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Understanding single-use plastic (SUP) during the COVID-19 lockdown through digital ethnographic research

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Abstract

How do people's interaction and behaviour change in a world where social contact is suddenly limited? How does ethnographic research change and adapt to new interaction rules? What can we discover through it? During the COVID-19 lockdown, we identified an extensive opportunity for digital ethnography (DE) to explore the evolving social worlds. As the starting point, this research aimed to inquire into the daily use of single-use plastics (SUP) consumption and disposal amongst the community that occupies UNAM's Posgraduate Unit through the design and application of a set of ethnographic analogic and participative tools. However, the COVID-19 world pandemic detoured our initial research plan and turned it into DE research. This shift required a change of theoretical contents into the comprehension and implementation of DE to rethink the field research. This article registers the adaptation of an ongoing project because of a disruptive event like a pandemic; through it, we want to share our experiences of using DE as a qualitative approach, insights about our project process and our predictive perspective about the growing problem we are facing with SUP.

Keywords: Digital Ethnography, Ethnographic Research, Lockdown, Single-Use Plastics, Design Ethnographic Futures

Introduction

We live in a world where digital interaction is a frequent activity in which we spend many hours, from sending a short text message to controlling smart objects. The most immediate example is the assembly of this article, quoting from digital sources, using digital tools for the study and analysis of the results, the collaborative writing and submission, as well as the contributions that came from different authors interacting behind a screen. This article was written because of a project developed at the Ethnographic Research Seminar in the Industrial Design Graduate School, and it was planned initially as a traditional ethnography approach but evolved into a digital ethnography study, which was fully developed during the COVID-19 lockdown.

For a better understanding of what digital ethnography (DE) means and encompasses, at the beginning of the semester we were familiarised with its predecessor, traditional ethnography. It is important to remark that in this paper, we agree on defining ethnography as "a way of practising research" (Pink et al., 2016, p. 21) in which data come from primary sources (people). DE relies on mediated contact with participants rather than an indirect presence. In fact, this approach "emerged as a response to the study of digital, mobile and networked media in everyday life, and it can be applied in different ways depending on the objective of the study" (Hsu, 2017, p. 41). We faced an opportunity because of the COVID-19 pandemic and used as inspiration the previous work and tools of DE researchers, such as "participant observation in digital contexts; delivering and communicating discoveries and research; or creating ethnographic databases" (Hsu, 2017, p. 41). We proved that "digital practices and technologies [...]

represent tools that offer a concrete step in the direction of a more participatory and inclusive ethnography, [...] more attentive to the establishment of a dialogue with the viewers” (Favero, 2017, p. 285). These ideas supported an alternative to go on with the research.

As different proponents of the approach argue, “there is not a unique method for DE, this research is methodologically innovative or ‘mixed’, transdisciplinary, empirical, contextual and cross-cultural” (Richardson & Keogh, 2017, p. 211). We used this quality as an opportunity to develop experimental research. DE is a tool for getting a deeper understanding of people’s thoughts and behaviours using digital media as a link between their thoughts and ours. It is a new virtual magnifying glass for the investigator to zoom in on and dissect modern culture; “not limited to virtual ethnography, it focuses on how our engagement with digital media and technological interfaces configure and the ways we attend to communicate and, perceive” (Richardson & Keogh, 2017, p. 215).

The main sections of the article were named after the four types of DE practice, which so far have been identified and documented by digital sociologists (Lupton, as cited in Pink et al., 2016, p.24) and applied to ongoing research developed at the RMIT University Digital Ethnography Design Centre (DERC) and point out the steps we followed along our research process:

- a. Use of digital tools to network and build conversations;
- b. Research into how people are using digital media, technologies and tools;
- c. Use of digital tools for analysis;
- d. Engagement in critical analysis of the use and consequences of digital media.

Secondary sources research

This collaborative research began in January 2020 at the Ethnographic Research Seminar. Our group identified that pollution from SUP was a common interest amongst us, especially related to the daily practices of waste production and disposal in the postgraduate building.

“Until the last months of 2019, [global] public discourse was largely focused on environmental matters including climate change and plastic pollution” (Kistler and Muffett, 2019). Mexico was no exception, since on the first day of 2020 the “Solid Waste Law” banned the use of single-use plastics (SUP), focusing on plastic bags. However, “SUP does not only generate pollution in its disposal but in its production, each year the production, recycling and incineration of plastic items emit about 400 million tonnes of CO₂” (World Economic Forum, 2016).

