

## **MSUS Culminating Experience Final Report**

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Gumantar Coffee Guide

Gumantar Community; Gumantar Vocational Education Center; GlobalResolve

### **Abstract**

The community of Gumantar in Lombok, Indonesia, one of the poorest regions of the island, is home to a large number of coffee farmers. Due primarily to production quality, these farmers struggle to earning a sufficient wage. While trying to provide for their families, the local environment often suffers. The persistent poverty has resulted in lower education levels, health care barriers, and decreased well-being. In an effort to empower the farmers and promote sustainable development, I have created a best practice guide that looks at five coffee production factors. The local farmers have specifically requested case supported, science-based information regarding these factors. The factors include farming techniques, drying practices, coffee specific small business skills, financial literacy, and coffee certification requirements. Access to information regarding these topics is intended to help reduce poverty, increase accessibility to quality education, and support local economic development, environmental health, and community health and well-being.

The guide will be available to the community by summer 2020. It will be accessible digitally via SolarSPELL technology, as well as in print at the Gumantar Vocational Education Center.

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## Introduction and Background

The village of Gumantar in Lombok, Indonesia is located in one of the poorest regions of the island. Many of the residents are coffee farmers that produce relatively small quantities. These farmers are constantly battling to earn a living wage off of their crop. As a result, they are struggling to put food on the table and clothes on everyone's back, as well as provide their families with adequate health care and education. They do not have the time and energy to invest into sustainable practices. While many of the older generations are resistant to change, the younger community members understand that alterations need to be implemented to achieve the quality of life desired (Price, personal communication BSPJ and GD, 2019). The community is becoming increasingly open to shifting their traditional norms to improve their income and quality of life (Idrus Syech, Lalu, & Lia, 2019), and with this movement, farmers are also increasingly open to exploring alternative means of coffee production (Price, personal communication BSPJ, DS, GD, and ZA, 2019).

Gumantar has underdeveloped hard and soft infrastructure. The farmers have only the rudimentary means and knowledge needed to grow and cure the beans. This results in a lower quality product that is only suitable to be sold in the traditional markets rather than to the much higher paying local resort industry. Despite dedicating their lives to coffee, currently, it can rarely provide them with a comfortable life. (Price, personal communication, 2019)

As a result of the low incomes, farmers do not have the resources to improve other aspects of life. They are unable to afford adequate building supplies to protect against the next earthquake or even remove the rubble left by the last earthquake (Price, personal communication BSPJ and ZA, 2019). Healthcare is a privilege that not all can manage, and for some, their children do not have the option to further education past primary school due to restricted finances (Price, personal communication MGGG, 2019). These restrictions impact the current status of the citizens, but they also have lasting effects that will be seen for generations to come.

The ongoing economic and social stresses have resulted in environmental neglect. Trash has piled up around the homes and along the fields, water full of soaps and chemicals flows directly into the fields (Price, personal communication, 2019). These are clear and urgent environmental matters that need to be addressed, but there are also less obvious examples. Many of the current agricultural methods aimed at increasing yield are having significantly negative effects on land productivity and biodiversity. Rather than having coffee trees planted the recommended three meters apart, they are often spaced at less than a third of this distance (Cerda et al., 2017; Price, personal communication, 2019). This practice results in soil nutrients being depleted and increases the risk of pests and diseases spreading (Cerda et al., 2017).

In efforts to increase income through increasing field size, slash and burn techniques are common throughout Indonesia (Gillison, 2004). This agriculture method results in fires that are harmful to the health of those nearby and negatively impact the biodiversity of the region (Gillison, 2004; Price, personal communication ZA, 2019). This complex system of factors has resulted in the health and well-being of the citizens being negatively impacted by poverty, pollution, lack of capacity, and feelings of helplessness (Price, personal communication, 2019).

Coffee is a thread that runs throughout the community. If managed correctly, it has the potential to drastically improve the lives of many in Gumantar. Local farmers are aware of this and have directly asked for assistance in expanding their capacities (Price, personal communication, 2019). Providing these farmers with education on the complexities of quality control, information on how to produce the best possible product, and illustrating how adopting sustainable practices can improve their health and quality of life can inspire and allow them to better take charge of their lives and futures. With an increase in economic power, the farmers will have greater power to invest in themselves. They will have power to improve their living situations as well as direct attention to the health and education of their families. The local environment may also see improvements through reduced pollution and harmful land management practices. Many of the most lucrative farming practices in this context can also be the best for the environment.

