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Three Mini-ethnographic Case Studies on COVID: Impacts on Greek Agricultural Sectors

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Keywords

Agricultural Sectors, Extension, Food Science, Agricultural Economics, Case Study

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Abstract

COVID was politically polarizing, had global and public health impacts, and created havoc in supply chains. Social dilemmas caused by the pandemic were difficult, but also created opportunities to be resilient and innovative in agricultural extension education. This mini-ethnographic case study examined three Greek agricultural sectors from the perspectives of experts in extension and higher education. Data included semi-structured interviews, review of technical reports, and photographs in developing each case study. From the cross-case analysis, there were four emerging themes: environmental, economic, and social impacts and the innovative solutions used to address these concerns. What we have learned, and where we go from here requires reimagining training and education to broaden our reach and approaches. There is a need to educate stakeholders to access reliable data, become citizen scientists, engage in learning communities in virtual settings across sectors, and become more entrepreneurial to sustain the environment, food security, and financial stability within communities worldwide.

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Introduction and Literature Review

We have become acutely aware of agriculture, climate, and health issues during the pandemic. COVID provided a real-time case study of the science–policy interface and agricultural training and education challenges. COVID was politically polarizing, had global and public health impacts, and created havoc in supply chains. Social dilemmas caused by the pandemic were difficult, but also created opportunities to be resilient and innovative in agricultural extension education.

In the primary agricultural production sector, COVID was exasperated with climate issues, such as drought and fires affecting food, feed, and animal production (Geiger et al., 2021). Furthermore, restrictions in transport at a global level caused a negative impact on the food supply chain (Huss et al., 2021). Overall, disruptions in the commodity supply chain have made the economic survival of small farmers very challenging (Quayson et al., 2020). Farmers already impacted by climate phenomena saw shifts in transportation and low profit margins during COVID. Extension training had to consider a shift in delivery and content to address growing concerns of farmers in a time of instability, as well as the inability to have personal contact. Additionally, training on the use of technology and IT tools had to be considered in extension programs, as digital transformation is regarded as critical to address the challenges caused by the pandemic that was a dramatic content shift (Huss et al., 2021).

In the food sector, product availability and accessibility were impacted. Plastics used for safety and shelf-life of foods presented a serious environmental problem with increased refuse. In the agricultural sector of food processing, the COVID pandemic impacted consumer perceptions, driven both by new food safety concerns and increased price consciousness during a time of economic uncertainty (Kitz et al., 2021). At the point of decreasing single-use plastic, COVID caused a shift in attitudes with a clear decline in support for tighter regulations or bans on single-use plastics, along with an increase in consumers' willingness to pay for biodegradable alternatives" (Kitz et al., 2021, p. 3). The nexus and intersectionality of the issues of primary agriculture, food packaging and distribution are interrelated with economic impacts:

As the coronavirus outbreak has spread and its humanitarian impact has grown, industries that help provide for essential needs, such as getting food and required supplies safely to consumers, are increasingly affected. With food packaging being the packaging industry's largest area of activity, the \$900 billion per year worldwide industry is on the front lines. The coronavirus crisis has already led to some of the sharpest declines in recent times in demand for certain types of packaging while accelerating growth for others—such as packaging for e-commerce shipments. Such changes are presenting many packaging companies with a new set of challenges (Aday & Aday, 2020, p. 167).

Another impact of the pandemic is the negative effects on the global economy. COVID had an impact from the field to the consumer. "There is now considerable concern about food production, processing, distribution, and demand, resulting in restrictions of workers, changes in demand of consumers, closure of food production facilities, restricted food trade policies, and financial pressures in food supply chain" (Aday & Aday, 2020, p. 14). Furthermore, the pandemic has affected consumers' eating habits, as they spent more time at home and stored food due to the restrictions (DiRenzo et al., 2020). As agricultural and extension educators, we

can engage directly in research and teaching to address these issues and reach our beneficiaries using creative delivery strategies.

