

The Decision-making Process through the Eyes of Farmers in Jamaica

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The study sought to better understand how Jamaican farmers make decisions on their farms and the thought process the farmers use to adopt or reject innovations in their farming operations. The qualitative interview protocol was developed by the researchers and included open-ended questions, which were facilitated through face-to-face interviews on or near the participant's farm. The questions in the interview protocol were each designed around each one of the stages of Rogers' innovation-decision process. The following themes emerged from the data analysis: (a) wanting to know more, (b) easy to find information, (c) guiding emotions, (d) discussion with other farmers, (e) emotions affecting decisions, (f) comparison of new to old techniques, (g) support for implementation, (h) using old and new techniques together, (i) continue if there are positive results, and (j) re-evaluate if there are negative results. To help Jamaican farmers gain access to new knowledge and innovations, it is recommended that extension professionals and other non-government organizations that focus on agricultural development build positive relationships with the local farmer groups within the community. Building positive relationships will help better understand the needs of the farmers, introduce innovations, and provide support throughout the five stages of Rogers' innovation-decision process.

Keywords: Diffusion of Innovations, Adoption, Extension, Farming, Responsible Consumption and Production

Introduction

In the upcoming years, the human population will reach 8.5 billion people (United Nations, 2024) and there is a “need for increased food production” (Cleland, 2013, p.10). According to Bergstrom (2004), innovative agricultural production methods increase food production success. However, in developing countries there are still food shortages and issues with food security. Reasons for food insecurity include, but are not limited to food handling, and food production issues (Kulmyrzaev et al., 2012). Similarly, countries in the Caribbean have a higher level of challenges associated with food security, and are impacted by climate change (Lincoln Lenderking et al., 2021). More specifically, populations in Jamaica have faced food insecurity for several reasons, which include “resource allocation and inadequate resources, and include lack of access to funding, unavailability of land, little extension support and lack of research into domestic food crops” (Beckford & Barker, 2007 p. 121).

Jamaica has large scale farms that produce most of the crops that are exported, which include coffee, sugarcane, bananas, and citrus fruits (Beckford & Barker, 2007). Whereas small scale farmers in Jamaica have less access to resources and often plant carrots, pigeon peas, coffee, and other crops that are in demand on the island (Kent, 2002), and the crops are typically for consumption within Jamaica (Beckford & Barker, 2007). Small scale farmers in Jamaica often integrate technologies into traditional practices (Kent, 2002). However, Buckland and Campbell (2022) found that farmers in Jamaica have limited adoption of online climate information services that could improve their crop production. Socioeconomic and cultural factors often contribute to the lack of adoption on the farm (Buckland & Campbell, 2022; Campbell & Lester, 2023).

Theoretical Framework and Literature Review

Rogers (2003) Diffusions of Innovations is the theoretical framework for this study and is defined as “the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, to confirmation of the decision” (Rogers, 2003, p. 381). There are five stages of Rogers (2003) innovation-decision process. The first stage is the knowledge stage in which an individual is first exposed to the innovation and learns a little about the innovation. The second stage is the persuasion stage and is where an individual develops a positive or negative attitude towards the innovation. After the persuasion stage, the individual moves to the decision stage, where “an individual engages in activities that lead to a choice to adopt or reject the innovation” (Rogers, 2003, p. 20). After making the decision, the individual reaches the implementation stage and uses the innovation. Finally, the individual reaches the confirmation stage and decides to retain the innovation or to discontinue the innovation (Rogers, 2003).

