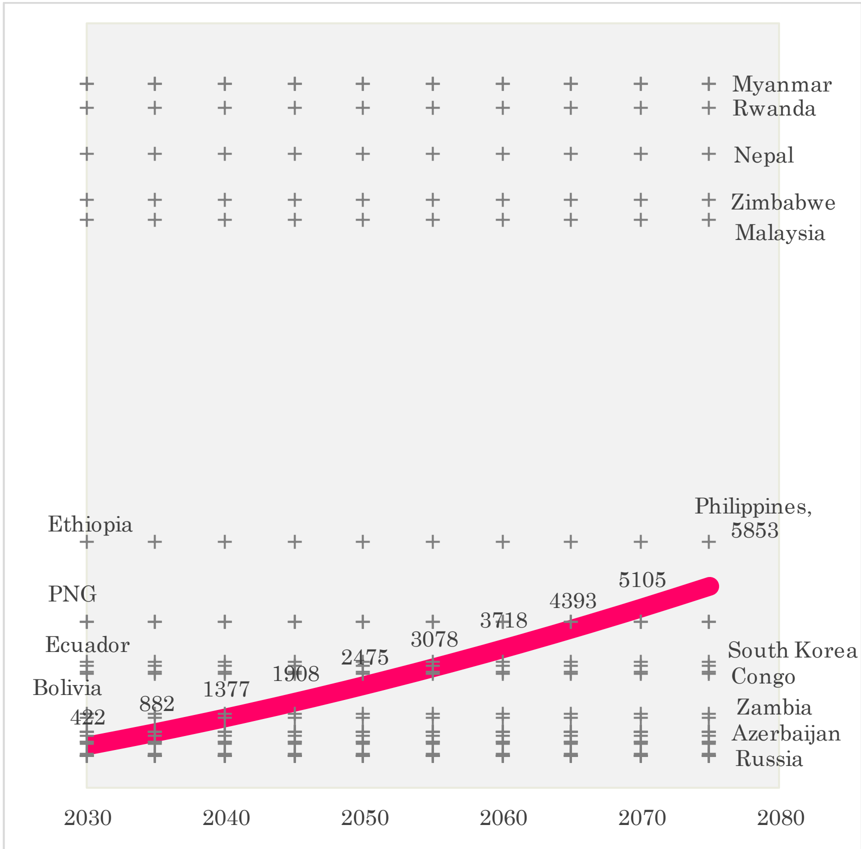
CHART 36/ ILLUSTRATION OF TRADE BLOCKS



[108] Devex. (2022, February 10) China Council for the Promotion of International Trade (CCPIT), Retrieved from www.devex.com: https://www.devex.com/organizations/china-council-for-the-promotion-of-international-trade-ccpit-102629
[109] Federation of Filipino Chinese Chambers of Commerce and Industry, Inc. (2022, February 10). Federation of Filipino Chinese Chambers of Commerce and Industry, Inc. Retrieved from Federation of Filipino Chinese Chambers of Commerce and Industry, Inc.: https://www.ffcccii.org/
[110] Organisation for Economic Co-operation and Development (2018) China's Belt and Road Initiative in the global trade, investment and finance landscape, Paris: OECD Bushiness and Finance Outlook.
[111] Saul McLeod (2014) Carl Rogers Theory, Cambridge, United Kingdom

Chart 37 illustrates the anticipated accession of these localities based on the natural ecological envelope; tea production can reach 633 tonnes after five years cultivation and by 2075 at a production level of 8779.

CHART 37/ ANTICIPATED ACCESSION OF THE PHILIPPINES, REFERENCE POINT



In due course, accession to international markets explicates competitive production volumes—at the very least, without noting product quality. To quantify the anticipated volume production, the results land utilization ζ with gradual uptake every five years are multiplied by the forecast yield-hectares y_o of 1.92841 tonnes per hectares. It is sufficient to states that this is a marginal approach, rather conservative forecast considering labour mobility is attainable whereby suggested, either from nearby barangays or regional pooling for plucking after tea plant growth of five years.

The results show the strong potential of the locality in international markets as shown in also in Chart 37forecast yield production by barrio. The illustration however, does not depict tea magnates China, India and Kenya; Sri Lanka, Turkey 212 and Vietnam; Argentina, Indonesia and Iran. The Philippines has the potential to compete with Ethiopia, South Korea, Congo, Zambia, Azerbaijan and Russia by 2040, or just ten years of industry activation, even in a very conservative approach to forecast. For the Philippines in 2030 yield is 422 tonnes, by 2035 yield is 882 tonnes, by 2040 yield is 1377 tonnes, by 2045 yield is 1908 tonnes; and gradually escalating.

SMALLHOLDER FARMERS' POTENTIAL EARNINGS

A first for parity by way of a Tea Corridor would be to institutionalize high value crop as a source of permanent income. Earnings ensure a more balanced life with less tension and pride in work urges participation to broader advocacies. Stability stems from the nature of the plant itself. A tea plant is tolerant in lengthy durations of drought and has a very long economic life. Under constant pruning and plucking; tea plant varieties of India have an average economic life of 40 years, while the varieties grown in China endure an economic life to a least hundred years.

The meta-analysis of profit to revenue ratios is shown in Chart 38 in cross-sectional data set. Points to ponder are that Viet Nam smallhold tea farmers attain 70 to 90 percent of revenue as profit; meaning only minimal expenses are incurred. In contrast, Thailand smallholder tea farmers profit cascades from a minimum of 18 percent to a maximum of 42 percent. India has a quite stable trading market, and just like African tea farmers, since the smallholder farmer is part of the tea British auction system. Profit to Revenue Ratio has a mean of 69.13 percent across these countries.

To forecast the smallholder farmer earnings, the probable profit to revenue ratios is extrapolated by stochastic analysis and illustrated in Chart 39. The chart derives from the meta-analysis of case studies in Indonesia[112], Viet Nam[113], India[114], Bangladesh[115] and Thailand[116]. Profit varies broadly.

The mean profit to revenue ratio derived is 69.13 percent. The stochastic abstraction or the random between upper and lower limit is 100 percent, which should mean to say in the subsidies provided for by Government, or investments are fully recovered shortly.

Chart 40 is the forecast smallholder farmer earnings per hectares. By mathematical computation, the tea yield multiplier of 2 tonnes per hectares ($\mathcal{Y}$) the equivalent potential production of the barrio in tonnes of tea. Add up the multiplier of Yield-substrate ($\mathcal{Y}_1$) at 37 percent, then subtracting yield-weed-slump at 32 percent ($\mathcal{Y}_2$) and applying half of Yield-envelope of 3.5 percent ($\mathcal{Y}_3$). The overall production in tons is computed against the cost of farm produce χ showing the profit to revenue at maximum 75 percent farmer earning and at minimum 18 percent profit.

For simple gauge, the capita income deciles established by CAR PSA under Reference SR 2020-37[117]; chart 40 shows that the 10th decile of 494,000 pesos, otherwise the highest decile; is surpassed in a single year if a single farmer operates 3 hectares, earning to 653,389 pesos (similar Jack Dulnoan Sr). A single farmer operating one hectare solely can earn 217,792 pesos in one year and exceed the 6th capita income decile of 204,000 pesos. Two farmers operating 2 hectares can split the harvest with each earning 145,195

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[112] Subhrajyoti Panda, Avrajyoti Ghosh, Litan Das, Satarupa Modak, Sabita Mondal, P.K. Pal and M.S. Nain. (2022). Economics of Small Tea Farming System (STFS): An in-depth Study of North Bengal, India. Indian Journal of Extension Education, 58 (1) 63-67

[113] Zeiss, M.R. and K. den Braber. (2001). Tea integrated pest management ecological guide: A trainers' reference guide on crop development. In M. a. Zeiss, Major agronomic practices and disease and insect management in smallholders tea cultivation in northern Vietnam. Hanoi.

[114] Di Kiruthiga and Damodaran Kuppusamy. (2016). Economies of tea cultivation in the Nilgiris district. Journal of Agriculture and Rural Economic Research, vol. (4).

[115] Huong Ho, Hung Van Vu and Le Quoc Hoi. (2020). Impact of farmers' associations on household income: Evidence from tea farms in Vietnam. Hanoi: Economies vol. 8(92).

[116] Tran Chinh, Tran Cuong and Jiancheng Chen. (2020). Factors affecting to tea-growing household's financial efficiency: A case study from Thai Nguyen Province. Journal of Scientific Research, vol.(7)12 .

[117] Philippine Statistics Authority CAR (2020) Family Income and Expenditure in CAR: 2015 and 2018

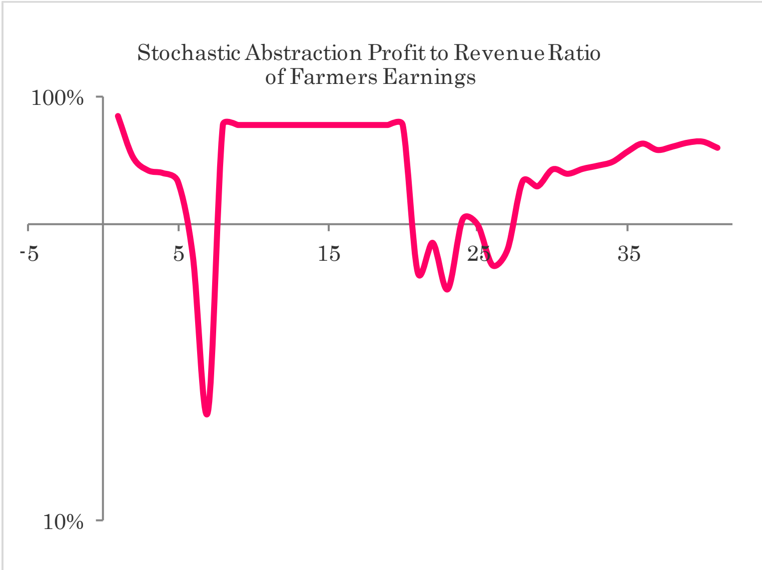
pesos to surpass the 1st capita income decile of 121,000 pesos. If there are three farmers to one hectares, the accumulated earnings of two year harvests exceeds the first income decile. This shows to say that group based farming is helpful for harvest and planting seasons.