For qualitative ethnographic studies, context is extremely important. Therefore, no specific theoretical or conceptual framework is used to guide the analysis and interpretation. The case study as a bounded system is richly described for transferability to other settings, but there is not an attempt to generalize beyond the applicability to similar contexts. Themes emerge directly from the observations, narrative, and material culture analyses and are not theoretically triangulated. Additional publications are included as supporting documents in the case studies rather in the introduction and literature review section.

Purpose

The purpose of this study was to determine local impacts of COVID on three agricultural sectors in Greece: (a) primary agricultural production, (b) secondary food processing, and (c) agricultural supply chain. The objective was to provide authentic mini-ethnographic cases from extension, higher education, and administration perspectives as transferable research and education experiences for other agricultural and extension educators worldwide.

Methods

The research design for this study was a blend of ethnography and case study, within the bounded system of Greek agriculture. Its epistemological orientation is interpretivist or naturalistic. Case study “investigates a contemporary phenomenon (the case) in depth and within its real-world context” (Yin, 2018, p. 15). Ethnography is “the description and interpretation of a culture or social group” (Holloway et al., 2010, p. 76). Researchers can understand the cultural norms, values, and roles of participants within a particular context with limited time constraints, due to the various methods employed. This research used a mini- ethnographic approach “bounded within a case study protocol that is more feasible” for researchers with limited time and resources (Dobbins et al., 2021; Fusch et al., 2017; White, 2009).

This study conducted three exploratory cases with a cross case synthesis (Yin, 2018). Three content experts were interviewed (semi structured) and provided technical/research reports from unique agricultural sector lenses: (a) primary agricultural production within Extension systems, (b) secondary agricultural food science and processing through a professor lens, and (c) the agricultural business and economic perspective from an administrative lens. Each interview was recorded and transcribed for referential adequacy. The interview was conversational with three broad, open-ended questions: (a) describe the overall impact COVID had on your agricultural sector and within your role at the college; (b) provide an example from your research or teaching to illustrate an impact in the last 18 months; and (c) describe consequences that impacted your work and what you learned as a result. Additional data were gathered by screen captures, journals/proceedings, reflective writing, and participant observation (Fusch et al., 2017).

Member checking and peer debriefing sessions were conducted during and after data collection to ensure credibility across sectors and perspectives for trustworthiness (Lincoln & Guba, 1985). Data themes emerged through open coding from multiple sources of evidence. The use of rich narrative descriptions promotes transferability to similar contexts.

Within case patterns were cross examined for data triangulation. The criteria used for judging the quality of the cases were (a) construct validity, (b) internal validity, (c) external validity, and (d) reliability (Yin, 2018). For construct validity, multiple sources of evidence were collected from various sectors and expert perspectives. For internal validity, open coding was

used across the cases to determine emergent themes and patterns to begin building explanations. For external validity, a review of relevant literature from the sectors related to COVID impacts was examined. Reliability was ensured with maintaining a chain of evidence in an audit trail. For the cross case analyses the focus was on identifying trends across perspectives and sectors on what was learned and future implications.

Results

Mini-Ethnographic Case: Primary Agriculture Production and Professional Development Impact on Extension & Research Services During COVID

Farmers are seeking opportunities to get training, but the American Farm School can not apply experiential training, only consulting in the field. We needed to find a way to provide training for the needs of the farmers in small groups, but this required more work from Extension to accomplish these tasks. The farmers were hesitant at the beginning and then (laughs) became full collaborators with us and were excited about using the new technology for their own training, operating the tractor while attending seminars in the field. It was amazing to see them getting trained in the field, in the tractor, while doing their chores. That was a new perspective or direction for using new technologies in training with those farmers who think entrepreneurially. The age of farmers dropped from more than 60 and now in their 50s, they are better educated than their ancestors, and think that to become more competitive they need to invest money toward agriculture in a specific area. They have strong environmental awareness and follow the new CAP [Common Agricultural Policy -EU Emissions Trading System-Climate Action] steps by the book. I am very confident that agriculture in this country has a great future and will be very competitive in quality production and environmental protection. (Expert 1, Figure 1)

Figure 1

Adult Learner Participating in a Seminar While in His Tractor, May 2020



Note. Own source in compliance with 2016/679 EC regulation of GDPR.