Technology has modernized the way people learn about innovations, and new forms of media help to shape the decision-making process (Rice, 2017). Knowing when innovations may

be adopted by the population is an important piece of information for the person creating or manufacturing modern technology (Meade & Islam, 2006). A study focused on Caribbean farmers found that “systemic lack of access to finance, markets, and knowledge networks is perceived as limiting smallholder innovation potential (Lowitt et al., 2015, p.1367). More specifically, Beckford (2002) posited that farmers in Jamaica are open to innovations and are continually deciding whether to adopt an innovation. However, farmers must be convinced of the value of the innovation before adoption (Beckford, 2002). Additionally, local knowledge is a critical component of the decision-making process for farmers (Beckford & Barker, 2007). Jamaican farmers use local knowledge in the decision-making process because it allows farmers to access knowledge that has been experimented with by farmers over the course of generations (Beckford & Barker, 2007). In a study focused on Climate Service Information, Buckland and Campbell (2021) found that Jamaican farmers are more likely to use information that they can directly connect to their own context.

Purpose and Research Question

The purpose of this study is to understand how Jamaican farmers make decisions on their farms and to understand the thought process the farmers use to adopt or reject innovations in their farming operations. The research question for this study is, “How do Jamaican farmers make decisions to adopt or reject innovations as it pertains to their farming operation?”.

Methods

A qualitative approach was used for this study because it allowed for the participants thoughts, feelings, and opinions to be analyzed (Creswell, 1998). Merriam posited that qualitative research strives to better understand a phenomenon through the perspectives of individuals (Merriam, 1988). In accordance with Merriam (1988), we used the generic qualitative methodology. IRB approval was granted for this research and the participants completion of the interviewed was considered by IRB to be the consent mechanism.

Subjectivity Statement

The lead author has a background in agricultural production in the United States and is currently teaching agriculture in a high school setting. The other four coauthors have experience teaching and conducting research at universities/colleges, within the agricultural field. One of the co-authors is Jamaican and helped our research team better understand the culture and traditions of living and farming in Jamaica. Three of the researchers have experience working with and conducting research with farmers in Jamaica. It is possible that experiences working with farmers in Jamaica and/or farmers in the United States could influence the findings of this study. Additionally, one of the coauthors had an appointment at [college] in Jamaica and taught an undergraduate diffusions of innovations course.

Participants

The population for this study were farmers in Jamaica. Eight farmers participated in this study. The criteria for participation were (a) registered farmer in Jamaica, and (b) currently farming in Jamaica. The farmers consisted of both males and females with varying amounts of farming experience that ranged from less than one year to over 20 years. All of the farmers were considered small scale farmers. The farmers were volunteers and were not paid or financially compensated for their participation. The participants were selected through snowball sampling. We contacted the Rural Agricultural Development Authority (RADA) in Jamaica, which is Jamaica's Extension service. RADA identified farmer's that would be willing to participate and be open to sharing details about their farming operation. Two RADA extension officers looked at their list of registered farmers in the region and contacted the ones they thought would provide detailed information. RADA extension officers accompanied two of the researchers to meet with and interview eight farmers in the Portland Parish of Jamaica. Descriptions of the participants and setting were provided for readers to self-determine if the findings from this study are transferable to a different setting (Erlandson et al., 1993; Lincoln & Guba, 1985; Merriam, 1988). After interviewing eight participants, we stopped collecting data because saturation occurred.

Interview Protocol Development, Data Collection, and Data Analysis

The stages of Roger's (2003) innovation-decision process model were used to develop the semi-structured interview protocol questions. Questions were developed by the researchers and included open-ended questions, which were facilitated through face-to-face interviews on the participants farm or in the region of the participants' farm. Interviews were conducted in December of 2023. Each of the 8 interviews lasted between 25-45 minutes and was audio recorded. Two of the researchers participated directly in the interviewing process. The audio recordings from each interview were transcribed using YuJA. The stages of Rogers (2003) innovation-decision model were used to organize the themes that emerged within each one of the five stages of the innovation-decision model. To analyze the data associated with each one of the five stages of the innovation-decision model (Rogers, 2003), deductive coding was used (Saldaña, 2016). All the coding was done by hand, without the use of computer technology.