To empathise during face-to-face classes, we applied research tools such as self-ethnographic photo diaries and concept maps developed individually and collaboratively. Through them, we identified that most of our garbage came from SUP, mostly used for food. This was our departure hypothesis, but we needed to open the scope to the postgraduate community to know more about their motivations and habits; therefore, in the way we were framing the topic, it was pertinent to use ethnographic research.

Field research planning

The first step was contextually setting the problem we had previously identified. We realised that the postgraduate building has the particularity of being geographically isolated from the other academic entities. Therefore, it does not offer the same amount and variety of food services as the rest of the campus. The postgraduate building has only one cafeteria, which does not always provide a satisfactory service to the members of the community. Then we ideated a way to ask the members of the community about the practices mentioned before with a series of analogical and participative tools to understand how

the garbage in the building is generated and disposed of, but also to know if the community was conscious about the pollution generated by SUP.

To get a notion of the SUP sources, we discussed the relevance of what and how to ask and agreed on the following questions, listed in Table 1, and designed illustrative ways to engage people interactively to collect their responses (see Figure 1).

Questions
How many snacks do you consume during the week? (Quantity and variety)
Where does your food come from?
How is your food packaged or contained?
Do you carry a reusable water bottle with you?
How many coffees do you buy in a week?
What would it take for you to stop using single-use plastic?
How do you classify this waste?
How could we generate less plastic waste in the Postgraduate building?

Table 1: Kick-off questions, before transitioning to DE.

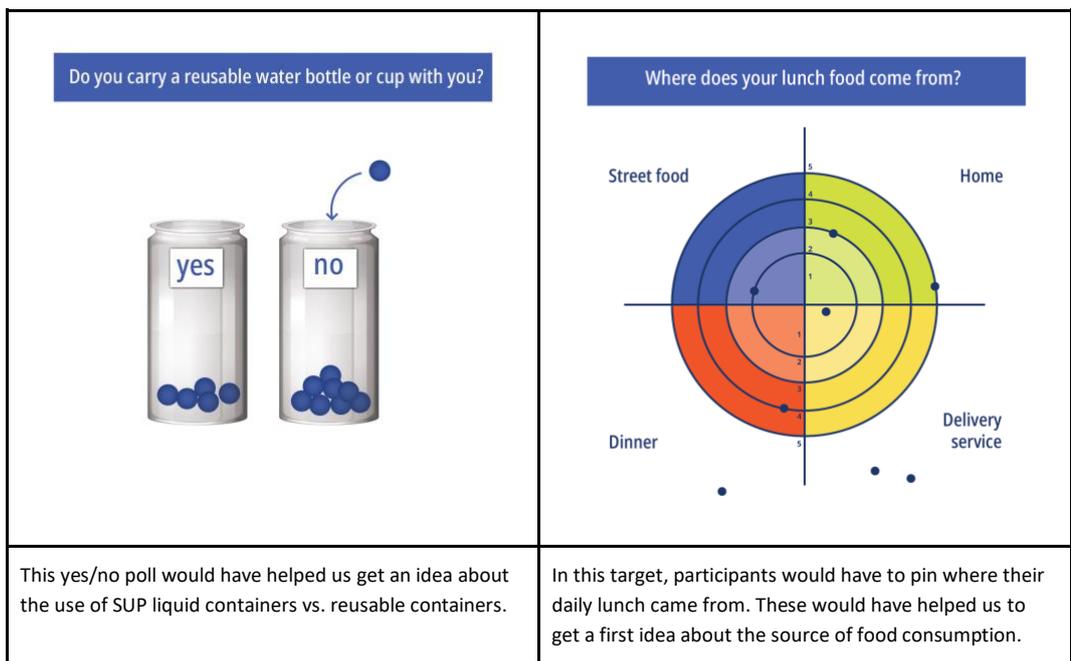


Figure 1: These are two examples of the designed analogic and participative tools. These interactive panels were supposed to be installed outside the cafeteria.

Adapting to the world's pandemic

“COVID-19 was implicated with the outbreak of uncommon pneumonia in the Chinese City of Wuhan, Hubei Province. The first cases were reported in late December 2019. Since then, the virus has spread to other Chinese cities, to other Asian countries, Europe and the rest of the world. Each nation implemented its own health strategies according to its contexts” (Samson et al., 2020). In Mexico, the first case was

confirmed on 29th February (BBC News Mundo, 2020), and the voluntary lockdown started on 23rd March 2020 with the countrywide campaign “*Jornada de sana distancia*” (Healthy distance campaign) to increase social distancing and reduce the speed of the virus transmission.