Agricultural Production Example on Reducing the Carbon Footprint in Growing Wheat

Extension applications were addressed to durum wheat farmers operating under contract with Melissa-Kikizas Food Company S.A., a pasta company located in the region of Thessaly. The food company contracted the School of Professional Education of the American Farm School to organize and execute tailored programs from 2014 to date to cover emerging growers' needs in contemporary agricultural knowhow related to primary production. Thus, training and field consulting are the primary concerns toward specific technical topics offered during each cultivation year from November through June.

Extension training has been conducted by physical presence in the Wheat Academy of the company. Over the last three years the demographic profile of participants has been an average age of 42, with a level of education 79% high school graduates and 21% university graduates. The gender breakdown is 93% male and 7% female. Since the COVID pandemic (from spring 2020 onwards), training moved to only online. "As opposed to experiential learning methodologies, how effective is online training to not lose our educational capital? Adult training curricula are more career oriented and require a physical presence for obtaining professional skills with a learn by doing component" (Expert 1).

The training duration was approximately 34 hours with 25 adult participants. The topics included wheat certified varieties and cultivation procedures, soil and plant nutrition within an integrated management framework, and the impact of climate change on cultivation and yield. Our efforts concentrated on providing field consulting to another 52 selected growers in three main agricultural regions of midland and northern Greece (Zoukidis et al., 2021).

The results were that the average carbon footprint per acre was 692Kg CO_{2e} and the average carbon footprint per ton primary production was 443Kg CO_{2e}. The range of CO₂ in primary production went from 691Kg CO_{2e} of 1,0-ton yield per acre down to 260Kg CO_{2e} of 2,6 tons yield per acre (Zoukidis et al., 2021). "Our focus is driven towards developing new cultivation protocols capable of influencing primary production and producing a better-quality product with lower adverse effect on the environment. This will have a positive impact on business development, contributing to rural community development" (Expert 1).

Consequences

In reflection about the effectiveness of the online training and consequences, Expert 1 expressed these concerns:

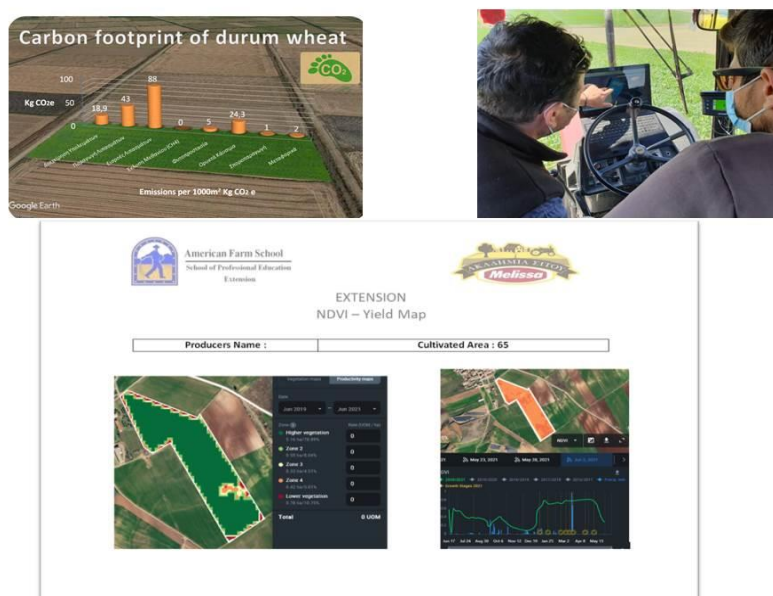
We must repeat two-three times when we consult in the fields [in person] and not through the computer. The time will come when things will be 3-D [laughs], but not now, so we spend more time doing our work correctly – based on the quality, not the quantity. We don't see our watch when we work with the farmers. Another aspect is that the farmers need to invest in new stuff all the time, new technologies every 6 months, computers...and we have difficulties with the Internet connection, depending on where the antenna, field, and farm is located. Unfortunately, Internet is not always reliable. Finally, we are exposed to COVID when doing consultancies, even though we take all the necessary precautions, but you never know. We are not afraid only for ourselves, but for what we bring into the school...Taking risks during a pandemic coincides with the conscientious mission of the Extension work. (Expert 1)

In the interview, the trend for younger and more educated participants was positive as they enjoyed the flexibility of conducting training while on their farms and were more comfortable with computer technologies for learning. The entrepreneurial approaches to improve farmer opportunities was causing a resurgence of the younger generation returning to the family land.