Trustworthiness

To help establish trustworthiness, credibility, transferability, dependability, and confirmability were considered throughout the research process (Dooley, 2007; Lincoln & Guba, 1985). Audit trails were developed to link findings to the original data and to show how methodological decisions were made (Dooley, 2007). The audit trails helped to demonstrate credibility and dependability. Participant validation was used throughout the interview process with each participant to confirm that the statements were accurate and interpreted correctly. The data for this study was analyzed by one researcher then shared and discussed among the team of researchers.

Findings

The themes that emerged from the study are presented under the appropriate stage of Rogers (2003) innovation-decision model.

Knowledge Stage

Usually, individuals find knowledge when they feel a need to learn more about a subject, or when individuals are exposed to innovation that is in relation to their need (Rogers, 2003). In the research, participants indicated that they would seek knowledge when they want to learn more about a topic they care about or have interest in (P2, P4, P5, P6, P7). The participants would also seek knowledge when the knowledge was easy to find. If the farmers have easy access to the knowledge, they were more willing to consider the knowledge (P2, P3, P4, P7, P8).

Wanting to Know More

Farmers are seeking to learn more information about farming. They are passionate about farming, “I love it, I just love it, I just love the farm” (P1), “I am always interested because I love farming” (P7), and “we can do more farming” (P8). Participant 2 posited that they want to continually learn more about farming because it is a passion. Participant 4 is continually seeking new knowledge to try different farming techniques. Other participants agree with P1 by stating that they have always been interested in learning more for their farming operations (P2, P4, P5, P6, P7).

There are many reasons these farmers seek knowledge for the farm. For some farmers, this new knowledge is sought to make farming easier or more successful (P2, P3, P4, P7, P8). Other farmers, such as Participant 4, seek information to financially benefit. Other participants use new innovations because “technology seems to make most work lighter” (P3) and “it makes it easier for you and new people that you are encouraging to do the farming” (P7). Farmers also use this new technology because they are “always open for trying new stuff” (P6) on their operations or if what they are “doing or working with seems to not be working” (P6).

Easy to Find Information

When finding information about new farming technologies, participants wanted information that was easy to find. Participants would ask their fellow farmers for information about the latest innovations (P1, P2, P3, P4, P5, P6, P7, P8) or farmer’s groups according to P2 and P7. According to Participant 2, they find information about farming in their 35-member farmer group. Other participants also, “get information from other farmers” (P3). Another source of information for these farmers is YouTube or the internet. According to several participants, when seeking information about an innovation or new practice, they will use YouTube videos (P2, P4, P6, P7), or search the innovation on the internet (P1, P3, P5).

Persuasion Stage

In the persuasion stage, farmers are deciding whether to have favorable or unfavorable attitudes towards innovations. These farmers use guiding emotions to decide whether to accept or reject the innovation (P1, P3, P5, P6, P7, P8). They also collaborate with other farmers to know their opinions about the innovation. They seek advice from their friends, or experts and learn whether to adopt or reject the innovation (P2, P3, P4, P5, P6, P7, P8).

Guiding Emotions

The Jamaican farmers in this study use their emotions when deciding whether to implement new innovations on their operations. These emotions help guide them when deciding whether to implement an innovation. Participant 1 states, “I feel emotionally like when you’re supposed to try”. The participant later adds that he gets nervous about having new innovations. “Sometimes a new farming thing can be really nervous, make you really nervous” (P1). Other farmers agree with their emotions being a part of the decision-making process (P1, P3, P5, P6, P7, P8).

Farmers also use emotions after they make the decision to implement a new technology. According to Participant 3, emotion “depends on the results”. If the result is favorable, according to participant 3, if “things that work out right, then you’re very happy”. Other participants agree with this view of happiness when innovations work right, and frustration when they do not (P1, P3, P5, P6, P7, P8).