“This campaign, similar to other countries, included basic prevention measures such as frequent hand-washing and correct coughing, no social contact, suspension of non-essential activities, the reduction of access to public space up to 50% of its capacity and suspension of massive events” (Animal Político, 2020)

Besides the national plan to deal with the pandemic, our seminar faced the administrative adaptation announced on 20th March, where “presence-based scholar, academic and administrative procedures and formalities were suspended until further notice, and each academic entity was responsible to adapt and preserve their activities” (Grauje, 2020). This situation caused the adjustment of our initial (traditional) ethnographic research, which at that moment was at the end of the planning phase, to a DE study. This approach sought “to radically transport, manipulate and reconstitute research materials with ease” (Hsu, 2017, p. 41), so all our previous work basis was adapted to the alternative research method.

This adaptation had to analyse and take into consideration the contextual particularities of the new (virtual) space within which we as researchers would interact with participants. One of the most important facts to consider was that traditional ethnographers immerse themselves in the world of their studied subjects, sometimes for long periods, to have a full comprehension of the studied phenomenon. The constant presence of the researcher in the subject’s physical space enables trust and comfort between them, giving the subject ease to naturally behave in their context.

In this case, it was recommended not to interact personally with our participants because of the situation, so we faced the question of how these spaces transform in DE. Cultural geographers contend that space and place are constructed culturally, suggesting that spatiality can form online. Although “online communities exist as legitimate places and, conversely, place-based communities exist online, such as national publics, regional networks, and local ways of living” (Kraemer, 2017, p. 180), both “production and construction of space are mediated by social processes, especially being contested and fought over for economic and ideological reasons” (Low, as cited in Kraemer, 2017).

To avoid the debate aroused among digital context researchers about “the extent social worlds that involve digital elements are reducing, increasing or changing social life and its consequences” (Pink et al., 2016, p. 130), in this article we agreed with defining the social world as Pink et al. do, namely “a neutral, heuristic concept that invites empirical investigation and comparative analysis. Though this definition is highly polysemic, it comes with fewer moral or normative strings attached” (2016, p. 149). This enabled us to discuss the use of social media platforms during the pandemic’s first weeks and identify the proper “space” that would facilitate the path of meaning making (Favero, 2017, p. 284).

Covid-19 and the plastic use context

With the growth and evolution of the pandemic, the hierarchisation of plastic use changed from sustainability to self-preservation; inevitably, SUP became a major issue. Decision-makers turned in favour of the use of SUP, and local policies were revoked. There was no time to prevent the urge for using plastics, and this has overtaken any sustainable initiative. The first hint was our seminar discussions on how some of us tried to keep ecologic practices, and food providers limited our options to pre-packed versions of products that a few weeks before you could have bought in bulk. Our research participants shared similar

experiences, and finally, worldwide news photos of face masks littering beaches and reports on general poor waste management reaffirmed our hypothesis on how the COVID-19 emergency left no space to discuss SUP control.

“This phenomenon was not related to Mexico; in Europe, stakeholders that have a role in decision-making, shifted their perception on environmental care, with concerns related to the COVID-19 outbreak ...” (Grodzińska et al., 2020).

“To maintain health safety standards, sanitization SUP became a must in everyday life leading to a shift in value hierarchization ...” (Bardi et al., 2009; Homer & Kahle, 1988, cited in Grodzińska et al., 2020).

Shifting from analogical to digital ethnographic research.

Amid the COVID-19 pandemic context, all face-to-face classes were suspended, and the application of the interactive research tools that we had designed was cancelled. Nonetheless, shifting to digital ethnography was more than a remedial measure, as Postill (2017, p. 67) states:

“... it is a “second best” choice for [researchers] unable to reach their field sites for reasons of safety, illness, or disability. It often helps us to observe familiar people and things from a different perspective, thereby creating a richer engagement with the worlds of our research participants”.