CHART 38/ CROSS-SECTIONAL DATA SET PROFIT TO REVENUE RATIO[118]

	Farm Revenue	Profit after Cost	Cost to Revenue Ratio	Profit to Revenue Ratio
Viet Nam, Association members 376	3,377,793	3,027,328	10%	90%
Viet Nam, non-members 366	2,499,349	1,807,527	28%	72%
India, 30 small farms 0-5 Hectares	1,039,037	696,208	33%	67%
India, 30 medium farms 5 -10 hectares	1,030,855	676,544	34%	66%
India, 30 large farms 5 - 10 hectares	1,007,778	639,166	37%	63%
Thailand, 210 participants, large earners	255,812	107,922	58%	42%
Thailand, 210 participants, small earners	190,857	35,217	82%	18%
Bangladesh, Age of farm in years, 2	51,610	44,237	14%	86%
Bangladesh, Age of farm in years, 3	49,194	42,166	14%	86%
Bangladesh, Age of farm in years, 4	49,746	42,639	14%	86%
Bangladesh, Age of farm in years, 5	51,309	43,979	14%	86%
Bangladesh, Age of farm in years, 6	53,989	46,277	14%	86%
Bangladesh, Age of farm in years, 7	56,692	48,593	14%	86%
Bangladesh, Age of farm in years, 8	61,544	52,752	14%	86%
Bangladesh, Age of farm in years, 9	59,466	50,971	14%	86%
Bangladesh, Age of farm in years, 10	64,361	55,167	14%	86%
Bangladesh, Age of farm in years, 11	57,172	49,005	14%	86%
Bangladesh, Age of farm in years, 12	52,972	45,404	14%	86%
Bangladesh, Age of farm in years, 13	52,864	45,312	14%	86%
Bangladesh, Age of farm in years, 14	55,495	47,567	14%	86%
Indonesia, Low yield block B21	13,675	5,264	62%	38%
Indonesia, Low yield block B51	15,343	6,932	55%	45%
Indonesia, Low yield block C21	12,959	4,548	65%	35%
Indonesia, Low yield block F-11	17,289	8,878	49%	51%
Indonesia, Low yield block F-21	16,765	8,354	50%	50%
Indonesia, Low yield block H-11	14,007	5,595	60%	40%
Indonesia, Low yield block S121	14,926	6,515	56%	44%
Indonesia, Medium yield block E03B	22,795	14,384	37%	63%
Indonesia, Medium yield block E04A	21,801	13,390	39%	61%
Indonesia, Medium yield block E04B	25,768	17,357	33%	67%
Indonesia, Medium yield block F09B	24,560	16,148	34%	66%
Indonesia, Medium yield block F05	25,896	17,485	32%	68%
Indonesia, Medium yield block S019	26,880	18,469	31%	69%
Indonesia, Medium yield block F01A	28,195	19,784	30%	70%
Indonesia, High yield block B02B	32,557	24,146	26%	74%
Indonesia, High yield block E01AJ	37,358	28,947	23%	77%
Indonesia, High yield block E07B	33,423	25,012	25%	75%
Indonesia, High yield block E10B	35,348	26,937	24%	76%
Indonesia, High yield block E10A	37,999	29,588	22%	78%
Indonesia, High yield block F01B	38,812	30,401	22%	78%

[118] Currency exchange rate used for the computation are Bangladesh Taka 1=0.512 peso/ Indonesia Rupiah 1= 0.003564 peso/ Indian rupee is = peso 0.663.

CHART 39/ SMALLHOLDER FARMER EARNINGS AT MEAN PROFIT TO REVENUE RATIO 69 PERCENT



By stochastic abstraction, the mean of profit to revenue ratio is 69.13 percent.
Mean, $\mu = 0.691$ or 69.13%
Standard deviation, $\sigma = 0.1789$
Upper limit, $\cup = 1.2280$
Lower limit, $\cap = 0.1547$
Stochastic abstraction Random between upper/lower limit = 100%
(Means that in general the amount invested is fully recovered shortly)

CHART 40/ FORECAST SMALLHOLDER FARMER EARNINGS PRR 69%

3 farmers / 1 hectares		2 farmers / 3 hectares		1 farmer/ 1 hectares		1 farmer/ 3 hectares	
15%	15,782	15%	31,564	15%	47,346	15%	142,038
69%	72,597	69%	145,195	69%	217,792	69%	653,379

1st capita income decile in pesos 121,000

6th capita income decile in pesos 204,000

10th capita income decile in pesos 494,000

Chart 40 suggests starting out at 3 farmers per hectares and moving into 1 farmer for 3 hectares over time, gradually in a continuous transition into self-sufficiency, and wealth by earning more than the 10th decile capita income if 3 hectares are operated single handed with hired hands.

Chart 41 presents the potential revenue by barrio with reference with the land utilisation uptake; using 69 percent profit to revenue ratio. If a tea farmer is earning just 18 percent of revenue, it might not be worthwhile a business. This figurative forecast follows after the Land utilisation uptake as to the labour population.

CHART 41/ FORECAST SMALLHOLDER FARMER EARNINGS

	Gadang	Pongayan	Sagubo	Karao	Nawal	Pito
2030	216	131	291	185	109	165
Land utilisation	72	44	97	62	36	55
Tea Garden Revenue	22,638,964	13,706,593	30,528,145	19,430,864	11,442,435	17,344,137
Profit to Revenue Ratio 69%	15,620,885	9,457,549	21,064,420	13,407,296	7,895,280	11,967,454
Farmer's earning	72,435	72,435	72,435	72,435	72,435	72,435
2035	231	146	306	201	125	181
Land utilisation	148.97	92.24	199.07	128.60	77.86	115.34
Tea Garden Revenue	46,915,599	29,050,857	62,693,960	40,499,399	24,522,541	36,325,944
Profit to Revenue Ratio 69%	32,371,764	20,045,091	43,258,832	27,944,585	16,920,553	25,064,901
Farmer's earning	139,984	137,140	141,183	139,240	135,802	138,621
2040	247	162	322	216	140	196
Land utilisation	231.25	146.17	306.40	200.69	124.60	180.82
Tea Garden Revenue	72,829,905	46,032,792	96,497,446	63,205,604	39,240,318	56,945,422
Profit to Revenue Ratio 69%	50,252,635	31,762,626	66,583,238	43,611,867	27,075,819	39,292,341
Farmer's earning	203,574	196,350	206,779	201,633	193,126	200,047
2045	262	177	338	232	156	212
Land utilisation	318.74	205.29	418.94	277.99	176.53	251.49
Tea Garden Revenue	100,381,882	64,652,397	131,938,603	87,549,480	55,595,765	79,202,571
Profit to Revenue Ratio 69%	69,263,499	44,610,154	91,037,636	60,409,141	38,361,078	54,649,774
Farmer's earning	263,909	251,516	269,659	260,504	246,224	257,763
2050	278	193	353	247	171	228
Land utilisation	411.42	269.61	536.67	360.49	233.66	327.36
Tea Garden Revenue	129,571,529	84,909,673	169,017,430	113,531,027	73,588,883	103,097,391
Profit to Revenue Ratio 69%	89,404,355	58,587,674	116,622,027	78,336,409	50,776,330	71,137,200
Farmer's earning	321,538	303,618	330,184	316,520	296,249	312,532
2055	294	209	369	263	187	243
Land utilisation	509.31	339.13	659.61	448.19	295.99	408.43
Tea Garden Revenue	160,398,848	106,804,620	207,733,929	141,150,245	93,219,672	128,629,881
Profit to Revenue Ratio 69%	110,675,205	73,695,188	143,336,411	97,393,669	64,321,574	88,754,618
Farmer's earning	376,892	353,344	388,653	370,187	343,970	364,922
2060	309	224	384	279	203	259
Land utilisation	612.39	413.85	787.74	541.08	363.53	494.70
Tea Garden Revenue	192,863,836	130,337,238	248,088,098	170,407,134	114,488,132	155,800,042
Profit to Revenue Ratio 69%	133,076,047	89,932,694	171,180,788	117,580,922	78,996,811	107,502,029
Farmer's earning	430,315	401,189	445,316	421,901	389,920	415,362
2065	325	240	400	294	218	274
Land utilisation	720.67	493.77	921.07	639.18	436.26	586.17
Tea Garden Revenue	226,966,496	155,507,526	290,079,938	201,301,693	137,394,263	184,607,875
Profit to Revenue Ratio 69%	156,606,882	107,300,193	200,155,157	138,898,168	94,802,041	127,379,433
Farmer's earning	482,086	447,522	500,385	471,972	434,478	464,185
2070	340	255	416	310	234	290
Land utilisation	834.16	578.90	1059.61	742.48	514.19	682.85
Tea Garden Revenue	262,706,827	182,315,486	333,709,449	233,833,923	161,938,064	215,053,377
Profit to Revenue Ratio 69%	181,267,710	125,797,685	230,259,520	161,345,407	111,737,264	148,386,830
Farmer's earning	532,432	492,619	554,038	520,649	477,923	511,651
2075	356	271	431	325	249	306
	952.84	669.22	1203.34	850.98	597.32	784.72
Tea Garden Revenue	300,084,828	210,761,116	378,976,630	268,003,824	188,119,536	247,136,551
Profit to Revenue Ratio 69%	207,058,531	145,425,170	261,493,875	184,922,639	129,802,480	170,524,220
Farmer's earning	581,539	536,693	606,429	568,131	520,464	557,970
Percent of Utilisation	79.56%	63.12%	126.69%	32.37%	15.63%	11.23%

Hurdle rate is the recovery of investment at minimum. In this study, hurdle is depicted on Chart 47. To establish that hurdle rate, the cost of investment of infrastructure and its corresponding efficiency determined, alongside the Profit-to-Revenue Ratio of Exporters of tea in bulk, and the export value contract ratio. These figures are deduced by the research methodology of extrapolating tangible limits by stochastic abstraction of the meta-analysis of these cross-sectional data sets.

For such reason, this section benchmarks the Water Resource Management Division of the Bureau of Soils Department of Agriculture, on SWIP: Small Water Impounding Projects and SFR: Small Farm Reservoir; featuring PAES 610:2016 of the Philippine Agricultural Engineering Standard on rainwater and runoff management–small farm reservoir. Small water impounding structures designed for a service area between 25 and 150 hectares; crafted out of earth fill structure on narrow valleys with barriers to stand a height between 5 and15 meters. RFS for independent farms are collection facilities at a height of 4 meters, built to hold rainfall and runoff within a reservoir area between 300 and 1500 square meters, mostly funded by Tan Yan Kee Foundation.

The Water Resource Management Division was promulgated under 1978 PD 1435 and Circular No. 3 s. 2019 of the Department of Agriculture; responsible for the development design and management of SWIP and SRF. WRMD is a Division previously functioning under the DPWH, Department of Public Works and Highways. Over the transition from DPWH into the Department of Agriculture, the Small Water Impounding Management Committee had 25 SWIP facilities built under Official Development Assistance worth ¥2,743 million for the following locations: Balibayo, Bulhao, Campin, Cramoan, Florida, Gabawan, Inamburakay, Kitao-tao, Lagunlong, Lamare, Macagtas, Malapong, Maniniog, Masalipit, Nangka, Panlagangan, Polangi, Potot, Santo Domingo, San Nicolas, Santa Fe, Santo Nino, Tugas, Traciano, and Woodland. These built irrigation facilities have proven efficient utilisation by allowing for cultivation in the dry season. The implementation of the project raised the land utilization from 74.2 percent to 128 percent[119]. By 2020, the Office of the Provincial Agriculturist of Bohol constructed SFRs in 104 sites in nine different barrios of 5.2M through funds from the Agriculture for Rural Transformation, ART. Each site marks down a peso-cost of 44,000 for reservoir dimensions of 300 square meters: 15 x 20 meters in length with 1.5 meters depth[120]. Then in 2021, the BSWM embarked on 22 SFR in San Ildefonso Bulacan with project bid peso-cost of 2.2M; 21 SFR in San Miguel Bulacan with project bid peso-cost of 2.1M; and 21 SFR in San Rafael Bulacan with project bid peso-cost of 2.1M. Each SRF is marked down at 100,000 pesos[121]. Further down 2022, the DA inaugurated SWIP Esmeralda for Cabaroan Farmers with completion peso-cost of 13M; Poblacion Irrigators' Association with completion peso-cost of 23.8M; Arapaap Small Water Irrigation System Association 24M; and San Aurelio First Farmers' Association 12.8M[122].