Discussion with other Farmers

Farmers collaborate with each other to learn best practices and to figure out what works for other’s operations to potentially include in their operation. According to Participant 6, they ask other farmers “because if it works for them then I don’t see why it wouldn’t work for me”. Other farmers echo this notion by saying they “discuss with each other first” (P4) before implementing the innovation (P2, P3, P4, P6, P8). Not only do these farmers discuss innovations with local producers, but they also talk with extension officers and professionals at other institutions (P2, P3, P4, P6, P7).

Decision Stage

When farmers are deciding to reject or adopt new innovations, there are many factors that help them to decide on adoption or rejection. Like the persuasion stage, emotions help guide farmers to adopt or reject new innovations (P1, P3, P4, P5, P6, P7, P8). Another factor that influences the decision-making process is a comparison between the new and old innovations. Farmers look at what the new innovations can do and compare them to what they are currently using on their farms (P1, P2, P3, P4, P5, P6).

Emotions that Guide Decisions

Farmers are passionate about their farms. They use their gut or guiding emotions to help guide themselves on what to implement and what not to implement on their farms (P1, P3, P4, P5, P6, P7, P8). Passionate feelings lead to strong emotions. According to Participant 1, “I feel emotionally like you’re not supposed to try, but eventually if you’re interested you have to try”. Other participants agree that emotions are an important factor when deciding whether to accept or reject innovations (P6, P7, P8).

Farmers will also use emotions when deciding to continue to use the innovation or to discontinue the innovation (P1, P3, P4, P5, P6, P7, P8). According to Participant 3, “if what you’re doing is positive then your emotion would be good”. Participant 1 agrees, “I feel good because at least we are experiencing something new, so if you go forward you are motivated to go forward”. Other farmers state that these new innovations can make them “a little nervous at times” (P2). Emotions guide the farmers to better understand their comfort level with the innovation and how to move forward in the future (P1, P3, P4, P5, P6, P7, P8).

Comparison of New to Old Techniques

One comparison that a farmer will make is the cost of equipment or the amount of profit compared to their current operation and cost of equipment (P2, P3, P4, P5, P6). According to Participant 6, they “first compare” the innovation to current innovations. If the equipment or cost of the innovation is too great, the farmer would not be able to afford to have it on their farms. Participant 3 states, “it may work, but is it that a small farmer can afford it?”. Other participants state that they will use the equipment, “if it is a benefit more financially” (P4) and “I can adapt their ways to get my business on the same level or above” (P5).

Other comparisons farmers will look to are on the results from harvest or results from other farmers (P2, P3, P6). Participant 2 will look at results from farmers who post videos on YouTube. According to Participant 2, “everyday there is new things on YouTube.” Participant six agrees, “if it works for them then I’ll definitely try it.” Similarly, farmers compare their own results. Participant 3 states, “I think about the positive that can happen, then think about the negative that can happen.” Other farmers do their own research to compare results, “once you research and you’re getting a lot of good results then it makes you quicker to try something” (P6).

Implementation stage

Farmers in this study use the innovation stage in numerous ways. These farmers want to perform “better at the market” (P5) and “get more money” (P6) so they are constantly looking to implement new techniques on their farms. In these stages, they are looking for support for implementing new innovations (P2, P3, P4, P5, P7, P8). Along with support, farmers will blend the new innovations with the old practices on their farms (P2, P3, P4, P5, P6, P7). This ensures the farmers will be more successful if they do not fully understand the new practices.

Support for Implementation

When implementing new techniques or technology, farmers need support from others to help use the innovative technology (P2, P3, P4, P5, P7, P8). Other farmers would like support from RADA for online training (P5) and to have step by step information on how to use the innovation (P2). These types of supports or “correct steps” (P7) for farmers would help them to be more comfortable with the new practices and allow them to benefit from having the new innovations in their operations.