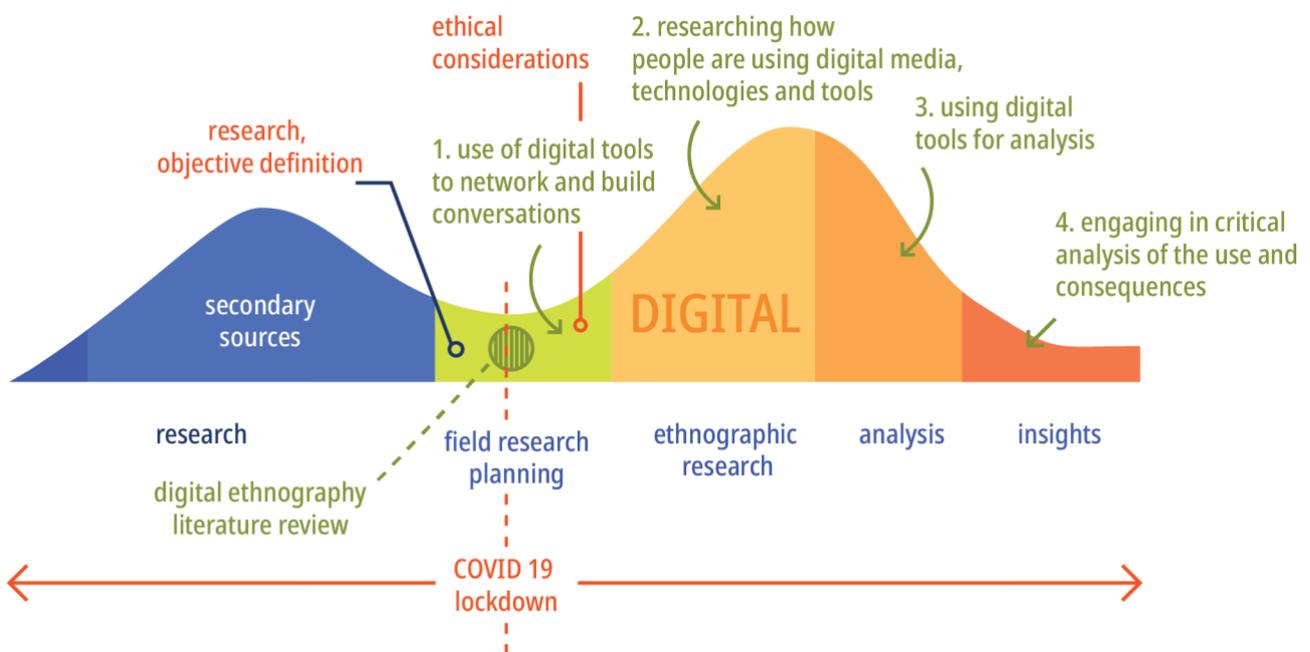


Figure 2: Research process and tools timeline.

Use of digital tools to network and build conversations

There was no doubt about the potential that the Internet has for mediating contact with a community; thus, we decided to overcome this situation. On our first Zoom meeting (our alternative workspace), new inquiries and questions related to the initial food packaging waste topic arose, which led us to adapt our objective to inquire about the use of SUP, its consumption and disposal practices during the quarantine and to design the remote field study application.

An example of how our initial questions from the analogue research evolved to the digital version was, “Where does your lunch food come from?” Depending on the answers (delivery, dinner, home, restaurant, or street food), we would get insights into how many of these meals produced plastic waste. In the Facebook group, we asked how many delivery services our participants had ordered during quarantine time (April 2020), where they were buying their groceries and how they arrived at their homes.

In this transition to DE, we planned the research process collaboratively through Google slides, as Figure 3 shows. Also, the activities we initially had in March were modified in this process, as shown in Table 2.