Chart 42 states the cost of investment for SFR and SWIP by way of random between upper and lower limit, the stochastic abstraction tangible limits for a probability space of 190 sites for farm water support infrastructure. Chart 43 states the tea export price based on 1299 instances of world trade compiled from the UN Comtrade in USD per kilogram.

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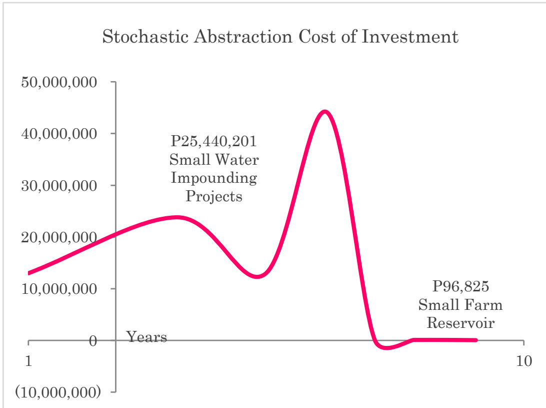
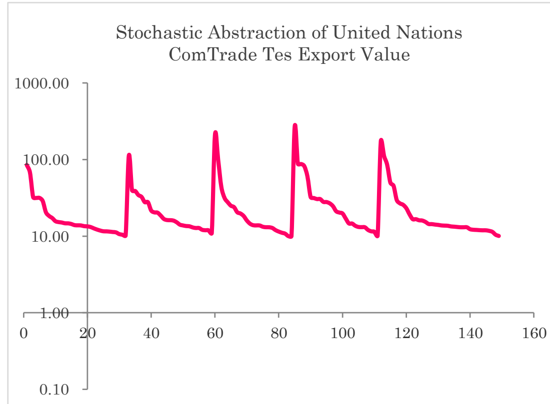
[119] Japan International Cooperation Agency (2001) Small Water Impounding Management Project, Manila: DPWH.
[120] Venus Ladaga (2020) Small farm reservoirs to waterless areas constructed. Tagbilaran: Office of the Provincial Agriculturist
[121] Bureau of Soils and Water Management (2021) Construction of 64 Small Farm Reservoir, SFR in Bulacan . Manila: IB NO,BSWM 2021-09-035.
[122] Christine Cudis. (2022). DA unveils 2 more small water impounding projects. Manila: Philippine News Agency .

CHART 42/ STOCHASTIC ABSTRACTION OF INVESTMENT COST OF SWIP/ SFR
CHART 43/ STOCHASTIC ABSTRACTION OF UNITED NATIONS COMTRADE TEA EXPORT VALUE





Based on the data of the for Small Farm Reservoir, the cost of investment,
mean value, μ = 87,500.00 pesos
Standard deviation, σ = 21,651 pesos
Upper Limit, ⋃ = 152,451.91 pesos
Lower Limit, ⋂ = 22,548.09 pesos
Stochastic abstraction of Small Farm Reservoir cost is 96,825 in peso.

Based on the data of the for the Small Water Impounding Projects, the cost of investment
Mean, μ = 23,547,582.66
Standard deviation, σ = 11,410,453
Upper Limit, ⋃ = 57,778,940.52
Lower Limit, ⋂ = (10,683,775.20)
Stochastic abstraction of Small Water Impounding Project is 25,440,201 in peso.

Chart 43 states the stochastic abstraction of tangible limits of bulk tea export price based on 144 nations[123] and 1299 instances between 2017 and 2022 from the United Nations ComTrade library.

Mean, μ = 16.61 US$/kg or 906,241 pesos per tonne
Standard deviation, σ = 18.23
Upper Limit, ⋃ = 71.31
Lower Limit, ⋂ = (38.09)
Stochastic abstraction tangible limit $\int_X$=48.0 US$/kg
The abstraction translates to 2.6882 M per tonne, possible for the pricey tea brands. Take note of the too high standard deviation higher than the mean, which means to say the price differentiation between tea varieties is expansive. Nonetheless the value is too high from the mean for conservative forecasting function. The mean value of 906,241 pesos per tonne fitting.

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[123] Albania. Algeria. Angola. Antigua and Barbuda. Argentina. Armenia. Aruba. Australia. Austria. Azerbaijan, Bahrain, Barbados. Belgium. Belgium. Bermuda. Bolivia. Bosnia Herzegovina. Botswana. Brazil. Brunei. Darussalam. Bulgaria. Burkina Faso. Burundi. Cote d'Ivoire. Cameroon. Canada .Chile. China. China, Hong Kong SAR. Colombia. Congo. Costa Rica. Croatia. Cyprus. Cyprus. Czech. Denmark. Dominican Rep. Ecuador. Egypt. El Salvador. Estonia. Eswatini. Ethiopia. Ethiopia. Fiji. Finland. France. French Polynesia. Gambia. Georgia. Germany. Ghana .Greece Grenada. Guatemala. Guyana. Honduras. Hungary. Iceland. India. Indonesia. Ireland. Israel. Italy. Jamaica. Japan. Jordan. Kazakhstan. Kenya. Kuwait. Lao PDR. Latvia. Lebanon. Lesotho. Lithuania. Luxembourg. Madagascar. Malawi. Malaysia. Maldives. Mali. Malta. Mauritania. Mauritius. Mexico. Mongolia. Montenegro. Morocco. Mozambique. Namibia. Nepal. Netherlands. New Zealand. Nicaragua. Niger. North Macedonia. Norway. Oman. Pakistan. Panama. Paraguay. Peru. Philippines. Poland. Portugal. Korea. Moldova. Romania. Russian Federation. Rwanda. Saint Lucia. Saint Vincent and the Grenadines. Samoa. Sao Tome and Principe. Saudi Arabia. Senegal. Seychelles. Singapore. Slovakia. Slovenia. South Africa. Spain. Sri Lanka. State of Palestine. Sweden. Switzerland. Tajikistan. Thailand. Timor-Leste. Togo. Trinidad and Tobago. Tunisia. Turkey. Ukraine. United Arab Emirates. United Kingdom. United Rep. of Tanzania. Uruguay. USA. Uzbekistan. Viet Nam. Zambia. Zimbabwe.

Chart 44 is a compilation of Annual Reports of global tea traders, in effort to cover traders from Africa and Asia supplying Europe, North America and the United States. All values are stated in Philippines Peso. Conversion of the British Pound for report of the Brodie Melrose Drysdale & Co Ltd on Scottish Teas, the Camelia Plc, the Jing Tea Limited and Keith Spicer Limited on Lancashire Tea, Dorset Tea, Tea India uses the conversion 1=66.868182 pesos.

CHART 44/ CROSS-SECTIONAL DATA SET PRR OF GLOBAL TEA EXPORTERS

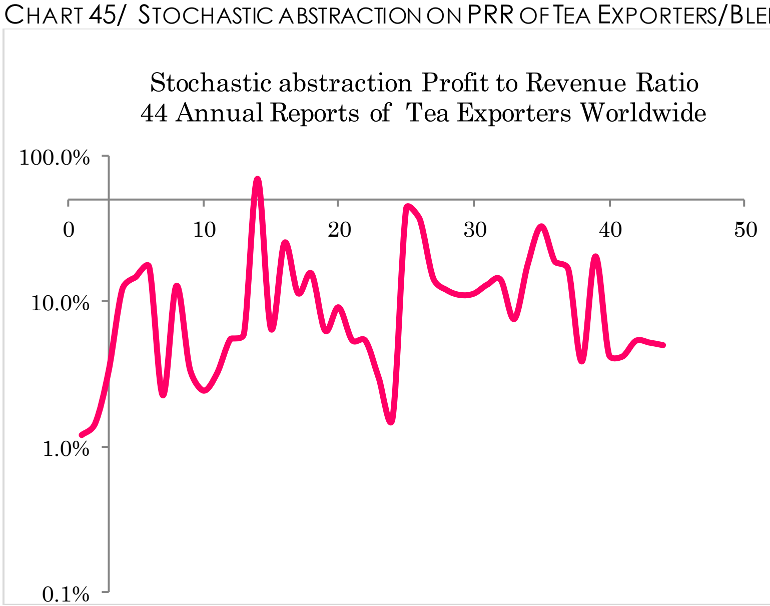
Corporation	Year	Revenues	EBIDTA	PRR
Asian Tea Exports Ltd	2013	745,296,384	46,773,048	6.3%
Asian Tea Exports Ltd	2012	679,442,064	61,624,752	9.1%
Asian Tea Exports Ltd	2014	10,040,434,403	541,613,327	5.4%
AVT Tea Services Limited	2013	10,157,414,152	541,176,835	5.3%
AVT Tea Services Limited	2021	59,409,509	1,727,239	2.9%
AVT Tea Services Limited	2020	52,932,857	836,271	1.6%
Bogawantalawa	2021	207,917,050	90,003,704	43.3%
Bogawantalawa	2020	161,817,456	59,428,829	36.7%
Brodie Melrose Drysdale & Co Ltd	2021	1,182,158,176	170,252,276	14.4%
Brodie Melrose Drysdale & Co Ltd	2020	1,115,374,449	132,992,990	11.9%
Camelia Plc	2019	1,405,089,875	154,866,710	11.0%
Camelia Plc	2018	1,278,920,849	144,034,064	11.3%
Camelia Plc	2020	10,163,619,000	1,321,270,470	13.0%
Camelia Plc	2019	9,888,249,000	1,384,354,860	14.0%
Ceylon Tea Brokers PLC	2020	2,561,148,144	193,137,743	7.5%
Ceylon Tea Brokers PLC	2021	16,501,610	2,967,204	18.0%
Dilmah Ceylon Tea Company PLC	2022	15,839,871	5,180,604	32.7%
Dilmah Ceylon Tea Company PLC	2021	7,117,595	1,333,157	18.7%
Finlays Colombia Plc	2022	1,441,746,078	237,664,038	16.5%
Finlays Colombia Plc	2020	1,248,167,955	48,084,534	3.9%
Gazal Corporation Pty Limited	2019	1,637,823,081	332,933,016	20.3%
Gazal Corporation Pty Limited	2018	13,758,095,195	590,621,490	4.3%
Goodrick Group Limited	2017	13,451,448,275	560,015,655	4.2%
Goodrick Group Limited	2016	12,970,816,503	692,873,916	5.3%
Jing Tea Limited	2015	9,799,850,933	508,687,120	5.2%
Jing Tea Limited	2014	8,466,265,449	421,909,279	5.0%
Keith Spicer Limited	2013	745,296,384	46,773,048	6.3%
Keith Spicer Limited	2012	679,442,064	61,624,752	9.1%
Keith Spicer Limited	2014	10,040,434,403	541,613,327	5.4%
Keith Spicer Limited	2013	10,157,414,152	541,176,835	5.3%
Kenya Tea Development Agency	2021	59,409,509	1,727,239	2.9%
Kenya Tea Development Agency	2020	52,932,857	836,271	1.6%
Talawakelle Tea Estates Plc	2021	207,917,050	90,003,704	43.3%
Tata Tea Extractions, Inc	2020	161,817,456	59,428,829	36.7%
Tata Tea Extractions, Inc	2021	1,182,158,176	170,252,276	14.4%
Warren Tea Limited	2020	1,115,374,449	132,992,990	11.9%
Williamson Tea Kenya Plc	2019	1,405,089,875	154,866,710	11.0%
Williamson Tea Kenya Plc	2018	1,278,920,849	144,034,064	11.3%
Williamson Tea Kenya Plc	2020	10,163,619,000	1,321,270,470	13.0%
Yee Lee Corporation Bhd	2019	9,888,249,000	1,384,354,860	14.0%
Yee Lee Corporation Bhd	2020	2,561,148,144	193,137,743	7.5%
Yee Lee Corporation Bhd	2021	16,501,610	2,967,204	18.0%
Yee Lee Corporation Bhd	2022	15,839,871	5,180,604	32.7%
Yee Lee Corporation Bhd	2021	7,117,595	1,333,157	18.7%

EBIDTA is understood as earnings before interest, taxes, depreciation and amortization. This measure of company profitability is used because in the global arena, these firms are exposed to practically equal pressure in trade operations. However, in terms of taxes and amortization, this varies broadly as to the conditions of the country exporting teas from and prior historical trade relations. As to amortization, there are some who have local banks as trading partners.