Other farmers would also seek other farmers for support or advice, according to Participant 5, they look to “get advice from other farmers” while they are implementing a new practice so they can “see all you can benefit from it”. They also “seek people for training and advice and talk to other farmers” (P5) about the innovations to ensure they understand how to utilize it properly in their operations (P2, P3, P4, P5, P7, P8). Finally, the last support some farmers seek is financial help to implement the innovative technology (P3, P5, P8).

Using Old and New Techniques Together

Using current farming techniques and combining them with the latest technology can help farmers be more comfortable in implementing modern technology. According to Participant 4, they will, “keep both and learn new” techniques which makes their farming, “kind of combined” with new and old techniques. Other farmers agree that they use them together to make themselves better farmers (P2, P3, P4, P5, P7, P8).

Other farmers will use the older technologies to guide them and it “depends on the past” (P7) or past results to decide if they will adopt latest trends on their operation. According to Participant 2, introducing recent technologies “all depends on the past” and that if “didn’t work the last time I didn’t get it, so what’s going to happen now”. Using this experience “would be a trait” (P3) to understand if having modern technologies would benefit their farmers because the individual will, “look back at what happened in the past and use it to improve” (P6).

Confirmation Stage

Farmers in this study use this stage to understand if they should continue with the innovation or new practice on their operations (P1, P2, P3, P4, P5, P6, P7) or if they should discontinue the innovation after they attempted to utilize it on their farms (P1, P3, P4, P5, P6, P7). Farmers use information they collected on their farms, talk to experts from extension or universities, or discuss the results with local farmers to understand if they want to continue using the innovation or new practice.

Continue if there are Positive Results

Positive results influence the farmers in this study to continue to use or practice the innovation they introduced to their operations (P1, P2, P3, P4, P5, P6, P7). According to Participant 2, “If it actually works, I’ll try it again” and Participant 3 stated that “I will continue to use them[innovations] as long as they work well”. Participant 7 would echo that by saying, “if

it actually works yeah if it actually works” they would continue with the innovation that they implemented on their farms. Other participants would agree that if they are seeing high yields in their fields, more produce at the market, or the innovation is more "environmentally friendly" (P5), they would continue to use the practice (P1, P2, P3, P4, P5, P6, P7).

Re-evaluate if there are Negative Results

When results occur that do not improve the operation or do not change results on the farm, the farmer reevaluates the use of the innovation on their farm (P1, P3, P4, P5, P6, P7). According to Participant 1, they ask themselves “If it didn’t produce why you’d be like, why would I do it again?”. Participant 6 would echo by saying that if “the result is the same then I would do something different”. Other farmers would give the innovation another chance saying, “I would try it on a different style” (P4), “keep it at least three times” (P4), and “I’ll try it once again” (P6). Participants agree that if the innovation is not successful on their farms, they might try it one more time and then discontinue using the innovation (P1, P3, P4, P5, P6, P7).

Conclusions, Recommendations, and Implications

Farmers’ in the study, continually wanted to better their operations by understanding more about the farming industry and new practices that emerge. This aligns with Rogers (2003) knowledge stage of the innovation decision process. The farmers embraced technology to easily access and gain knowledge, which aligns with Rice (2017). More specifically, social media has allowed farmers to expand their knowledge. This aligns with Rogers’ generalization 5-3 which states “earlier knowers of an innovation have more exposure to mass media channels of communication than later knowers” (Rogers, 2003 p. 169).

During the persuasion stage (Rogers, 2003), emotions helped guide farmers on whether to implement an innovation. If the new practice or innovation gives the farmer confidence or a good feeling, farmers are more likely to adopt the innovation. Similarly, Pfister and Böhm posit that emotions are key components of the decision-making process (2008). Additionally, farmers in this study sought advice from other farmers to fully understand whether they should adopt or reject an innovation. Seeking advice from other farmers allowed for the farmer seeking advice to see if the innovation has value, which aligns with Beckford’s (2002) statements that implies farmers must be convinced of the value of the innovation prior to adopting the innovation. Like the persuasion stage, emotions are a part of the decision stage as well. Emotions that are positive will more likely influence the farmers to adopt an innovation than negative emotions. This relates to the Loewenstein and Lerner idea that emotions play a part during action that a person makes, and it leads to a decision (2003).