There is an ongoing project led by Dr. Buyung Agusdinata through GlobalResolve at Arizona State University that is working to create the Gumantar Vocational Education Center (GVEC). This center will offer an array of multifaceted programs. For my culminating experience I am producing a coffee focused best practice guide from which the center will structure one of their programs around. Through GVEC, the written guide will also be available, open access to the community in physical and digital form and in Bahasa Indonesian and English. The guide will offer research-based methods for small-scale Indonesian coffee farmers to increase their yield, quality, and profit margins through a sustainability lens. By increasing accessibility to such information this project will promote the community of Gumantar to invest in itself.

This guide hopes to create meaningful and lasting change by providing researched information designed to foster ecological integrity and improving income potential. The guide aims to ensure that all Gumantar coffee farmers feel educated and empowered to make the best decisions they can for their coffee. The information

provided through the guide and the changes it inspires will hopefully aid in decreasing local poverty and inequity while simultaneously increasing opportunity, well-being, resilience, and healthy land management practices. Further reaching impacts are likely to be seen such as increased access to health care and education, and improved infrastructure.

To create the guide, I have compiled knowledge from academic articles, general research, and subject matter experts in the form of academics, NGOs, coffee buyers, and coffee farmers from both Gumantar and other areas. I have looked at aspects of coffee production from growing all the way to the end consumer, providing best practices, recommendations, and resources for each major stage. The guide focuses on context specific factors to ensure that recommendations best designed to achieve the vision state are being provided. A variety of pros and cons are addressed, weighed, and commented upon. Possible risks and unintended consequences are reviewed in an effort to minimize potential negative outcomes and insure efficiency and viability over the long term.

## Literature Review

Traditional livelihoods obtained through small-scale farming are becoming increasingly insecure (Ulrich et al., 2012). The Global South is particularly affected in this regard due to climate change, global market integration, and the shift away from subsistence farming (Schmook et al., 2013). Many of the coffee farming practices commonly adopted in hopes of increasing income, well-being, and quality of life are in fact doing the exact opposite (Cerda et al., 2017; Gillison, 2004). One such example of this is the use of slash and burn agriculture which often results in clearing the forest and increasing agricultural land commonly seen in Indonesia (Gillison, 2004). These fires have been known to grow so large that they turn the sky red, ground planes, and leave citizens trapped, gasping for air all around the scattered island country (Paddock, Suhartono, & Ifansasti, 2019). A less dramatic example can be seen in the planting distances often implemented. Farmers are knowingly or unknowingly planting their coffee trees significantly too close together (Cerda et al., 2017). The hope in doing so is that they will produce a larger yield, unfortunately research shows that close proximity decreases the plant's production due to depleted nutrients and increases the risk of pests and diseases spreading (Cerda et al., 2017). Misguided practices further lock small-scale farming communities in a losing cycle of trying to make ends meet.

To best support a sustainable livelihood, Indonesian coffee farmers must have a comprehensive understanding of the market and best practices at every stage of the process. These stages include growing, drying, and selling, and each comes with its own list of concerns.

During the growing stage of coffee production there are many factors that can affect the viable yield and its quality. Already discussed was the impact planting distance can have (Cerda et al., 2017). Along with this, the concept of soil nutrients and pest/disease impact was introduced. One such plant disease that commonly affects coffee production is coffee rust. Coffee rust epidemics can destroy yields, but specific crop management through means of different combinations of shade, coffee tree density, fertilization and pruning can drastically reduce the prevalence of outbreaks (Avelino,

Willocquet, & Savary, 2004). Crop management techniques can also be used to preserve and promote soil nutrients (Beer, 1988). Beer discusses the effects of different shade trees, such as *Erythrina poeppigiana*, and how their different litterfall contributes to annual nutrients return (Beer, 1988).