The Rupee of India for reports of the Asian Tea Exports Ltd on Assam and Darjeeling, the AVT Tea Services Limited, the Goodrick Group Limited on Camellia, and the Warren Tea Limited; uses the conversion 1= 0.659 pesos, with some report translated from crore or ten million India Rupees. The Sri Lanka Rupees for reports of the Bogawantalawa on Celyon Tea, the Ceylon Tea Brokers Plc on Celyon Tea, the Dilmah Ceylon Tea Company Plc, the Finlays Colombia Plc on Camelia and the Talawakelle Tea Estates Plc uses the conversion 1=0.16728139 pesos. The Australian Dollar for report of Gazal Corporation Pty Limited on Do Ghazal Teas uses the conversion 1= 36.3743 pesos. The Kenyan Shillings for reports of Kenya Tea Development Agency on KTDA and Williamson Tea Kenya Plc on Williamson Tea uses the conversion 1= 0.411 pesos. The Malaysian Ringgit for reports of Yee Lee Corporation Bhd on Sabbah tea and Lee tea uses the conversion 1=12.261953 pesos. The US dollar for reports of Tata Tea Extractions Incorporated on Tetley tea uses the conversion 1= 54.56 pesos.

By way of stochastic abstraction tangible limit, as shown on Chart 45, the Profit to Revenue Ratio is 18 percent.

CHART 45/ STOCHASTIC ABSTRACTION ON PRR OF TEA EXPORTERS/BLENDERS



Mean, μ= 4,276,034,760 Revenues, μ=327,278,444 EBIDTA
Standard deviation, σ=5,847,822,538 Revenues, σ =421,718,536 EBIDTA
Upper Limit, ⋃= 21,819,502,375 Revenues, ⋃= 1,592,434,051 EBIDTA
Lower Limit, ⋂= (13,267,432,855) Revenues, ⋂= (937,877,164) EBIDTA
Stochastic abstraction $\int_X$ = 4,338,376,548 Revenues, ⋂= 780,140,083 EBIDTA

Mean Profit to Revenue Ratio, μ= 7.7%
Stochastic abstraction tangible limit of Profit to Revenue Ratio, $\int_X$= 18.0%

Then to establish the water requirement in relation to the infrastructure capacity; the Small Water Impounding Projects of the Department of Agriculture has a service area between 25 and 150 hectares. BWSM definition of reservoir is capacity in cubic meters equal to the surface area in square meters multiplied by the depth in meters. The reservoir height of about 5 m against a pond area of 1500 square meters to be more than the minimum catchment area.

What had been surmised for forecast uptake in land utilisation by 2075 as follows; Gadang 909.53 hectares, Pongayan 637.25 hectares, Sagubo 949.80 hectares, Karao 811.74 hectares, Nawal 568.23 hectares and Pito 748.13 hectares. Offhand with reference to page 44; Gadang entails six SWIP at 76 percent land utilization; Pongayan entails four SWIP at 60 percent land utilization; Sagubo entails six SWIP at 100 percent land utilization; Karao entails 5 SWIP at 31 percent land utilization; Nawal entails 4 SWIP at 15 percent land utilization; and Pito entails 5 SWIP at 11 percent land utilization.

Specifically for the tea plant, the research of McConnaughey and Ruter (2013)[124] is adapted to this study basing on the forecast Yield-envelope. The study determined the watering requirements as follows: Summer duration of 120 days the water requirement is 3162 gallons per acre. For 60 days of fall the tea plant watering requirement of 977 gallons per acre. Over 90 days of winter, the tea plant watering requirement of 212 gallons per acre. For 60 days of spring, the tea plant watering requirement of 1089 gallons per acre. The adaptation of the results state summer months February up to May, the tea plant water requirement 29.57 cubic meters per hectares; and for 60 spring days from December to January the tea plant watering requirement of 10.27 cubic meters per hectares. This translates to 39.849 cubic meters water per hectares per year. The rest of the year is a collection of rain. Conversion 264.172 gallons to 1 cubic meter and 2.4711 acres to hectares, shows the yearly watering requirement fitting the reservoir capacity equivalent service area of 150 hectares, as detailed on Chart 46.

CHART 46/ADAPTATION OF TEA WATERING REQUIREMENT TO YIELD-ENVELOPE

	Gadang	Pongayan	Sagubo	Karao	Nawal	Pito
Land utilization (2075)	909.53	637.25	949.80	811.74	568.23	748.13
Equivalent SWIP units	6	4	6	5	4	5
Optimal land resource %	76	60	100	31	15	11
H_2O requirement/ yr. cu. m.	36,243.51	25,393.53	37,848.21	32,346.71	22,643.18	29,811.94
Reservoir capacity	6,040.58	6,348.38	6,308.03	6,469.34	5,660.79	5,962.39

Justification of infrastructure investment draws from the study on tea drought threshold of water content in soil; states conclusive yield-water-slump between 14 and 20 percent, extending drastically to plant mortality between 6 and 19 percent[125]. The same is evaluation of low leaf expansion volumes, which had been traced back to deficit of water content in soil resulting mortality[126]. Another study released by the Journal in Experimental Agriculture, Cambridge University confirmed the impact of rain months on tea gardens increased yield to about seven percent[127]. Plant loss of water described in botany as transpiration, explains the basic need for constant replacement of rain or watering for a tea plant uptake of water content in soil to sustain productivity. Other scientists explain this with the concept of water stress frequently in tea nurseries[128].

[124] McConnaughey and Ruter (2013) Evaluation of alternative tea propagration nursery systems in Athens and Georgia. Athens University of Georgia.
[125] Heruiyot et al (2008)Threshold soil water content for growth of tea. Tea Research Foundation, vol. (29)2 pp.29-38 ref.32
[126] William Stephens and Mick Carr (1993) Responses of tea to irrigation and fertilizer. Shoot extension and development. Experimental Agriculture 29(3), pp.323-339
[127] Anna Nowogrodzki. (2019). How climate change might affect tea. Nature Briefing, 3
[128] Roghieh Hajiboland (2017) Environmental and nutritional requirements for tea cultivation, Folia Horticulture vol.(29) 2, pp.199-220, Polish Society for Horticultural Science

CHART 47/ HURDLE RATE ACROSS SIX BARRIOS FOR SWIP

	Gadang	Pongayan	Sagubo	Karao	Nawal	Pito	TOTALS
Land utilisation, 2075	909.528	637.249	949.800	811.738	568.232	748.129	4624.676
Percent to total	75.9%	60.1%	100.0%	30.9%	14.9%	10.7%	48.7%
SWIP Count	4	4	4	4	4	4	24
SWIP Investment	(101.761)	(101.761)	(101.761)	(101.761)	(101.761)	(101.761)	(610.565)
Highway Improvements	(34.565)	(34.565)	(34.565)	(34.565)	(34.565)	(34.565)	(207.389)
2030	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0
2034	22.613	13.691	30.493	19.408	11.429	17.324	114.957
2035	22.613	13.691	30.493	19.408	11.429	17.324	114.957
2036	22.613	13.691	30.493	19.408	11.429	17.324	114.957
2037	22.613	13.691	30.493	19.408	11.429	17.324	114.957
2038	22.613	13.691	30.493	19.408	11.429	17.324	114.957
2039	46.861	29.017	62.621	40.452	24.494	36.284	239.728
2040	46.861	29.017	62.621	40.452	24.494	36.284	239.728
2041	46.861	29.017	62.621	40.452	24.494	36.284	239.728
2042	46.861	29.017	62.621	40.452	24.494	36.284	239.728
2043	46.861	29.017	62.621	40.452	24.494	36.284	239.728
2044	72.745	45.979	96.385	63.132	39.195	56.879	374.314
2045	72.745	45.979	96.385	63.132	39.195	56.879	374.314
2046	72.745	45.979	96.385	63.132	39.195	56.879	374.314
2047	72.745	45.979	96.385	63.132	39.195	56.879	374.314
2048	72.745	45.979	96.385	63.132	39.195	56.879	374.314
2049	100.265	64.577	131.785	87.447	55.531	79.110	518.715
2050	100.265	64.577	131.785	87.447	55.531	79.110	518.715
2051	100.265	64.577	131.785	87.447	55.531	79.110	518.715
2052	100.265	64.577	131.785	87.447	55.531	79.110	518.715
2053	100.265	64.577	131.785	87.447	55.531	79.110	518.715
2054	129.420	84.811	168.820	113.399	73.503	102.977	672.930
2055	129.420	84.811	168.820	113.399	73.503	102.977	672.930
2056	129.420	84.811	168.820	113.399	73.503	102.977	672.930
2057	129.420	84.811	168.820	113.399	73.503	102.977	672.930
2058	129.420	84.811	168.820	113.399	73.503	102.977	672.930
2059	160.212	106.680	207.491	140.985	93.111	128.480	836.959
2060	160.212	106.680	207.491	140.985	93.111	128.480	836.959
Discount Rate (Nominal)	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%	5.4%
Discount Rate (Real)	6.7%	7.1%	6.6%	6.8%	7.2%	6.9%	6.8%
Inflation Rate	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%
NPV	610.200	316.604	869.906	504.673	242.353	436.073	2978.909
FIRR	15.7%	12.4%	17.9%	14.6%	11.3%	13.8%	14.5%
Payback (years)	13	14	12	13	15	13	13.33
Capital at Risk, max	136.326	136.326	136.326	136.326	136.326	136.326	817.953
Cost Benefit Ratio	5.5	3.3	7.4	4.7	2.8	4.2	4.6

Hurdle is calculated over thirty (30) years, although Accession looks into fifty years, Reaffirmation should be stipulated after completion of the first 30 years. All values are in

Philippine currency in millions (Php'm) derived from the previous abstractions on land utilisation forecast, tea export price in bulk, profit to revenue and average cost of SWIP investment.

Infrastructure investment looks into 50 years in terms of water holding capacity and highway provision, considering the International Organisation has fully recovered investment in farm support infrastructure within the first 15 years and is granted leeway over the succeeding 15 years for exclusivity of the bulk buy that can be reduced gradually, after thirty years, allowing for local manufacturing. Nonetheless, export exclusivity continues to the same group, until expiration of treaty or there is a buyout of the treaty by the nation or the autonomous region.

Allocation for SWIP is confined to 4 units per barrio until the specific barrio exceeds 250 hectares of land utilisation in tea cultivation, then additional water holding can be allocated.

PRC-BRI/ FFCCCII ought to build an overlay bridgeway straight out of Sagubo into the Sual Port with alternate drop off point at Poro Point airstrip; within five years. The overlay bridge is designated as the primary corridor with interlink between barrio Pito into barrio Karao; Karao into barrio Nawal; Nawal into barrio Pongayan; Pongayan into barrio Gadang; Gadang into barrio Sagubo.