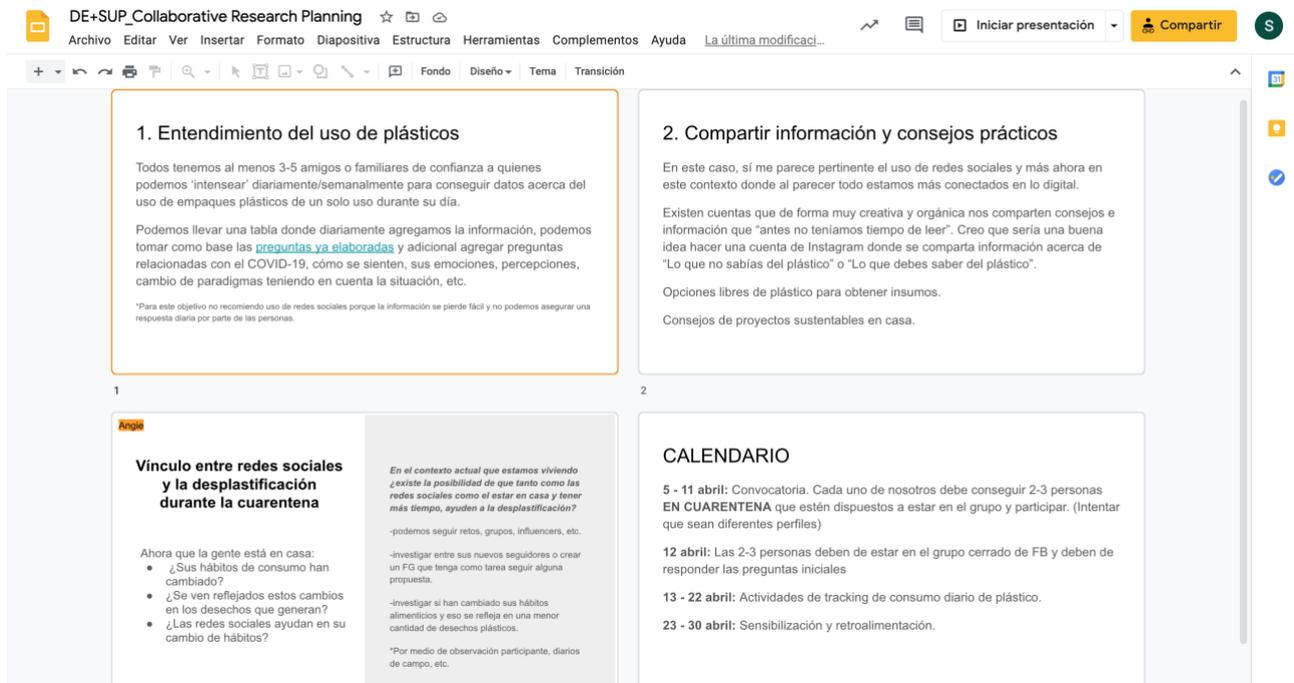


Figure 3: Collaborative research planning made by the research team in Google slides.

Researching how people are using digital media technologies and tools

Once the new objective was stated, we evaluated the platforms that could help us. According to Favero (2017, p.276), “interactive platforms can function as a tool for generating new multimodal and participatory ways for both displaying and producing ethnography”. Facebook Groups was the chosen platform because “during quarantine, people were using more than usual social platforms and Facebook is still the most used one” (Statista, 2020; New York Times, 2020). We chose the Groups feature, so that we could have a small community answering one question/activity per day, and the posts would remain there for as long as we needed. Also, posts would appear in the participants’ feeds, and, if they forgot to answer, we would be able to remind them through private messages.

Activity / Question

A1 (Google forms). Hi! Could you help us to know you by filling out this form?

A2 (FB poll). Since lockdown started, how many delivery services have you ordered? Mark your answer in the poll and specify in the comments what you ordered.

A3 (FB post). Could you share on this post a description, photo or video of what you used to prepare your breakfast, lunch or dinner? Try to show the product's packaging. Thank you!

A4 (FB post). Could you help us understand how groceries arrive at your home? If possible, share a picture in the comments section of this post (It does not have to be from today; it applies to the day that you ordered or from the day before). Tell us, where are you buying your groceries?

A5 (FB post). During lockdown, have your food expenses increased or decreased? Could you comment on why or how?

A6 (FB post). During lockdown, has your online shopping increased or decreased? In what kind of packages were they delivered and what did you do with them?

A7 (FB poll). During lockdown, which of these products have you bought? Please comment on how many of each.

A8 (FB post). What would you do if the garbage truck stopped working?

A9 (FB post). During lockdown, have you noticed an increase in your single-use plastic-wrapped food consumption? Which ones? If it has not increased, what are the containers or wraps of your food?

A10 (FB post). Please share with a comment what could you do to decrease single-plastic consumption during a lockdown.

Table 2: Activity planning: the order of the questions and the platform features were decided among the researchers.

Even though Facebook Groups, comments, polls and the possibility to upload pictures was helpful, this platform did not allow us to collect all the responses in the same database to make the analysis easier phase, so all responses were captured manually in Google Sheets (Figure 4).

Plástico en Casita (Database)									
La última modificación se realizó hace 2 minutos.									
16-Mar-2020									
	¿Cuál es tu nombre? (nombre en FB)	¿Dónde vives?	¿Qué día iniciaste la cuarentena?	¿Qué actividades has realizado en tu casa durante la cuarentena?	¿Con quién vives?	¿Hay nos podrías compartir en los comentarios de este post, una descripción, foto o video de lo que ocuparás u ocupaste para preparar tu desayuno, comida o cena? (Intenta mostrarnos los empaques en los que vienen los productos) (Gracias).	FOTOS ACT. 3	¿Podrías compartir con nosotros la manera (empaques, envoltorios, bolsas, presentaciones) que llegan los artículos que compras a tu casa?	Registro fotográfico
4	Osiris Vite	CDMX	16-Mar-2020	Home office, curso online, leer, bailar, yoga, labores de casa aseo, lavar la ropa, despensa, jardinería	Pareja	<p>Preparo la comida para toda la semana, la coloco en recipientes de plástico o vidrio.</p> <p>Uso bolsa de mandado para evitar utilizar de plástico o cajas</p> <p>Las bolsas, recipientes de plástico o de vidrio los lavo y reutilizo</p> <p>Los recipientes de plástico para guardar fruta o comida los chicos para hacer hielo, los de vidrio para guardar semillas, le algunas especias</p> <p>Bolsas lavadas para reusar al comprar</p>		Son latas, cajas de cartón, bolsa celofán, tetrapack, botellas de plástico. Si voy al super, tienda de abarrotes o tianguis llevo mi propia bolsa y bolsas recicladas para la verdura si es que se necesite sino las evito.	
6	Kam A. Sarmiento	CDMX	13-Mar-2020	Leer, cocinar, actividades artisticas .	Papá	<p>Envases reutilizables de plástico o vidrio, utilizo en cada compra de alimentos específicos.</p> <p>Bolsa plástico que contenía huevos.</p> <p>Empaque plástico para mantequilla.</p>		<p>Empaque plástico fresas.</p> <p>Bolsa galletas.</p> <p>Bolsa plástica para queso.</p> <p>Recubrimiento plástico 1/3 sandia.</p> <p>Verduras bolsa reutilizable.</p> <p>Huevos bolsa plástica.</p>	
11	Stephanía Cj	España	6-Mar-2020	Lectura, ver series, ejercicio, cocinar	Familia	Huevo, espinaca, café, puré de tomate y avena.			