Coffee bean drying is the stage of the production process which holds the greatest potential for quality influence. The environment in which the beans are dried is of significant importance. Air temperature, airflow, moisture, and even the surface on which the beans are dried all affect the drying outcome (Berbert et al., 1994). One common problem that can occur during the drying process is the development of Ochratoxin A (OTA), a type of mold (Bucheli et al., 2000). OTA can form when the mixture of drying components (air temperature, airflow, moisture, and drying surface) are out of sync (Bucheli et al., 2000). OTA also has a positive correlation with coffee fruit that falls spontaneously and the time it stays on the ground until being harvested (Paulino De Moraes & Luchese, 2003). Abdullah et al. reviews prototypes of greenhouse effect solar dryers designed to foster the ideal drying environment and reduce the prevalence of OTA tested on coffee in Indonesia (2001). Their findings were promising and highlight potential solutions for the Indonesian coffee context (Abdullah et al., 2001).

After growing and drying the beans, farmers must sell them. This is when the monetary value will be determined, so it is important that farmers understand the commodity market, exporting and its effect on the community, and how to fetch a fair price. These topics are discussed in depth throughout Nevins and Peluso's book *Taking Southeast Asia to Market* (2018). An article by Neilson gets even more specific and discusses how the global private regulation of ethical and environmental standards is impacting the value chain structures and institutions in smallholder coffee systems in Indonesia (2008). To effectively produce coffee from growth to market, farmers must have a network in which they can connect (Wijaya, Glasbergen, & Mawardi, 2017). To promote sustainable coffee production and sales the Mediated Partnership Model, which focuses on local level derived, bottom-up networking, can be applied (Wijaya, Glasbergen, & Mawardi, 2017). The article by Wijaya, Glasbergen, and Mawardi looks at the Mediated Partnership Model in action throughout Indonesia (2017).

Having a clear and concise, easy to access guide addressing each of these areas that farmers can refer back to will serve as an important link between scientific research and science in practice. The difficulties associated with access to proven knowledge are further compounded by the rural setting of Gumantar. Knowledge exchange and knowledge mobilization are critical components for sustainable action and as such, efforts should be made to connect knowledge production (academia and government), knowledge mediation (knowledge networks, actors, relational dimension, and contextual dimension), and knowledge-based action (instrumental, symbolic, and conceptual) (Nguyen, Young, & Cooke, 2017). Simply having digital access to information has been shown to promote learning, as seen in Mitra and Rana's Hole in the Wall experiment (2001).

Targeting current unsustainable practices within the coffee production chain that present less resistance to change or were included in the community's direct request

for assistance in altering will help in ensuring the implementation of the provided suggestions. Because most human behavior is goal-directed, by looking at practices which hold potential for positive, desired change that can be altered with relatively little upset to the current system, it can be expected to see high farmer buy-in and better retention of the altered practices (Ajzen, 1985; Fujii, 2006). With areas in which farmers have requested assistance, we can already see evidence of the value they place on such areas, the assumption that there is a threat, and the belief that their altered actions can result in a positive improvement. Based on the value-belief-norm theory of movement support, these realizations support my assumption that providing resources to support the desired change will be well-received (Stern et al., 1999).

## Project Approach and Intervention Methods

To best aid in the development of the guide, I have analyzed the sustainability problem and assessed the problem using criteria derived from Gibson's principles. Gibson's sustainability principles have been used because they are designed to look at social, economic, and ecological aspects of a problem to aid in better strategic decision-making for development (Gibson, 2010). During my assessment, I also reviewed the problem against the Sustainable Development Goals to help me determine where to focus my scope without compromising the integrity of the project. This sustainability problem-solving approach has allowed me to identify the current state, the root causes and associated outcomes, and identify opportunities for meaningful, sustainable change.