We are very proud that more and more farmers are interested in the program. Why? Because farmers found benefits in participating in the program in terms of gaining contemporary knowledge and skills that gradually reflect on the enhancement of returns and social status. Besides, the company assures better quality primary production to reach its current and future goals facing market competition with more confidence. Now we must interview them [training participants] to select participants because we can only accommodate 25 people per region with our limited resources. After they finish the course, even the consultant part, they are staying connected with us with phone calls and visits to the school. They bring their kids to enroll in [school] programs. Plus, the company gives a full scholarship for someone in the area who attended the seminar who is selected to study vocational programs here based upon their scores. (Expert 1, Figure 2)

Figure 2

Primary Agricultural Sector Extension Training



Note. Own source in compliance with 2016/679 EC regulation of GDPR.

Mini-Ethnographic Case: Secondary Agricultural Food Processing and Packaging Impact on Post-Secondary Research and Education During COVID

There were numerous impacts on food processing and packaging due to COVID. In the beginning of the COVID crisis, people were afraid of touching food in the supermarket because we didn't have any data about how the virus was transmitted and if the virus could survive for a long time on surfaces. People would clean their groceries once they got home, and people were afraid to even order food online for take-out. This changed over time as various studies came out saying the food was safe. There were changes in the ways people bought from the store, with interest in shopping online (Greeks were not so used to that up until now). People are still reluctant to purchase food online because they want to see their food (vegetables, fruits, meat) before they buy it...So mainly they purchased processed products online. There were a lot of changes in the food processing units themselves, as all food companies take very strict measures,

like hygiene, cleaning, gloves, hats, disinfectants, shoe protectors, etc. It was difficult for certain companies to find workers in the sector (quarantine, shutdown, etc.) and demands for certain products (such as toilet paper and baking yeast) were not in supply. We saw an excess in the use of packaging material because everything needed to be packed in separate containers, so single-use plastics increased while the EU had just passed legislation to ban certain single-use plastics. (Expert 2)

Challenges from the Food Sector during the Pandemic

According to Galanakis (2020) four significant issues impacted the food industry and supply chain. First, as consumers were looking to boost their immune system with healthier diets, the availability of probiotic food supplements and functional foods were in higher demand. Secondly, measures in the terms of food safety and hygiene were critical to minimize transmission between producers, retailers, and consumers. Findings of a survey conducted in 16 countries and involving 825 food companies demonstrated that the level of maturity of a food safety system in place is the main trigger in classifying companies and their responses to the pandemic challenge. Companies confirmed the implementation of more restrictive hygiene procedures during the pandemic and the need for using additional protective equipment (Djekic et al., 2021). The third area of importance was food security since global alerts have increased due to the various strict lockdowns. Empty supermarket shelves and long waiting lines were common images in many countries over the first months of the pandemic. Lastly, sustainability of food systems should be taken into consideration since the food system plays a significant role in achieving the Sustainable Development Goals (SDGs) set by the United Nations in 2015.

Consequences

From the professor standpoint there were many challenges. Students did have to negotiate computer time from home with parents and other siblings, but connections were good in general.

[I]t was a very challenging year and we had to be more creative, and we needed to be close to the students. When we are on campus, we say a few words and they feel more comfortable with us. The biggest challenge was with the first-year students because they didn't know us. We had to modify the teaching materials, create videos, and download videos for the practical sessions. For a specific course on sensory evaluation, what I did was make some kits with different samples for the labs we had to perform so they got the kit at home, and they were excited to open the box, and do the tasting together over Zoom. (Expert 2, Figure 3)

Some of the challenges also presented opportunities for continuing with blended and online communications. Meeting with students online, for emergencies or those needing assistance for a lab report, deadline, or exam, the school plans to continue to use Zoom. At the graduate level the college will be using a blended approach with one week delivered online and one week on campus to provide more flexibility with work responsibilities of adult learners. Faculty already had course materials on Moodle, so it helped with providing paperless access and the transition to online delivery. Graduate students were able to interact in virtual groups on a product development team and did exercises with shared files on a Google share drive. Polling, chats, and breakout rooms were an effective way for students to engage. The campus even opened for a few extra weeks with practical laboratory sessions for undergraduates and graduate students to proceed with research projects with safety measures in place. Students were able to perform at consistent levels with the shift to online and faculty created instructional materials and can be used in the future (Expert 2).