Figure 4: Google sheets database generated from the feedback provided by the participants in the Facebook Group.

Using digital tools for analysis

As mentioned above, we invited participants from our social circles that we knew were staying at home during the quarantine and had a Facebook profile. Thus, we had the confidence to remind them to participate if they had not answered activities. DE broke the geographic barrier, so we were able to collect answers not only from different states in Mexico but also from Medellin, Colombia. Our population turned out to be almost evenly distributed between men and women, with an average age of 35 years. Contact with participants, as well as between ourselves, was digitally mediated the whole time.

While inviting our participants, we encountered the ethical considerations of making the objective or motives of the investigation clear at the beginning of this study. This made participants trust the research but, at the same time, it could alter the outcome of the research, predisposing participants to respond the way they thought researchers wanted to. In particular in our research, we briefly explained the motives and reasons behind this study to the Facebook group members. Also, we created a visual image to present the research with proper formality and uniformity (see Figure 5).



Figure 5: Banner used to invite people to join the Facebook group "Plástico en casita" [plastics at home].

DE research on Facebook included activities like polls, narrative comments, and photographic evidence. These resources, according to Favero (2017, p. 276), are multimodal, material, and relational items; the task we had as researchers was to recover ethnographic evidence, awakening the conversation with participants to deepen insights on the material they were sharing with us.

At the end of the activities, the information we received from our participants was as follows:

- Most of them had ordered home delivery 1 to 3 times during the first month in lockdown.
- The most consumed product categories were prepared food, groceries and home accessories or toys. All of them were contained in SUP packages and wraps.
- Supermarkets and retail companies were their first point-of-purchase choice, second were local public markets and third the local convenience store. Participants who got their groceries in supermarkets declared that they acquired more packaged products than before lockdown. Participants who got their groceries in public markets and local convenience stores still used market tote bags.
- A significant number of participants reported that their food expenses decreased because they began to eat fewer meals a day and prepare them at home. On the contrary, there were also cases where food expenses increased due to a rise in food prices and food anxiety-related disorders, as mental health was undermined for some.
- The most consumed COVID-19-related products were facemasks, hand sanitiser and medicines.

- The participants considered changing their consumption habits and implementing reuse and recycle practices when asked to imagine a scenario where the garbage recollection truck stopped working. This question caused surprise and some distress in them.
- The participants proposed reducing SUP use by being a responsible consumer and adopting practices like buying in bulk, avoiding purchases of products contained in SUP and the use of market tote bags.

At the beginning of the research process, some participants asked for the results. We interpreted this as a sign of interest in the topic and engagement with our research. The research team decided as an ethical principle to share with them not only our findings, but also extra information related to the discoveries on the Facebook group, as shown in Figure 6.



Figure 6: Insights—visually expressed—shared through the Facebook group.

It was interesting to witness how a community started to develop among participants who, at the beginning, did not know each other. From their public answers, they started identifying what tips they could share and to inspire each other on different projects like composting or making eco bricks.

One of the emergent aspects of this research was the co-evolution of the participants' responses from their appraisal of others' comments in the group. Then, a participatory experience and construction of common knowledge emerged. We identified that participants might have started to feel insecure about revealing their true practices since they began to reshape their answers as activities went on during the field study application, making each response more detailed and supported by photographs. We also wondered if there were participants who abstained from answering certain activities because they felt embarrassed due to how they handled SUP.