Using my knowledge of the current state, I have targeted aspects of the coffee production chain that I perceive as the most malleable. These aspects include areas in which the farmers have identified a willingness or desire to change their behaviors and areas that with minimal behavior change hold the potential for significant sustainable change. By doing so, I expect to see a smoother transition from the old practices to the new practices. This expectation is rooted in behavior change theory. (Ajzen, 1985; Fujii, 2006; Stern et al., 1999)

I will be delivering my final guide through multiple mediums. The expected main mode of access will be through two SolarSPELLs (open access, solar powered, digital libraries accessible via a self-generated WiFi hotspot) located in the community and managed by the Gumantar Vocational Learning Center. There will also be hard copy versions available at the center to insure access independent of technology. By incorporating SolarSPELL technology as the main delivery method of this guide, the farmers will have the ability to download the guide and access it at any time. The digital version will also allow for farmers to comment on recommendations and communicate with one another. By using technology to increase information accessibility and interactivity, I can expect a higher rate of use for the guide. (Linzy and Hosman, 2017; McCreadie and Rice, 1999)

To evaluate the guide, I sent it to a panel of reviewers. This panel was comprised of four Gumantar coffee farmers, one Lombok coffee roaster, one Hawaiian coffee farmer, and three academic subject matter experts. Their feedback was reviewed and a sSWOT analysis was conducted on each section of the guide. This insight has been used to inform final revisions and next step recommendations.

## Outcomes/Findings

By assessing the sustainability problem using criteria derived from Gibson's principles, it was determined that maintaining ecological integrity and improving income potential would be two of the core objectives of the guide. These objectives and others were then overlaid upon the Sustainable Development Goals to further focus the emphasis of my work. No poverty (SDG 1), decent work and economic growth (SDG 8), reduced inequalities (SDG 10), and partnerships for the goals (SDG 17) were determined to be the goals that most closely correlated with the mission.

During the construction of each guide section local farmers, subject matter experts, and academic literature were heavily referenced. This wealth of knowledge highlighted how truly little I know about the topic. Despite the learning curve, I was able to produce a relevant document that compiles knowledge from across sources into one central location.

The process resulted in a multi-sectioned guide (see appendix for guide's table of contents) which looks at different topics relevant to Gumantar coffee farmers. The finalized guide has not yet been delivered to the community. Due to COVID-19, all travel arrangements have been suspended, the SolarSPELL delivery date is unknown, and alternative implementation plans are being considered. Despite the disruptions, the completed guide draft was sent out to a panel of reviewers. Although the process has been retarded due to COVID-19, the feedback received thus far indicates that the guide is likely to be accepted and has the potential to make significant positive change.

Through the reviewing process specific strengths and weaknesses of the guide were discussed. The section regarding drying techniques was highlighted by reviewers as having particular potential for economic impact with minimal time required before seeing changes. If true, this will help with livelihood concerns through increased resource efficiency. The small business skill section was another section viewed as potentially being highly socially and economically impactful. This section is expected to stimulate livelihood opportunities, increase community well-being, and promote intragenerational development through local business empowerment. Other sections were met with more critique. The material on farming practices was viewed as having beneficial, Lombok specific information regarding land management and ecosystem integrity, but concerns were raised that the brief glimpse at such issues may be insufficient to accurately predict latent cascading effects, whether social, economic, or environmental.

While the impact of this project is still greatly unknown, the current state has already been notably altered in at least one way; partnership (SDG 17). I have been virtually meeting with members of the community on a regular or semi-regular basis. This includes farmers, wives, government officials, and more. During many of these meetings I have also included past and current GlobalResolve participants. This integrated communication has significantly strengthened the relationship between the Gumantar community and Arizona State University entities such as GlobalResolve. It has improved the dialog and reinforced trust between the entities. The partnership will be beneficial for all parties moving forward, as GlobalResolve intends to continue working with the community.

## Recommendations

The guide provides recommendations to farmers over a breadth of coffee production topics. Due to time restraints and partner requests, it was decided to review an array of topics at light to medium depth, however, the guide is intended to be a living document and could benefit from being reviewed, revised, and expanded upon in the future. Impact assessments should be conducted in yearly intervals after the guide is provided to the community. Each section of the existing guide could be explored in greater depth, and additional sections should be added. Depending on the reaction and interest of the farming community, the nutrients cycle and other aspects of hard science could be explored at greater depth. More complex business skills may also be desired by the community.

The guide would also benefit from a section on equity through gender, class, and disability inclusion. Issues of gender equality could be addressed through a partnership or consultation with Juniatun, the founder of Alamanda Coffee Roasting, a cooperative of single mothers from a neighboring community. She has seen wonderful success in reducing gender barriers and empowering local women over the past several years and is hopeful to spread her model to other communities in Lombok.