Past innovations also play a role in the decision-making process. When farmers think about implementing an innovation, they think about innovations/practices they are currently using. Farmers use past results to guide them into thinking about whether they need to change their practices or keep them as the same.

During the implementation stage, support from others is needed for successful implementation. Farmers seek financial support, practical support of how to implement the innovation, and support of how to carry on the innovation, which aligns with Rogers (2003). In alignment with Rogers (2003) concept of reinvention, farmers in this study felt more confident in implementing an innovation when they can combine the practices that they know or have used for extended periods of time and combine them with the new innovations they are looking to implement on their operations (Kent, 2002). Similarly, Buckland and Campbell's (2021) assertion that Jamaican farmers are more likely to use information that can be directly connected to their own context, aligns with our finding that shows farmers feel more confident adopting an innovation when it can be easily connected to something that is familiar to them. Buckland and Campbell (2022) posited that farmers in Jamaica have limited adoption of online climate information services that could improve their crop production. Our study did not specifically, focus on the adoption of online climate information services, but our findings indicate that Jamaican farmers in this study are willing to adopt new technologies if they understand the technology and see the value in the technology.

The final stage the farmers advanced through was the confirmation stage. When farmers are satisfied with the results, yields, or profits that they increased from using the innovation on their operations, they are more likely to continue using the innovation which could help solve food security challenges and help combat some of the socioeconomic and cultural factors that could contribute to the lack of adoption on the farm (Buckland & Campbell, 2022; Campbell & Lester, 2023). Similarly, farmers discontinue use of an innovation when they are unhappy with the results they are seeing, which often leads to them searching for new innovations to try.

To help Jamaican farmers gain access to new knowledge and innovations, it is recommended that extension professionals and other non-government organizations (NGOs) that focus on agricultural development build positive relationships with the local farmer groups within the community. Building positive relationships will help to build rapport between extension/NGOs and will be a way to better understand the needs of the farmers, introduce innovations, and provide support throughout the five stages of Rogers (2003) innovation-decision process. Helping Jamaican farmers identify innovations that could enhance their farming operation could help Jamaica in their effort to solve food security issues (Beckford & Barker, 2007). Future research should be done in Jamaica to confirm the findings of this study to the small sample size. Additionally, further research should be conducted with farmers from other Caribbean islands to help us to better understand how farmers within the Caribbean region make decisions to accept or reject innovations on their farms. We also need to learn more about the information the farmers seek and how they use the information to make decisions. Additional knowledge would help Extension to provide more effective information and trainings to the farmers and future research that focuses on the impact of adopted or rejected innovations and how the decision impacts the profitability of the farming operation would help to better understand the innovation-decision process.