Figure 3
Sample Sensory Evaluation Kit Over Zoom



Note. Permission granted for recording and visual material in compliance with 2016/679 EC regulation of GDPR.

Mini-Ethnographic Case: Agricultural Economics and Supply Chain Impact on Administration and Agribusiness During COVID

There were several challenges during the pandemic impacting food security. We must ensure an adequate supply of food and evaluate the production and consumption to address food security. First, there was a sudden shortage of labor. Most of the labor in agriculture comes from neighboring countries who are seasonal workers who come for two-three months, and mostly harvest fresh vegetables and fruits. With borders closed and transportation of laborers who were trained for things like picking olives was not possible, farmers found harvesting to be a problem. In terms of agricultural production in Greece, it remained relatively stable. What changed and had a huge impact, was that income of consumers drastically decreased. Many businesses closed and people had income reduction and less disposable income. As we know, if there is a change in demand, the supply will also be impacted. The other thing here is that tourism decreased and a lot of the food production here is to serve the tourists. There was also the closing of the open markets (farmers markets), very common in Greek culture to buy fresh food. People shifted to buying food from the large supermarket chains (five dominant retailers in Greece), who saw a drastic increase in revenues. We moved from more direct selling from farmers to the large retailers. Another impact was the logistics and cost for exports with the additional export controls and shipping processes that had to adjust to COVID. (Expert 3)

Example of Administrative Changes for College Delivery of Educational Programs

From the administrative perspective, assessment and planning records were shared as an example of college responsibilities to ensure students were well prepared in their studies. Contingency plans were in place in case of a sudden closure with preparations for laboratory and

hands-on learning early in the semester. There was also a need to consider all the parameters within the academic systems (economic, housing, Ministry of Education, accreditation, legal, etc.) to ensure the quality and reputation of the institution were not damaged. It is anticipated that students will become more critical of online instruction and need more academic support. There was a need to continue to develop quality virtual components to include at a distance and in on-campus classrooms. Even study abroad programs were offered online. The increased work demands on faculty with increased technical aspects for delivery. “There needs to be a philosophical focus on the *real* rather than *ideal* with flexibility in teaching and learning, such as blended programs (part physical, part distance)” (Expert 1).

The distance education pilot program was evaluated, and determined that most students who were attending, were engaged, were satisfied and were able to complete the course successfully. A representative comment from the faculty survey indicated that there was “overall good feedback and learning experience according to the students with good engagement... [T]his lecture involved case study content and guidelines for the assignment. Additional material (videos etc.) was uploaded to Moodle.” Another indicated that the less mature students (2nd year) were not as engaged: “I am not satisfied with student engagement...The remainder of the course is more agricultural practice related which is more engaging to them, so hopefully things will improve.”

Consistent feedback and adjustments allowed for a smooth transition for faculty and students. The college offered orientation sessions to help address technical problems, faculty and student availability issues, and reduce stress and anxiety for both students and faculty. Even though there were minor issues with technology the first week, these issues were addressed efficiently. Many of the online sessions were recorded and can be used again for review and asynchronous learning. Overall student responsiveness and participation was satisfactory. The biggest challenge for the College, was to “develop and maintain a *collective and consistent reaction* [emphasis in original] to all students...the challenge was to respond to this crisis as a unit and not as individuals” (Expert 3). The college administration wanted to stay “emotionally connected” rather than just “electronically connected.”

Consequences

Expert 3 shared a need for more farmer training with Expert 1.