Guides for other local agricultural products such as cacao, banana, avocado, cashew, or clove could also be of benefit to the community. My coffee guide, and the process I used to produce it, can be employed as a template to aid the development of such future guides. The University of Mataram implemented a program training the village how to transform raw cashews into a snack food, but a knowledge gap still exists regarding the best farming practices for the nuts.

For the farmers, a list of resources, organizations, and potential partners has been included within the guide. This list is intended to provide a starting point to independently gather information that they may want. In an effort to ensure the guide is a living document, each digital section has a commenting option enabled so the farmers can remotely discuss their experiences and support each other. Remarks for these boards should be used in the future to inform edits and expansions.

My project holds great potential for future student expansion. It is expected that GlobalResolve will continue their work developing GVEC, and thus fostering room for this project, and others related to it, to grow. Following up on the process and recommendations could lead to continuous improvements for coffee farmers and other agriculture sectors in Indonesia. To add in this process, a next step write-up has been produced and provided to GlobalResolve outlining these and other observations and recommendations.

## Conclusions

By applying a sustainability problem-solving approach to the issues facing Gumantar coffee farmers, I was able to identify the economic, environmental, and social barriers impeding the prosperity of the community, the root causes to barriers, and their associated



impacts on farmers. This approach also allowed me to identify opportunities for meaningful, sustainable change.

Relevant academic literature was reviewed, and local farmers and subject matter experts were consulted at depth regarding each section of the guide. The more information and knowledge I absorbed, the more I understood that I knew very little about the complexity of coffee production. This was a handicap that I was able to work through by compiling a strong working knowledge of the topic to produce a quality document.

Continuous communication between the many different partners and stakeholders was a crucial part of successfully completing this project. Multiple meetings were held weekly between myself and different project actors. I found the most important aspect of reliable communication and project participation was buy-in. Those who felt they had a significant stake or role in the success of this endeavor were much more communicative than those that inherently cared less. This held true for both the American and the Indonesian contributors. Overall, I found no significant difference in communication frequency or quality between my international versus state-side contacts. While I feared that the largest communication barrier would be language, that was not the case. Technology has minimized the language barrier to a nearly unnoticeable degree. Instead, COVID-19 proved to be the largest and most disruptive communication barrier.

Due to obstacles imposed by Covid-19 and the complex nature of the project, many of the project outcomes are yet unknown. It is hoped that access to this guide will reduce poverty and inequalities, promote economic growth, and ultimately foster a happier, healthier, more resilient community. Feedback from the review panel indicates that they believe the guide will, indeed, support these goals. The sections covering drying techniques and small business skills were highlighted by reviewers as having a particularly high likelihood for positive impact. While these assertions are speculative, one result is already clear. This project has strengthened the partnership and trust between the village of Gumantar and GlobalResolve.

Moving forward, the relationship can be leveraged. The students of GlobalResolve should continue to cultivate open communication with the villagers. This will ensure greater success for future revisions and additions to this guide as well as any related projects being implemented through the Gumantar Vocational Education Center. Recommendations on potential guide additions and future projects have been provided to GlobalResolve for continuing the work that has been started”.

I faced significant challenges undertaking this project, from escalating communication barriers to knowing very little about coffee, having never drunk a single cup. Through the course of a few months, I was able to create and execute research and communication plans, drastically expand my knowledge, and produce a sustainability document that has the

potential to prompt meaningful and lasting change. Through this process I have been able to highlight my project management skills, my understanding of complex issues, and my ability to construct sustainable solutions for such issues. Most importantly, I am proud of the fact that the work has the potential to raise the Gumantar coffee farmers standard of living, and help them take a more systemic and sustainable approach to coffee farming.”