References

- Beckford, C.L. (2002). Decision-making and innovation among small-scale yam farmers in central Jamaica: a dynamic, pragmatic and adaptive process. *Geographical Journal*, 168 (3), 248-259. <https://doi.org/10.1111/1475-4959.00052>
- Beckford, C., & Barker, D. (2007). The role and value of local knowledge in Jamaican agriculture: Adaptation and change in small-scale farming. *The Geographical Journal*, 173(2), 118–128. <https://doi.org/10.1111/j.1475-4959.2007.00238.x>
- Bergstrom, L. (2004). Symposium 2 Part 2: Food production for a growing world population. The impact of food production on soils and groundwater resources. *Journal of Food Science*, 69(9), R181–R184. <https://doi.org/10.1111/j.1365-2621.2004.tb09943.x>
- Buckland, S. F., & Campbell, D. (2021). An assessment of factors influencing awareness, access and use of agro-climate services among farmers in Clarendon, Jamaica. *Geoforum*, 126, 171-191. <https://doi.org/10.1016/j.geoforum.2021.07.032>
- Buckland, S. and Campbell, D. (2022). Agro-climate services and drought risk management in Jamaica: A case study of farming communities in Clarendon Parish. *Singapore Journal of Tropical Geography*, 43: 43-61. <https://doi.org/10.1111/sjtg.12414>
- Campbell, D. & Lester, S. (2023). Building resilience in Jamaica's farming communities: Insights from a climate-smart intervention. *Case Studies in the Environment*, 7 (1) <https://doi.org/10.1525/cse.2023.1233811>
- Cleland, J. (2013). World population growth: Past, present and future. *Environmental & Resource Economics*, 55(4), 543–554. <https://doi.org/10.1007/s10640-013-9675-6>
- Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Sage.
- Dooley, K. E. (2007). Viewing agricultural education research through a qualitative lens. *Journal of Agricultural Education*, 48(4), 32–42. <https://doi.org/10.5032/jae.2007.04032>
- Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing naturalistic inquiry: A guide to methods*. Sage.
- Kent, R. J. (2002). History and necessity: the evolution of soil conservation technology in a Jamaican farming system. *The Geographical Journal*, 168(1), 48–56. <https://doi.org/10.1111/1475-4959.00037>
- Kulmyrzaev, A., Smith, M., & Alpas, H. (Eds.). (2012). Strategies for achieving food security in Central Asia (1st ed. 2012.). Springer. <https://doi.org/10.1007/978-94-007-2502-7>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.
- Lincoln Lenderking, H., Robinson, S., & Carlson, G. (2021). Climate change and food security in Caribbean small island developing states: challenges and strategies. *International*

- Journal of Sustainable Development and World Ecology*, 28(3), 238–245.
<https://doi.org/10.1080/13504509.2020.1804477>
- Loewenstein, G., & Lerner, J. S. (2003). The role of affect in decision making. In R. J. Davidson, K. R. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 619–642). Oxford University Press
- Lowitt, K., Hickey, G.M., Saint Ville, A. *et al.* (2015). Factors affecting the innovation potential of smallholder farmers in the Caribbean Community. *Reg Environ Change* 15, 1367–1377. <https://doi.org/10.1007/s10113-015-0805-2>
- Meade, N., & Islam, T. (2006). Modelling and forecasting the diffusion of innovation – A 25-year review. *International Journal of Forecasting*, 22(3), 519–545.
<https://doi.org/10.1016/j.ijforecast.2006.01.005>
- Merriam, S. B. (1988). *Case study research in education: A qualitative approach*. Jossey-Bass.
- Montes de Oca Munguia, O., Pannell, D. J., & Llewellyn, R. (2021). Understanding the Adoption of Innovations in Agriculture: A Review of Selected Conceptual Models. *Agronomy*, 11(1), 139. <https://doi.org/10.3390/agronomy11010139>
- Pfister H-R, Böhm G. (2008). The multiplicity of emotions: A framework of emotional functions in decision making. *Judgment and Decision Making*, 3(1), 5-17.
<https://doi.org/10.1017/S1930297500000127>
- Rice, R. E. (2017). Intermediality and the diffusion of innovations. *Human Communication Research*, 43(4), 531–544. <https://doi.org/10.1111/hcre.12119>
- Rogers, E. M. (2003). *Diffusion of innovations*. Simon and Schuster.
- Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). Sage.
- Stuiver, M., Leeuwis, C., & van der Ploeg, J. D. (2004). The power of experience: Farmers' knowledge and sustainable innovations in agriculture. In *Seeds of transition: Essays on novelty production, niches and regimes in agriculture* (pp. 93–118). Van Gorcum.
- United Nations. (2024, November,). *Population*. United Nations. <https://www.un.org/en/global-issues/population#:~:text=The%20world's%20population%20is%20expected,billion%20in%20the%20mid%2D2080s.>