We need to adjust to the new reality. Challenges for consumers getting their food is completely different and this is extremely difficult in Greece. Why? 65% of the Greek farmers are over 65 years old. Only 5% of the Greek farming population is less than 35. We realize that it is easier with the younger population, but more complicated with older farmers because their educational level is very low. Less than 7% of Greek farmers have training, compared with 35% in Europe. So, age and lack of basic skills, and small farm size in Greece make the adoption to the new reality very challenging. So, what needs to change is training the farmers...they need to become more open-minded, entrepreneurial, and more importantly, (we cannot all become experts as farmers and teachers), to know where to seek reliable advice. That is what is missing today. (Expert 3)

Expert 3 had a unique perspective on the social and economic impacts rather than a focus on the environmental impacts.

The impact of e-commerce, we saw that there are now very sophisticated e-stores with purchasing. This trend may decrease but will continue to exist because people became accustomed to the convenience. Now it also became more prevalent to use credit cards for the transaction. (Expert 3)

From the college administration perspective, closing the school became a logistical and safety concern.

First thing we had to do was to address the challenge of student safety. We had to close the school suddenly. We had many on campus students (residential school which is uncommon in Greece). In 2019, we also had 33 students from the United States who we had to send back home, and we had to find ways to deliver their courses. (Expert 3).

Like Expert 1 and 2, the colleges' competitive advantage and reputation was tied to experiential learning with a working farm on campus. The closure caused a shift in delivery options, moving toward a blended approach. The difficulty was maintaining emotional connections with the students.

Most of our courses are hands-on courses (a competitive advantage for us). Unlike other universities in Greece, we have farms, fields, and laboratories, that require students to be on campus. We had to deliver many classes and accommodate at a time of day when both U.S.A. and Greek students could participate. Our faculty were leaders, offering classes after 6 pm to not lose the opportunity to help students stay connected to the school. Due to the quality of resources, the electronic connection was not a challenge. Most of the faculty were familiar with technologies, used Moodle for course resources, and used Zoom to stay connected and offer the theoretical offerings of the classes. Most families in Greece have access to computer technologies and the Internet (very few technical problems). The emotional connection to the students was the challenge. Every week we sent a questionnaire to the students about their classes, and we managed to have a high success rate for student satisfaction. When we were allowed to open again, we offered the laboratory work and extended the semester for one month. All students got all credits for their courses. The second year we started classes earlier. In collaboration with all faculty, we started with the laboratory sessions in case we had to close again. We were more prepared the second year to be very flexible; although, zoom fatigue came to all of us. (Expert 3)

The biggest challenge for the administration was collecting student fees and convincing parents that distance education (as offered by this college) was effective. Parents did not see the value of distance education and wanted a refund or reduced cost. "It was not easy to convince parents that the way we do distance education is of the same value if students put some effort into it" (Expert 3). The resources needed for online instruction required more faculty time for supporting students as mentors and using creative and innovative teaching techniques. However, parents ended up paying once convinced.

Cross Case Discussion and Conclusions

Even with semi-structured interviews and no solicitation as to the specific example from each sector, the cross-case analysis shows some interesting parallels. From the interpretivist paradigm, each mini-ethnographic case can be reviewed as stand-alone. However, unique and collective themes were clearly delineated through axial coding and peer review. Table 1 shows the audit trail of themes and categories that emerged across the three cases: environmental impacts, economic impacts, social impacts, and innovations in teaching and training. This discussion will provide insight into the intersectionality of impacts and consequences across sectors and perspectives (Table 1).

Table 1*Cross Case Themes by Sector and Perspective*

Cross Case Themes	Extension Primary Agricultural Production	Faculty Secondary Agricultural Production	Administration Agricultural Economics and Supply Chain
Environmental	Lower carbon	Single-use plastics	
Economic	Better ROI from training shifts and better-quality products	Labor shortage Shift from farmer markets to supermarkets (Online ordering for groceries = eCommerce)	Labor shortage Shift from farmer markets to supermarkets More credit card purchases, eCommerce Less disposable income Export controls
Social	Increased Extension workload Still need direct interactions with farmers (experiential reputation) Lack of education and training (older farmers) Shift to entrepreneurial practices	Increased Faculty workload Still need direct interactions with students – emotional connections (1 st year) Public food safety concerns Food security	Increased Administrative workload Still need direct interactions with students and farmers – emotional connections (experiential reputation) Lack of education and training (older farmers) Food security Shift to entrepreneurial practices Fewer tourists Parent and student satisfaction and paying fees for online instruction
Teaching Innovation	Training via Zoom and consultancies for experiential learning; blended learning	Sensory lab kits over Zoom, extended semester for labs for experiential learning; blended learning	Extended semester for labs for experiential learning; blended learning Assessing student progress and satisfaction