Allocation for highway benchmarks the Bauang bypass road cost implications and absorbs as baseline reference the 23rd Edition of the "Status of the nations' highway, bridges, and transit" by the U.S. Department of Transportation, Bureau of Transportation Statistics; Transportation Economic Trends. All values in lane-mile-dollars had been converted to lane-kilometre-peso as appropriate.

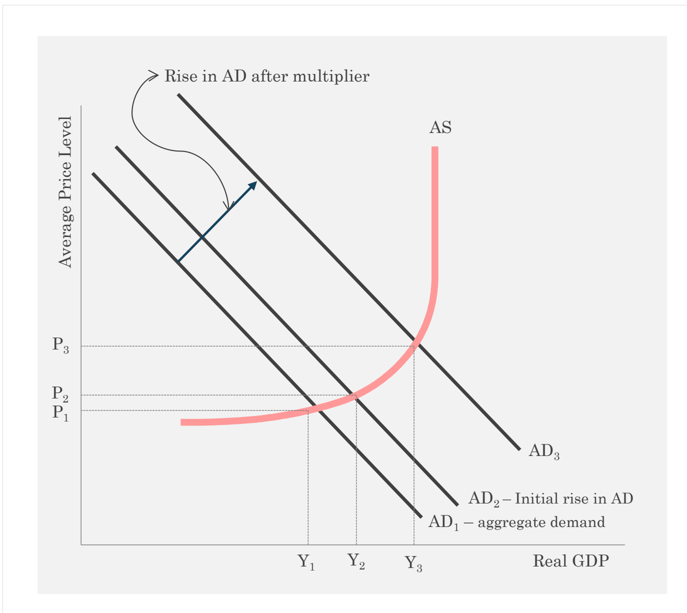
Bridgeway overlay investment considers two major diversion roads to start out the corridor as appropriate. These are to comprise new alignment arterial collectors in mountainous terrain, with cost–per–lane–kilometre pegged at 2,304,317 pesos. Bridgeway Overlay One establishes the Nawal Corridor from Nawal into Pongayan, manoeuvring through Atok and Tublay for 15 kilometres two lanes or investment allocation of 69.129514 million pesos. Bridgeway Overlay Two is to establish the Sagubo Crossing manoeuvring through San Gabriel into Poro Point La Union for ferry of airfreight, allowing 15 kilometres four lanes shoulder as appropriate with an investment allocation of 152.641206 million pesos. Bridgeway overlay investment is recovered in whole across these six barrios.

MULTIPLIER EFFECT OF FOREGN TRADE

The multiplier effect explains that injections in an economy can raise consumption and investments; Government liquidity and expenditure, all resulting in the increase of private savings. The ripple down of money flows from the spending of Government.

Economic injections can include Investment, Government spending and Exports. Foreign trade multiplier effect increases Government liquidity and stimulates the proliferation of other small businesses to support or augment the industry

CHART 48/ ILLUSTRATION OF MULTIPLIER EFFECT



The multiplier effect is further construed as a macroeconomic tool to study the impact of capital infusion. Capital infusion results in the proportionate change the national demand and national income. In mathematics this is explained by the Keynesian multiplier, or the fiscal multiplier, measured as the fraction of change in national income to the change in Government spending[129].

A Keynesian multiplier shows that the economy expands beyond an initial amount spent by the Government. Multiplier = 1 / (1 – Marginal Propensity of Consumption)

∑Tea Corridor Value Creation	Infrastructure Investment	For Trade Mobility year-on-year
= $\Delta AE \div (1 - MPC)$	= 839.099M[130]	=114.956M
= $\Delta AE \div (1 - 0.75$[131])	= 3137.404M	=459.827M

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[129] Dheeraj Vaidya (2023) Multiplier effect. Wall Street Mojo, Virginia

[130] The multiplier effect is ΔAE which represents the change in investment, divided by 1 less the marginal propensity to consume which is 0.99 centavos for every 1 peso. The value 141.285M is obtained from the mean expenditure of small water impounding facility at 23,547,583 pesos for one unit each selected barrios. The possibility of shared water impounding service area should be evaluated further for Gadang and Sagubo, and Nawal and Karao.
23,547,583

[131] Consolidated Accounts of the National Accounts of the Philippines, June 2017 states the households' marginal propensity to consume (Δ in HFCE/Δ in HDI) for 2016 is at 1.02. Households are spending more for every peso increase in their disposable income (Bangko Sentral ng Pilipinas (2017) Philippines Funds Flow, Manila. https://www.bsp.gov.ph/Media_And_Research/Philippine %20Flow%20of%20Funds/FOFReport2016.pdf
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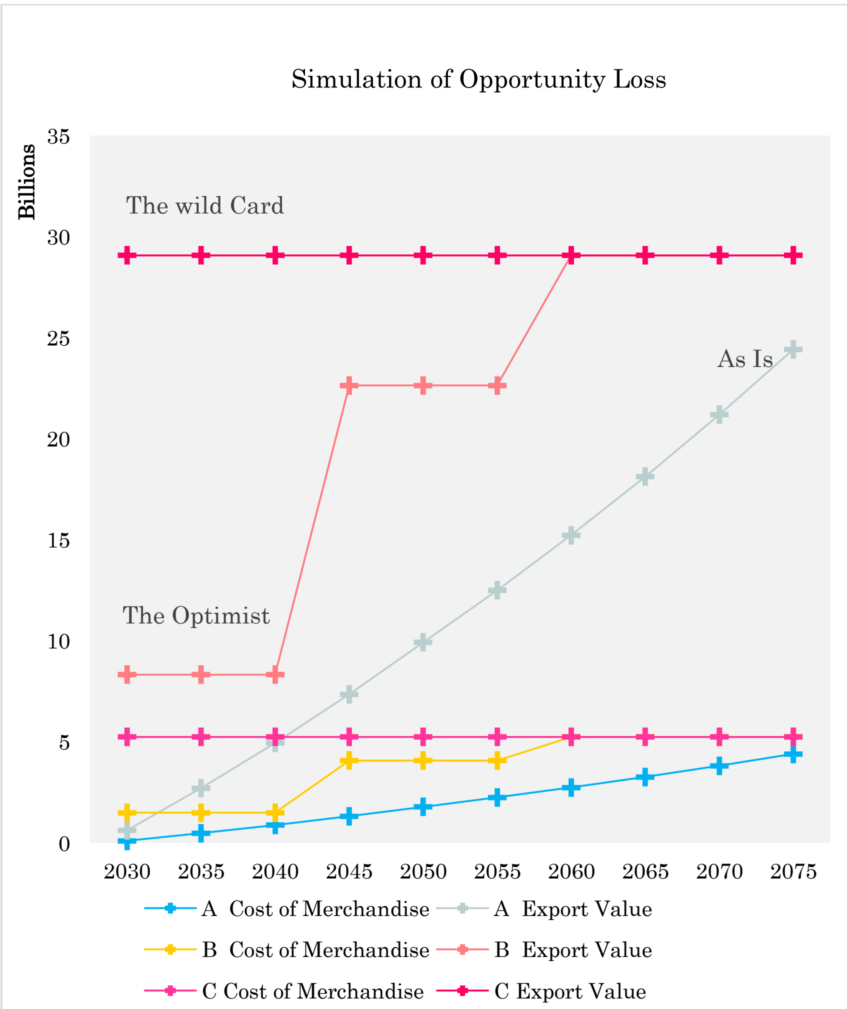
OPPORTUNITY LOSS

Loss of opportunity is illustrated in chart 49 which states that the option to raise the yield by manipulation of controllable variables as simulated. As-Is had been outlined as A, to show that the cost of farm produce which is the farmers revenue, and the export value, follow after the barrio population growth. That is, land utilisation is a dependent value on population growth. The upper limit of annual revenue of the smallholder farmers attained in 2075 is 4.411 billion and the upper limit of annual revenue of the international organisation is 24.426 billion.

CHART49 ILLUSTRATION OF OPPORTUNITY LOSS



Despite the fact utilisation is a dependent variable, labour can be mobilised and therefore is also a controllable variable. By so, should; the program mobilise labour to bring land utilisation to optimal, the gradual yet massive approach is to consume all land of ideal elevation in Nawal and Sagubo, then move into Gadang and Pito after 15 years; then lastly to utilise all land in Karao and Pongayan. This we call the The-Optimist that had been outlined as B. The upper limit of annual revenue of the smallholder farmers attained in 2075 is 5.254 billion and the upper limit of annual revenue of the international organisation is 29.094 billion.

Lastly is the Wild-Card that had been outlined as C. The upper limit of annual revenue is attained in immediately in 2030, by an instantaneous mobilisation of labour across all barrios. For the smallholder farmers, it is 5.254 billion and the upper limit of annual revenue of the international organisation is 29.094 billion.

A rule of thumb is land resource utilisation that is poorly, loses an equivalent nine percent of respective GDP.

GOVERNMENT COUNTERPART

Government counterpart is fundamentally training and monitoring; subsidy of farmer's fertilizers for the first five years without harvest and collection post of farmer produce. Interestingly, the High Value Crop Development division could develop and tailor-specific the right fertilizer.

Government must field at least 5-10 scientists /agriculturists in each barrio, scientists highly capable and trained overseas to actively vanguard results.

The Bureau of Soils, Water Resource Management Division has to design these SWIPS, four in each barrio and inspect the construction progress of the international group.

DA is to initiate seed cultivation, and inculcate proper training.

The Local Government Units are to identify the location of the public lands to accommodate these SWIPs.

The Telecoms industry can architect a tea trade auction platform and available through smart phones for the smallholder farmer access and direct participation.

Chapter 8/ Equity & Inclusion

Equity is not equality. Equality could be a distortion of human rights by the assertion that people ought to have exactly the same opportunities and resources; be measured under the same schemes and held to the same expectation. Equity is the recognition that people differ; therefore provisions simply facilitate specific access to pertinent resource or opportunities. Inclusion means non-constrictive of cultures or interest group, affiliations or capacities to participate.

The parameter to equity is the fundamental straightforward access to opportunity and resource, its availability and ease of access.

Unfortunately, equity outcomes persist only when the right policy instruments or mechanisms are properly in place and practiced. These policy instruments are tediously scrutinized and based on actual life experiences or scientific evidences. As an example, taxation is a mechanism for equity, where taxes of those fortunate are used for improvements utilized for common good.

The Cordillera Corridor Tea Trade Treaty by itself is a mechanism to facilitate access to opportunity; raise the utilisation of the land resource; prompt for university completion and facilitates the basic access to water resources. The summary below of these Social Equity Returns is elaborated in the succeeding pages.