Our interpretation

To start envisioning future design opportunities and different scenarios, we mainly reviewed the work of Akama, Pink and Fergusson (2015), who proposed a framework for studying futures that combines ethnographic research with various disciplinary practices like design research, to provide a step sideways and to depart from traditional approaches in DE and Human-Computer Interaction (HCI) and named it Design + Ethnography + Futures (DEF). This approach creates a different way to consider design opportunities to trigger change-making initiatives and change behaviour.

The DEF framework has been applied before in workshops, but we adapted it to our research, helping us to explore people's cultures and the human capacity for improvisation in an emergency state involving the use of SUP, as well as to recognise uncertainties that could help us foresee how possible future scenarios might emerge. Regarding this, Akama et al. (2015) remarked:

“Our interest as designers and researchers has relied on understanding and creating change, working with emerging qualities and with people with whom we share journeys into the immediate future and that we have always been oriented towards future making and willingly embrace the unexpected”.

We combined the DEF framework (Akama et al., 2015) and the previously mentioned four types of practice (Pink et al., 2016) to develop the interpretation phase. To accomplish this task, we used the Miro app, a collaborative whiteboard that enabled our team to work in real time, organise data and identify design challenges in the immediate future, as shown in Figure 7.

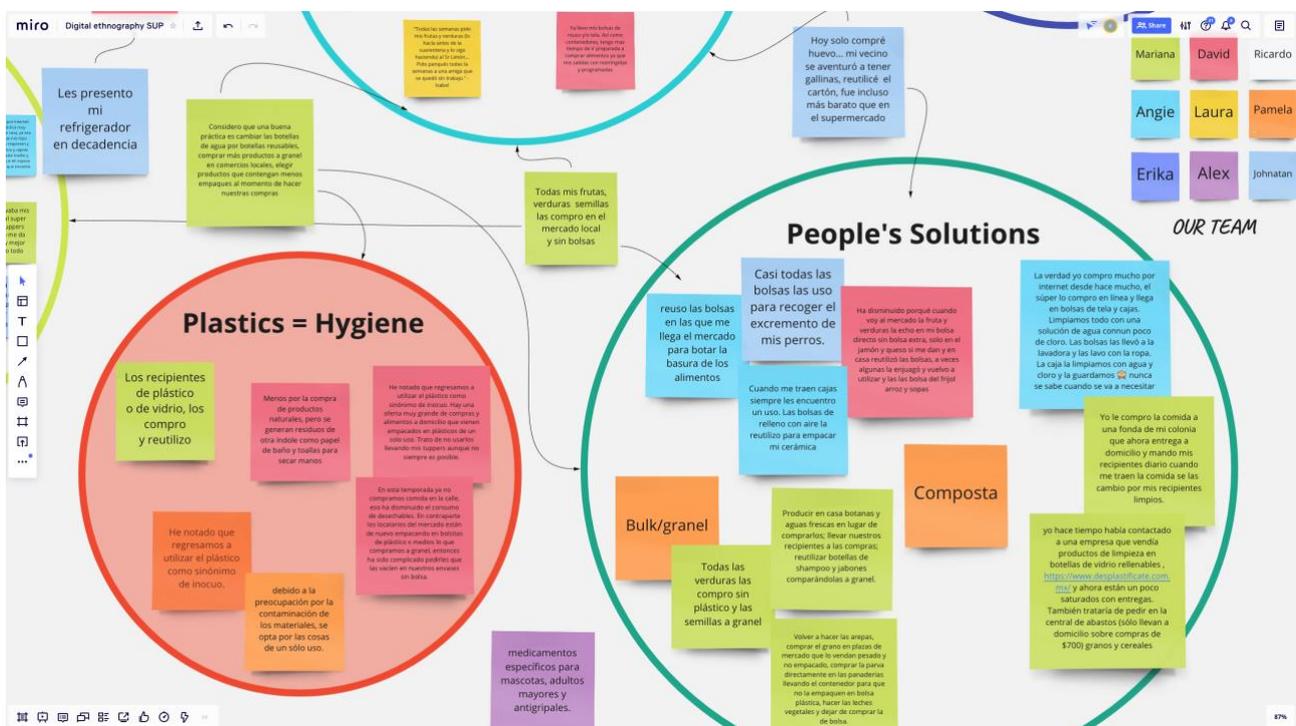


Figure 7: Using the DEF framework in Miro to find patterns, make connections, interpret answers, and visualise dynamics or tendencies.