The first theme was environmental impacts. Early in the COVID lockdown there was scientific evidence of the positive impacts on the environment with people not commuting to work. In the European Union, there is serious regulation on decreasing greenhouse gases that

contribute to climate change and reducing waste such as single-use plastic. Both Extension services and higher education experts were involved with research and training on these subjects.

Economic impacts were more prevalent with the agricultural economics perspective but were also mentioned by the other two experts. Extension was incorporating the new technologies and legislative mandates in their seminars to help farmers be economically sustainable with higher quality products and less environmental degradation. In the food sector, there was a labor shortage that greatly impacted the harvesting, processing, distribution, and exportation of safe and healthy food. Within this sector, there was a shift from fresh food markets with local farmers to purchasing food (often online) from the major supermarket chains. The economist also mentioned that many businesses closed, and families had less disposable income for purchasing products and services.

There were several social impacts resulting from the pandemic. All experts across sectors were concerned about increased workload. Sudden shifts to online instruction and expanded hours and semesters resulted in working more hours remotely. All had a strong ethic about experiential, hands-on learning with direct physical contact to meet the educational and emotional needs of the learners. Both extension and administration were concerned about the training of farmers who often lack the knowledge and skills for the shifts needed to become more entrepreneurial to increase production and reduce environmental impacts. The economist also mentioned that fewer tourists negatively impacted the food and service industries. As an administrator in the college, there was also a struggle with convincing parents to pay school fees when the campus closed with coursework being delivered online. Student progress, engagement, and satisfaction were critical. Finally, the food science professor mentioned the public concern with food safety due to COVID and how that impacted the packaging and purchasing of food.

Extension, faculty, and administration all expressed how the college responded to meet the needs of stakeholders through innovative educational delivery. The college determined that one platform (Zoom) for synchronous delivery would make it easier for students to navigate the shift to online learning. All found creative ways to provide hands-on learning through extension consultancies, lab kits sent to student homes, extending the semester when campus opened to provide intense laboratory training, and being flexible with scheduling, assignments, and exams. Many of these shifts will remain, with more online content being created for multiple purposes through the school and blended learning options. Including feedback by surveying faculty and students provided opportunities for continuous improvement.

Educational Importance, Recommendations, and Implications

Given what we have learned during COVID, how will we grow, reimagine, and improve international agricultural education and extension? First, it is imperative that we *reimagine training and education* to broaden our reach and approaches. There are now sunglasses with cameras that allow extension educators to capture what they see in the field and send short instructional pieces out via What's Up, Snap Chat, Twitter, a Text, Blog... Why not? These instructional materials can be distributed across nations to communicate impending plant pathogens and pests before they come into a new region with diagnostic networks. We may have been "forced" into technological solutions, but we now have new possibilities to reach new audiences more efficiently, reducing the workload for experts addressing these concerns.

A second implication is to shift the agricultural education and extension focus on *resiliency and sustainability*. Looking across themes of environmental, economic, social, and innovation, we can use the intersectionality of disciplines to prepare our stakeholders to access reliable data, become citizen scientists, engage in learning communities in virtual settings across

sectors, and learn to be more entrepreneurial to sustain the environment, food security, and financial stability within communities worldwide.

The mini-ethnographic approach provided rich data about the impact of COVID at one institution of higher education in Greece. Future research should broaden the sectors and perspectives to include primary/secondary education, agricultural and food industries, and consumer perspectives. We encourage you to join us in innovative solutions across agricultural sectors and stakeholder groups for a productive and sustainable future.

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