∑Tea Corridor Equity Creation	Direct Impact	Intergenerational
Break cycles of poverty with education premiums	3877 children	3955 children
Reducing schooling repeaters	No estimate	3955 children
Earnings after university up 9%	3877 children	3955 children
Earnings & Education/ GDP capita growth	Up by 18 % or	Incremental 18%
Earnings & Education/ Productivity increase	Up by 31.7%	Incremental 31.7%
Stop decline in productivity due to No Education	3877 children	3955 children
Infrastructure Investment/ Increased land resources use, soil surface protection and susceptibility to landslide	4,624.68 hectares	16647.9 hectares
Infrastructure Investment/ Increased income levels	1615	
Infrastructure Investment/New jobs 4 of 5	1550	1939
Infrastructure Investment/Raised the livelihood	12%	
Infrastructure capita income increase 17%	1939	Incremental 18%
Improved dwelling space 1of 5	387	1939
Time gains without fetching	1939	Incremental 18%
Reduction of water-borne disease and child disability with access to safe water	1939	

Sequential studies measure the improvement in parent earnings and how this enhances the next generation productivity. A positive direct effect on the education and the completion rate of the child had been proven to result increased earnings of a parent. Consequently, the nuance of child labour reduced, at the same time literacy rate raised[132]. Studies on the intergeneration impact on schooling find a statistically significant relationship between the schooling completions of mothers. A child does not turn out a repeater with family income increasing at about 0.187 or 18.7 percent[133]. Such reasoning is supported by other studies that find the decisions of a child less fortunate is severly influenced by the lack of education of the parent.

A thorough investigation of the World Bank on output decline as a result of No Education is summarised on Chart 50 with about 49 percent decline in output as extrapolated and shown on Chart 51[134].

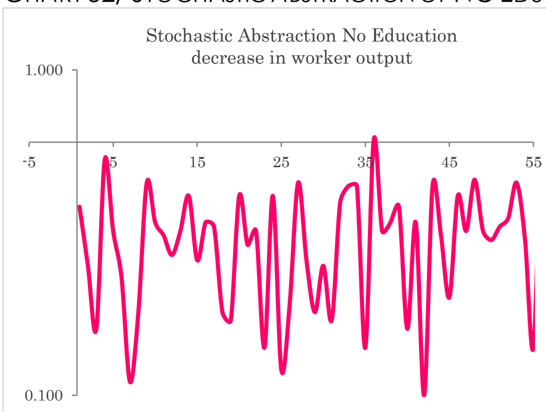
CHART 50/ CROSS-SECTIONAL DATA SET OF NO EDUCATION, DECREASE IN WORKER OUTPUT

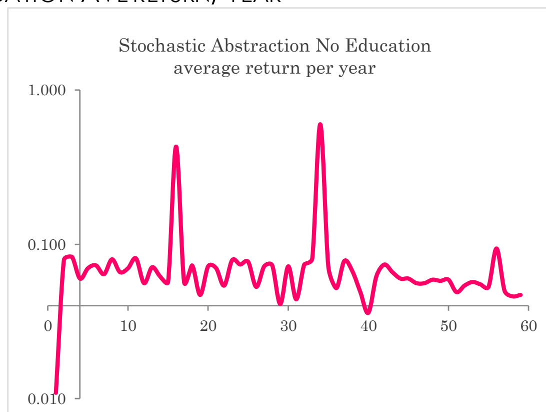
Country	Output Decline	Ave return	Country	Output Decline	Ave return
Italy	0.380	0.011	Iran	0.170	0.044
Africa	0.250	0.079	Ireland	0.390	0.074
Argentina	0.160	0.083	Israel	0.440	0.081
Australia	0.530	0.060	Japan	0.440	0.600
Austria	0.320	0.070	Kenya	0.140	0.072
Bolivia	0.230	0.073	Korea	0.610	0.052
Botswana	0.110	0.064	Malaysia	0.320	0.078
Brazil	0.180	0.080	Mexico	0.340	0.067
Canada	0.450	0.066	Netherlands	0.380	0.049
Chile	0.340	0.070	Nicaragua	0.160	0.036
China	0.310	0.081	Norway	0.340	0.062
Columbia	0.270	0.056	Pakistan	0.100	0.074
Costa Rica	0.320	0.071	Panama	0.440	0.066
Cyprus	0.410	0.062	Paraguay	0.310	0.060
Denmark	0.260	0.057	Peru	0.200	0.060
Dominican Republic	0.340	0.430	Philippines	0.410	0.056
Ecuador	0.330	0.057	Poland	0.320	0.056
Egypt	0.180	0.073	Portugal	0.460	0.059
El Salvador	0.170	0.047	Singapore	0.320	0.058
Finland	0.410	0.072	Spain	0.300	0.059
France	0.290	0.070	Sri Lanka	0.330	0.049
Germany	0.320	0.054	Sweden	0.350	0.054
Ghana	0.140	0.079	Switzerland	0.450	0.057
Greece	0.410	0.074	Thailand	0.300	0.055
Guatemala	0.120	0.077	Tunisia	0.140	0.053
Honduras	0.190	0.053	USA	0.660	0.094
Hong Kong	0.450	0.072	United Kingdom	0.380	0.050
Hungary	0.260	0.073	Uruguay	0.380	0.046
India	0.180	0.041	Valenzuela	0.270	0.047
Indonesia	0.250	0.072			

[132] George Psacharopoulos and Richard Layard (1979) Human capital and earnings: British evidence and a critique. Review of Economic Studies vol. (46) 3, pp. 485-503
[133] Barbara Wolfe and Samuel Zuvekas (1997) Nonmarket outcomes of schooling, international Journal of Educational Research vol. 27(6), pp. 491-502
[134] George Psacharopoulos and Harry Anthony Patrinos (2002) Returns to investment in education: A further update, World Bank Policy Research Working Paper 2881

The slump in output per worker with no education across 58 countries is shown in Chart 52 and Chart 53. The mean at 31.7 percent reduction in output and schooling return of 7.9. In other words when the farmers children are subsidized through earmarked Tea Taxes, a direct increase in productivity at 31.7 percent can be expected.

CHART 51/ STOCHASTIC ABSTRACTION OF NO EDUCATION-OUTPUT DROP PER WORKER
CHART 52/ STOCHASTIC ABSTRACTION OF NO EDUCATION-AVE RETURN/ YEAR





Mean, μ=0.317 or 31.7%
Standard deviation, σ=0.123
Upper Limit, ⋃= 0.685
Lower Limit, ⋂= (0.051)
Stochastic abstraction $\int_X = 1$

Mean, μ= 0.079 or 7.9%
Standard deviation, σ= 0.087
Upper Limit, ⋃= 0.339
Lower Limit, ⋂= (0.181)
Stochastic abstraction $\int_X =1.000$

For clarity, education is not simply a means to raise the income bands because going overseas as Domestic Helper or Japayuki can do much more. What is of greater importance is that education shapes an interesting, aspiring nation.

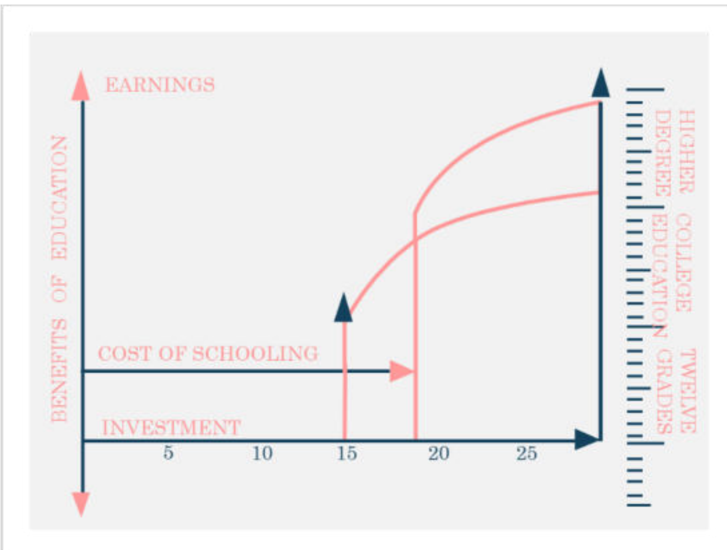
Circumstances such as in this scenario, underscore inequality in terms of cognitive skills and the quality of endowments to include ability. Another is that the parent, who is a tea farmer, could have spending habits and vices that reduce the chance of the child to attend university and attain completion[135]. Each additional year in school returns higher GDP per capita at 30 percent[136] and raises the average capita income between 3[137] and 6 percent[138]; effectually, the macro rate of return to education between 18[139] and 30

[135] Arnaud Chevalier, Colm Harmon, Vincent O' Sullivan and Ian Walker (2013). The impact of parental income and education on the schooling of their children, Journal of Labour Economics, vol (2)8, pp.1-22
[136] James Heckman and Peter Klenow (1997) Human capital policy, University of Chicago
[137] Barbara Sianesi and John Van Reenen (2003) The returns to education: Macroeconomics. Journal of Economic Surveys vol. (17) 2, pp. 157-200
[138] Andrea Bassanini, Stefano Scarpetta and Philip Hemmings (2001) Economic growth: The role of policies and institutions. Panel data evidence from OECD countries, IZA Institute of Labor Economics.
[139] Angel de la Fuente and Rafael Doménech (2010) Human capital in growth regressions: How much difference does data quality make? Journal of the European Economic Association, vol (4)1, pp.1-36

percent[140]. A university degree holder earns 136 percent higher than the earnings of those who complete just high school.[141]

Chart 53 is the popular Mincerian equation (1974), showing the duration of schooling has an equivalent increase in earnings, regardless of educational level[142]. For culture specific impact, a study states that among Asian nations, a return of 4.8 percent increase for women and 9 percent for men[143].This trend had been confirmed in a policy paper evaluating trends and patterns using a data set of 139 countries, to conclude that the world rate of return to one extra year of schooling is about 9 percent in earnings, with the highest returns in primary education[144].

CHART 53/ THE MINCERIAN EQUATION



For these localities an Educational Maintenance Allowances or EMA[145], as formerly institutionalized in Europe can be the premium on top of the farm produce purchase value constant ratio. This stipend is issued directly to the tea farmer child, for as long as the child is schooling. To break the cycle of poverty, tea farmers should push for mandatory schooling up to university completion, for all generations next. This is to sustain the intergenerational effect[146]. Special full blown State Scholarships in Agricultural courses such as Bio-Engineering, Botany and Plant Genetics should be earmarked by the Department of Finance as budgets from the Tea Taxation Fund. This is to alter the existing ability of Filipino farmers who are fundamentally left out of university. Crucially, Government should raise the capacity of the farmer folks to benefit international competition.

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[140] Alan Krueger and Mikael Lindahl (2000)Education for Growth: Why and For Whom? National Bureau of Economic Research, Working Paper 7591. Journal of Economic Literature, American Economic Association, vol. 39(4), pages 1101-1136, December.

[141141] Timothy Bartik and Brad Hershbein (2018) Degrees of poverty: The relationship between family income background and the returns to education. Upjohn Institute for Employment Research Working Paper 18-284

[142] Jacob Mincer (1974) Schooling, experience, and earnings, National Bureau of Economic Research, New York

[143] Xin Wei , Mun Tsang , Weibin Xu and Liang-Kun (2006) Education and earnings in rural China, Education Economics vol. (7) 2, pp.167-187.

[144] George Psacharopoulos and Harry Antony Patrinos (2018) Returns to investment in education a decennial review of the global literature, Policy Research Working Paper 8402, Education Global Practice, The World Bank Group.

[145] Heather A. MacPherson. (2021). *Correction to: European Child & Adolescent Psychiatry.* Berlin: Springer-Verlag GmB Germany

[146] Philip Oreopoulos, Marianne Page and Ann Stevens (2006). The intergenerational effects of compulsory schooling. Journal of Labor Economics, vol. 24(4), 729–760.

INFRASTRUCTURE INVESTMENTS SOCIAL RATE OF RETURN

A study by the World Bank Group (2000) examining the relation between infrastructure investment and the social rate of return, concluded the upper limit of the relationship curve, defines an capita income of 3600 international dollars. The study uncovered that the middle income countries, such as the Philippines, present with the highest rate of return[147].