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## References

- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39). Springer, Berlin, Heidelberg.
- Avelino, J., Willocquet, L., & Savary, S. (2004). Effects of crop management patterns on coffee rust epidemics. *Plant pathology*, 53(5), 541-547.
- Berbert, P. A., Queiroz, D. M., Silva, J. S., & Pinheiro Filho, J. B. (1994). Drying of coffee (*Coffea arabica* L.) in a fixed bed with a simulated periodic airflow reversal. *Journal of agricultural engineering research*, 59(3), 195-202.
- Cerda, R., Avelino, J., Gary, C., Tixier, P., Lechevallier, E., & Allinne, C. (2017). Primary and secondary yield losses caused by pests and diseases: Assessment and modeling in coffee. *PloS one*, 12(1), e0169133.
- Fujii, S. (2006). Environmental concern, attitude toward frugality, and ease of behavior as determinants of pro-environmental behavior intentions. *Journal of environmental psychology*, 26(4), 262-268.
- Gibson, R. B. (2010). Beyond the pillars: sustainability assessment as a framework for effective integration of social, economic and ecological considerations in significant decision-making. In *Tools, Techniques and Approaches for Sustainability: collected writings in environmental assessment policy and management* (pp. 389-410).
- Gibson, R. B. (2006). Sustainability assessment: basic components of a practical approach. *Impact assessment and project appraisal*, 24(3), 170-182.
- Gillison, A., Liswanti, N., Budidarsono, S., Van Noordwijk, M., & Tomich, T. (2004). Impact of cropping methods on biodiversity in coffee agroecosystems in Sumatra, Indonesia. *Ecology and Society*, 9(2).
- Hopwood, B., Mellor, M., & O'Brien, G. (2005). Sustainable development: mapping different approaches. *Sustainable development*, 13(1), 38-52.
- Hosman, L., & Cvetanoska, M. (2010, December). Technology, teachers, and training: combining theory with Macedonia's experience. In *Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development* (p. 20). ACM.
- Idrus Syech, G. I., Lalu, Y., & Lia, R. (2019, May). MODEL DEVELOPMENT OF GUMANTAR TRADITIONAL VILLAGE ON CREATIVE ECONOMY.
- Linzy, K., & Hosman, L. (2017). *The SolarSPELL Offline Digital Library*.
- McCreadie, M., & Rice, R. E. (1999). Trends in analyzing access to information. Part I: cross-disciplinary conceptualizations of access. *Information processing & management*, 35(1), 45-76.
- Mitra, S., & Rana, V. (2001). Children and the Internet: Experiments with minimally invasive education in India. *British journal of educational technology*, 32(2), 221-232.
- Neilson, J. (2008). Global private regulation and value-chain restructuring in Indonesian smallholder coffee systems. *World Development*, 36(9), 1607-1622.
- Nevins, J., & Peluso, N. L. (Eds.). (2018). *Taking Southeast Asia to market: Commodities, nature, and people in the neoliberal age*. Cornell University Press.

Paddock, R. C., Suhartono, M., & Ifansasti, U. (2019, September 25). A Blood-Red Sky: Fires Leave a Million Indonesians Gasping. Retrieved from <https://www.nytimes.com/2019/09/25/world/asia/indonesia-red-sky-fires.html>.

Paulino De Moraes, M. H., & Luchese, R. H. (2003). Ochratoxin A on green coffee: influence of harvest and drying processing procedures. *Journal of agricultural and food chemistry*, 51(19), 5824-5828.

Price, P. (2019, July). Personal interview with Bagus Setiawan Putra Jati (Farmer and Village Leader's son), Dacil Semet (Farmer and Shop Owner), Gios Drefitos (Farmer), Memet Gazymon Ginzaro Gibal (Older Farmer), and Zaenul Aripin (Younger Farmer).

Schmook, B., van Vliet, N., Radel, C., de Jesús Manzón-Che, M., & McCandless, S. (2013). Persistence of swidden cultivation in the face of globalization: a case study from communities in Calakmul, Mexico. *Human Ecology*, 41(1), 93-107.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 81-97.

Ulrich, A., Speranza, C. I., Roden, P., Kiteme, B., Wiesmann, U., & Nüsser, M. (2012). Small-scale farming in semi-arid areas: Livelihood dynamics between 1997 and 2010 in Laikipia, Kenya. *Journal of Rural Studies*, 28(3), 241-251.

Wijaya, A., Glasbergen, P., & Mawardi, S. (2017). The mediated partnership model for sustainable coffee production: experiences from Indonesia. *International Food and Agribusiness Management Review*, 20(5), 689-708.