CHART 54/ CROSS SECTIONAL DATA SET OF SOCIAL EQUITY RETURNS BY INFRASTRUCTURE INVESTMENT

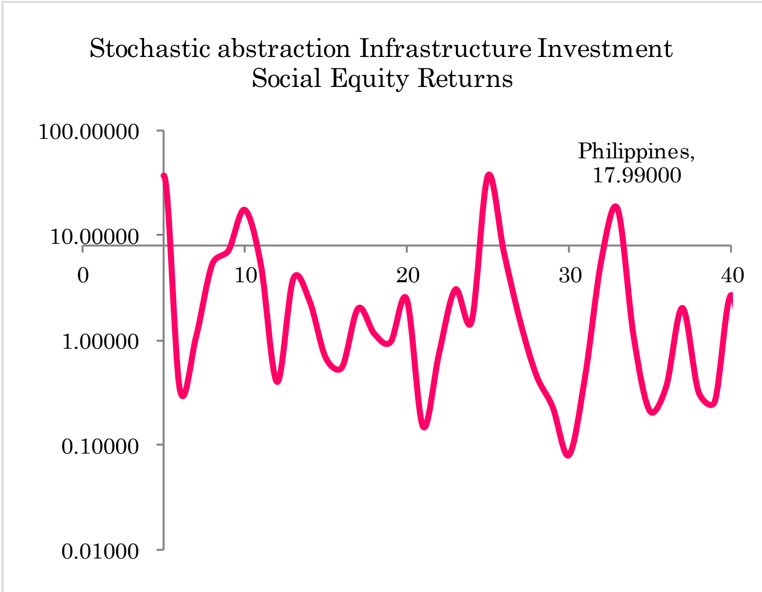
Country	SRR	Country	SRR
Argentina	13.33000	Ireland	0.15000
Australia	(0.02000)	Italy	0.76000
Austria	(0.02000)	Japan	3.05000
Belgium	0.14000	Kenya	1.51000
Bolivia	37.09000	Republic of Korea	36.95000
Botswana	0.34000	Liberia	6.82000
Brazil	1.07000	Malawi	1.50000
Cameroon	5.31000	Netherlands	0.46000
Chile	7.15000	New Zealand	0.23000
Colombia	17.53000	Norway	0.08000
Costa Rica	5.24000	Pakistan	0.45000
Denmark	0.40000	Panama	5.76000
Ecuador	3.85000	Philippines	17.99000
El Salvador	2.38000	Senegal	1.07000
Finland	0.68000	Sweden	0.21000
Germany, West	0.55000	Tunisia	0.36000
Guatemala	2.01000	Turkey	2.03000
Honduras	1.15000	United Kingdom	0.32000
India	0.96000	United States of America	0.26000
Indonesia	2.45000	Zambia	2.69000
		Zimbabwe	0.33000

The idea of a new diversion or bypass from Nawal in Bokod into Pongayan in Kapangan and a second in the Sagubo Corridor through San Gabriel into Poro Point La Union; for the ease of farm produce farm produce movement. Across these six barrios, the road network is mountainous and rural. In Bokod, the Pito Bridge to Karao is roughly 24 kilometres, Karao to Nawal takes in nearly 64 kilometres. Nawal to Pongayan in Kapangan is about 50 kilometres. Pongayan to Gadang is estimates at16 kilometres and Gadang to Sagubo is 6.7 kilometres. A farther stretch from Sagubo to Sual Port is 149 kilometres.

The benefits as detailed in succeeding pages are measured in Chart 55 presenting the details of the tangible limits of the Social Equity Returns obtained through Infrastructure Investments. Reversely put, the loss of opportunity due to poor access Chart 56 is an illustration of the pace of decline of opportunity in reference with labour and mobility, as defined by the ILO working group[148]. Chart 57 is an illustration of the sanitation and health ladder resulting access to safe water.

[147] David Canning and Esra Bennathan (2000) The Social Rate of Return on Infrastructure Investments. The World Bank Library.
[148] Donnges, Edmonds, and Johannessen (2007) Socio-economic and transport cost impacts by economics study. Allen Institute for Artificial Intelligence

CHART 55/ STOCHASTIC ABSTRACTION SOCIAL EQUITY RETURNS BY INFRASTRUCTURE INVESTMENT



Mean, μ = 4.50171
Standard deviation, σ = 9
Upper Limit, ∪ = 30
Lower Limit, ∩ = (21)
Stochastic abstraction tangible limit $\int_X$ = 9 percent. Note that the Philippines is 17.99 percent.

Bridgeway benefits are elaborated in a recent study published by the Journal of Social Economics tediously documents the socio-economic changes in a remote barrio, after bridgeway connection. The analysis concluded that four out of every five persons from the locality landed new jobs and five out of every six persons in the labour age group increased income levels. Access into the barrio raised the livelihood of the locality at about 12 percent. Four in every five households improved dwelling structures, with 1 in every five households with permanent structure; and two in every five households with semi-permanent structure. Child literacy improved with better frequency of school presence[149].

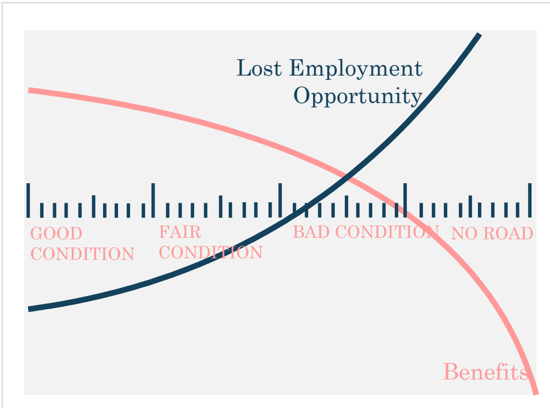
A classic example of bridgeway impact is the bridgeway across the Amu River to connect Afghanistan and Uzbekistan. This had been initially built with political purpose for the passage of troops and sustenance for the invasion of Afghanistan. Today it serves as the passage of 70 percent of all country life sustenance from international development groups[150]. More urgently and fundamentally humanitarian, safe water access is the first of the equity returns with farm support infrastructure provided by the FFCCCII PRC Belt and Road Initiative under stipulations of the treaty prioritize safe water access is benefited by the tea farmer community. Safe water access reduces exposure to diarrhea diseases and the deterioration of health conditions that result in a higher occurrence of absences in work life or school activity. Safe water access extends to its reuse that helps the farmer meet the crop water requirement[151].

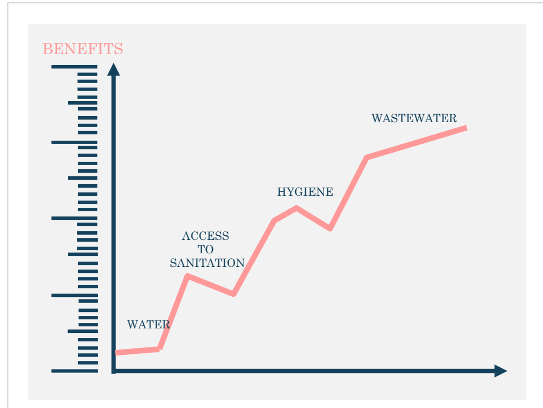
[149] Abdul Fattah, Syed Morshed, Gitisree Biswas, Nazmul Haque, Saifullah Ansar, Mojammel Hoque, Fahmida Sami and Asma Rimi. (2021). Socioeconomic and environmental impacts of bridge construction: evidence from the Khan Jahan Ali Bridge, Khulna, . International Journal of Social Economics, vol.(48)8, 1121-1138.

[150] Bidisha Sharaf (2023) Economic and political impacts and benefits of bridges, US Bridge, Civil Engineering

[151] Abdul Majeed Nadeem, Muhammad Zahid Rafique, Khuda Bakhsh, Muhammad Sohail Amjad Makhdum and Shaoan Huang (2020) Impact of socio-economic and water access conditions on life satisfaction of rural farmers in Faisalabad district of Pakistan. Water Policy, vol.22(4), 686–701/

CHART 56/ LOST LABOUR AND MOBILITY CURVE[152]
CHART 57/ THE WATER & SANITATION BENEFITS CURVE





The farm infrastructure support eradicates the manual water collection which typically fell on women. The UN Water Policy study in a rural community, confirmed that one household chore of girls goes for about 30 minutes every day in water collection. The routine takes effect in a lag in school performance, returning an increased impact on long term poverty[153].

Access to safe water raises the household living conditions, even without increasing the household income. Households with poor living conditions report 5 out of every 10 persons below good health. Children are most affected with life adjustment disability up to twenty years.

Specifically to the tea farm support infrastructure of impounding water for increased access is to sustain the six months each year with rainfall below ideal conditions. As such, the increase in yield-envelope is in full seven percent[154].

The cost benefit ratio for barrio Gadang is 1 is to 5, Pongayan is 1 is to 4, Sagubo is 1 is to 7; Karao is 1 is to 5, Nawal is 1 is to 3 and Pito is 1 is to 4.

[152] Chris Donnges, Geoff Edmonds and Bjorn Johannessen (2007) Socio-economic and transport cost impacts by economics' study; Rural road maintenance, sustaining the benefits of improved access, International Labour Organization
[153] Jennie Wong. (2015) Water and Gender, Paris: UN The World's Women/
[154] Francisco Ferreira (2019) Inequality of opportunity: New measurements reveal the consequences of unequal life chances. New York: The Word Bank/

RIFT VALLEY
Kericho, Kenya
Uniliver Tea & Chim chim Tea

Elevation 1000–2000 meters
Ave. Rainfall 1000–1500 mm
Ave. Temperature 22–28oC
Ave. Humidity 40%
Type Black teas

CAMERON HIGHLANDS
Pahang State, Malaysia
Bharat Gold Teas, BOH Red Tea

Elevation 1135–1829meters
Ave. Rainfall 100–500 mm
Ave. Temperature 20–29oC
Ave. Humidity 80-89%
Type Black. White. Green. Oolong

Shida Okabe Farms
Shizuoka, Japan
Fukamushi Sencha, or the Japanese Green Tea
(Won Japanese National Tea Award)

Elevation 100–757 meters
Ave. Rainfall 100–500 mm
Ave. Temperature 20–29oC
Ave. Humidity 80-89%
Type Green. Sencha

Gorilla Tea Trek, Rwanda
Rakkasan Teas, Rwanda Mountain Tea

Elevation 1800m to 2800m
Ave. Rainfall 1200–1400mm
Ave. Temperature 23–26oC
Ave. Humidity 80-90%
Type Black teas, green teas

Darjeeling hills, West Bengal, India
Twinnings, Lipton, Goodricke

Elevation 2045m–2074 meters
Ave. Rainfall 200–854 mm
Ave. Temperature 15–23oC
Ave. Humidity 84%
Type Black . Green White. Oolong

Colombo, Sri Lanka
Sour Sop, Green Tea Lemon, Sensations,
Camomile, Hibiscus, Mint, Chai Tea,
Royal Ceylon Tea

Elevation 1800m–2524m meters
Ave. Rainfall 243 mm
Ave. Temperature 23–33oC
Ave. Humidity 85%
Type Black. Green. White

Alborz Slopes
Lahijan, Gilan Province, Iran
Persian Royal & Earl Grey

Elevation 1600–2000meters
Ave. Rainfall 1500-1800 mm
Ave. Temperature 7–26oC
Ave. Humidity 80-90%
Type Premium black teas

Malnicherra Estate
Sylhet Bangladesh
Malotira Mountain Tea, Assam Tea Company

Elevation 790–890 meters
Ave. Rainfall 377–1456mm
Ave. Temperature 13–33oC
Ave. Humidity 85%
Type Black

Lahu Forest, Thailand
Swedish tea/ Monsoon Tea

Elevation 1135–1829meters
Ave. Rainfall 100–500 mm
Ave. Temperature 20–29oC
Ave. Humidity 80-89%
Type Black. White. Green. Oolong

China's Secret Brew
Ancient Pu-erh thousand-year-old tree gardens
Yunnan, China

Bana Tea Company
Elevation 1000–1500meters
Ave. Rainfall 377–1456mm
Ave. Temperature 23–25^{o}C
Ave. Humidity 60–80%
Type Dark tea. Pu-erh raw. Pu-erh ripe

Chapter 10/ Conclusion

This instrument substantiated the Cordillera Corridor Tea Trade Treaty as a significant strategy for resource use transition. Tea plant survival is eligibly apt to the natural elevations and climate conditions; even containing presence of specific tea weeds to ascertain the same substrate. Infrastructure investment for farm support is well within a financially fit hurdle rate above 13 percent; with a decent cost benefit ratio of 1 is to five. Smallholder farmer earnings can exceed the first capita income decile utilisation of three hectares, insofar the profit margin of a trader is very small, it translates to large sums of money by effective Accession.

Fundamentally, the Cordillera Corridor Tea Trade Treaty could momentously improve the lives of others with intergeneration impacts worth exploring. Nevertheless, it is in a setting where the farmers are frail and the local authority diffident in a political scheme characterised as concentrated, bordering syndicate.

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Special Chapter/ Social Acceptance

To tone down the hyperbole of the manipulation of the Tea Corridor Treaty; a quite decisive positivity is uncovered in the probe into the views and sentiments of opinion leaders in these barrios. Of equal importance, the earnest repercussion is told without good governance over the course of the programme. A farmer has the overwhelming desire to better the lives of the people of the barrios; apparently the farmer is constantly challenged by the lack of capacity in terms of finances and training.

Unmistakably, opinions and sentiments do not impact on the GCC equation. Notwithstanding, accession to international markets is construed by the political leadership on all levels of Government.

Farmers' Organization,
Akbot Farmers Association
Dayukong Farmers Agriculture Cooperative
Dibonow Organic Practitioners & Irrigators Association
Faith & Trust Multi-Purpose Cooperative
I Kibungan Farmer Migrants in Kapangan Organization
Kaliwaga Community Association
Kapangan Organic Practitioners Association
Municipal Agriculture and Fisheries
Nawal Farmers Association
Pongayan Credit Cooperative
Puspusok Consumers Cooperative
REDECO Cooperative
Sagubo Multi-Purpose Cooperative
Timoc Sagubo Agriculture Cooperative
Wakal Organic Farmers Association

Village Leadership,
Barrio Sagubo
Barrio Gadang
Barrio Pongayan
Barrio Nawal
Barrio Karao
Barrio Pito

Farmer Opinion Leaders,
Peter Begawen
Gerardo E. Beray
Amor Amcay
Marcela Asin
Jhonny Ayam
Editha Bawingan
Lenio Aludos Basalong
Marife Buslayan
Lito Canuto
Grace Camilo
Myra Cariño
Veronica Dennis-Catalino
Elizabeth Kantala
James Lingwasac
Syria Mapanao
Amylyn Padawag
Francis Sagpigao Sibaen
Florentino Rimando Sadac
Febrina Tadios
Crisencia Tagart

THE ZERO-SUM RUBRIC

	QUESTION 1	QUESTION 2	QUESTION 3
Positive Response	Positive response but vaguely supported with concrete explanation of the question. 3-3	Challenges Tea Corridor concept in a positive way and fully supports the Tea Corridor concept 3-2	Knowledge is certain and evidence based; using insightful justification and a broad range of agricultural vocabulary 3-1
Indifferent	No Opinion 2-3	No Concern 2-2	No Interest 2-1
Negative Response	Understands completely the reason of Key Informant participation, but cannot support the Tea Corridor 1-3	Has clear perception of smallholder farmers and awareness of Industry issues, but cannot support Tea Corridor 1-2	Strong negative. Knowledge is certain and evidence based; and fully discourages Tea Corridor concept 1-1

The score sheet of these answers uses the Rubric in a Zero-sum Philosophy; because the reality is no such thing as win-win. The principle of Zero-sum is that the gain of one side is the loss of the other side. In other words, anything that is not zero is the outliner

The Opinions and Interpretations of Industry Experts of the Locale

There are a total of 41 respondents to this survey. Each respondent is a hand-picked Key Informant selected by the Department of Agriculture and Municipal Agriculturists. A Key Respondent is recognized as an opinion influencer and acknowledged to have expert understanding, having particularly informed perspectives on the native farm life, with views that truly reflect the local famer needs and sentiments for the population under study.

Of the 41 Key Informants in this study, a majority opted to be marked down as anonymous, with only the following participant for publicity. The Department of Agriculture HVCD Regional and National Officers, and Municipal Agriculturists steered action.

For purpose of statistical measure, a confidence level of 95 percent is derived .The population of the marginalised group to draw conclusions account 6884 persons, representing Karao (989), Nawal (581) and Pito (1092) for the Municipality of Bokod; Gadang (1513), Pongayan (786) and Sagubo (1923) for the Municipality of Kapangan. At a confidence Level of 95 percent, at five percent margin of error using 2.5 percent of the population size, the sample should be 38.

Characteristics of the Sample Key Informant

On the average, the Key Respondent is mature with a discerning drawn from actual farming experience and less formal schooling. About 1/3 of the sample completed high school, another 1/3 completed university studies and another 1/3 took up some university studies. One third of the sample fall within the age group 21 and 45; half of the sample fall within the age group 46 and 65; and 1/7 of the sample fall within the age group 66 and 75.

Half of the Key Informants had worked on the farm for about twenty years; one 1/4 of the Key Informants have about thirty years of farming experience and another 1/4 with less five years on the farm. 80 percent of the Key Informants are smallholder farmers themselves with farms less than one hectares in size, and a few held farms between three and five hectares in size. Two Key Informants held a farm of ten hectares and one held a farm of twenty hectares. Only three Key Informants earned about 300-500 thousand pesos year-on-year; and all the rest had earned less than 100 thousand pesos annually.

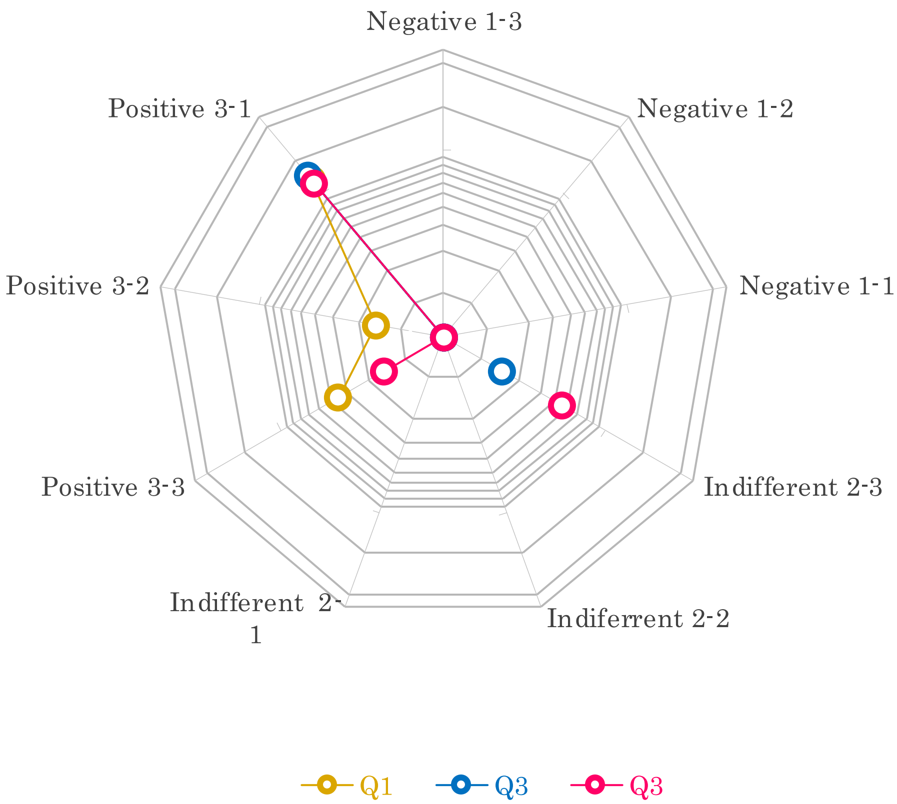
Two Key Informants are high level decision influences of the Department of Agriculture; about 2/3 or 57 percent of Key Informants represent the leadership of farmers of these localities, and 1/3 or 32 percent of Key Informants represent the opinion leaders of the Village Government. Women outnumbered the men in the opinion survey by just one unit; otherwise there is an even gender representation of opinion and sentiment.

Do you think a tea industry would be good for the locality?
Why?

There is an overall positive response, "Yes, the industry would be good for the locality." More than half of the Key Informants 18/37 emphasize the substantial contributions to livelihood; less than 6/37 Key Informants consider the implications on better health as first importance; and another 6/37 Key Informants look at the potential community growth of better worth. One respondent was uncertain while two state a positive effect is conditional to factors such as leadership and extensive farmer orientation. One respondent underscored the long term impact on the generation next, such as the farmer can afford to send the children to university.

The assertion of the Department of Agriculture High Value Crop Development is that the exclusivity of farm produce for export ought to be withheld; and that the opportunity to manufacture finished products in-country is an option in the Trade Agreement. Marketing agreements between the smallholder farmer and the Local Government Units need to be forged, on the basis that the LGU is representing them to the BRI. The expectation of all Key Informants for social and technical preparation of the participating farmers and monitoring groups; farm support infrastructure and five year fertilizer supply; are rudimental to the establishment of the tea industry in the locality; are to be attained through the Tea Corridor.

CHART 58/ SURVEY RESULTS



How do you think does the smallholder farmer feel about a Tea Corridor?

The general sentiment confirms the farmers would feel very happy about the Tea Corridor Programme. More than half or 24 Key Informants say the programme is helpful and can better the lives of the farmer because farm practices are to improve; opportunity is more and knowledge broadened. 1/4 of the Key Informants do not have good or bad attitudes as the foreseen results are conditional to the training imparted and knowledge garnered; the guidance over the initial stages and the integration into existing farm life. Three Key Informants have feelings of uncertainty and two feel strongly negative of the Tea Corridor Programme.

Do you believe the Tea Corridor is a manipulation for control? Or else, is the opposition manipulating to maintain the status quo to continue to keep the poor farmer --poor?

The dominant opinion is "No". 3/4 of the Key Informant perceives the Tea Corridor Programme to be helpful and not meant to exploit; advantageous for the women and most likely a strategic structural transition. 1/6 of Key Informants state that the controlling and manipulation of the industry strictly depends on the programme leadership as well as the scheme and systems applied. Two Key Informants are uncertain and three Key Informants put down an absolute "yes" the Tea Corridor is a manipulation for control.