Engaging in critical analysis of the use and consequences of digital media

At the end, we obtained various conclusions:

- About design research tools, there were some mistakes while formulating questions; some participants commented that they did not reply to some activities because they did not understand either the question or the instructions. As questions were formulated in language open to participants' interpretations, they answered according to their understanding. This bias might have led to the loss of some information.
- About the research progress, researchers should encourage participants to tell their stories and promote fluid communication. We realised that enriched storytelling from participants reflected the trust they had in the research team or goal.
- About replacement of physical interaction, there must be compensation for the limitations of participant observation, not only through the narratives but also with images or photographs that support it. For the photographic analysis, the researchers must develop a trained eye to understand the context, situations, interactions between objects and humans and ways of living reflected in the picture. By asking participants to take a photo of their daily consumption and to tell us about what they bought, we discovered useful insights about plastic consumption, behaviours and future design opportunities. Sharing insights with participants so that they could have certainty about how we used the elicited data reinforced their confidence in how their answers were used.

One of the most important findings we restate is the importance of empathy as a skill for ethnographic studies to understand people and their relationships with life and their own view of their worlds. Amid COVID-19, this was important for our remote field research because empathy became a constant reminder to keep a critical point of view about the complexity of timing and situation while research activities were developed.

Possible future scenarios

As an outcome of the DEF approach, we agree with Pink (2020) that to overcome future ecological and health crises, society should adapt and benefit from digital connections to reduce their ecological footprint. Under this premise, we worked on the creation of different future scenarios to explore design's opportunities regarding possible future crises, such as:

- New business models for industries, distinct service solutions, new payment options, communications and learning solutions.
- Business guaranteeing the cleanness-related values people have for SUP while reusing, recycling, and reducing its consumption.
- How new human interactions emerge and change against the modification of one's objects.
- Transformation of public spaces and transportation.

We used the Hitachi Foresight North America 2019 card set, developed by d-lab (2019), which condenses emerging trends in economics, society, technology and politics; this tool was used to provoke conversations—amongst our research group—about the future of SUP. For this article, we chose to present only as an example the outcome related to the “plausible scenario” (Voros, 2003), where current

knowledge could happen, the context remains the same, opportunities are maximised, and threats are minimised.

In this scenario, we used the “devastating inequality” (dlab, 2019) trend to think about the SUP future consumption problem. The departure point is context, where we observed through DE research that household consumption has a strong tendency to use SUP to deal with the pandemic problem. This consumption behaviour in the healthcare context has also increased.

The opportunities lie in:

- New recycling processes, as well as safe disposal programmes that diminish exposition risk to the people that manage the residuals. There is a broad opportunity for design to develop new material alternatives that aid to keep cleaner and healthier practices—this was a common perception about products wrapped in plastic among research participants. The threat we should minimise is long-term responses due to emergency situations, in reference to the gap between knowledge and implementation.
- Changing consumption habits and reducing SUP consumption were also enunciated during the research process. The DEF framework led us to think about the imperative shift from consumption towards an ethical economy (dlab, 2019), where consumers are no longer blindly loyal to brands but make their purchase decisions based on how a product or service is made of and what it stands for. To achieve this scenario, companies should realign their brand, act with transparency and be empathic to current situations such as the pandemic. A trend to link to new consumption practices and be considered a serious opportunity is “tailored services” (dlab, 2019), which must be regulated to not provoke quick production, delivery and hyper customisation but nonetheless, at the same time, make the shopping process effortless, involving fewer steps.
- Regarding digital interaction, current evidence shows that mediated contact with people will keep growing, not only during emergencies like the COVID-19 pandemic but also to get closer to long-distance communities and thus enrich knowledge through new interactions or even to reduce urban mobility. Somehow this will lead to the development of “adaptive cities” (dlab, 2019) where infrastructure will be responsive to resident’s needs and changing conditions. In adaptive cities, change will be anticipated in modular and resilient ways that are modifiable whenever needed. Due to the pandemic, we put into practice adaptive conditions; schools and students had quick adaptation to provide personalised on-demand services and promote flexible learning of contents and new skills. This tailored service has been aided by online platforms, apps and teleconferencing, making learning multimodal.

Conclusion

The pandemic triggered a quick migration from the in-person world to the digital one. Though digital ethnographic research is a work in progress, it has been in development for at least 20 years, but under lockdown conditions it has represented an important tool to go on with certain research projects.

Our project adaptation benefited from its virtues (budget friendly, inclusive and facilitating collaboration) and enabled us to establish communication with our participants and with our teammates.

Research discoveries led us to think about alternatives that could optimise the ongoing dynamic and mitigate negative effects into positive social changes in domestic and commercial SUP consumption. But

at the same time, the futures approach pointed out the urgency of developing handy waste management systems, which enable users to efficiently separate household waste and promote specialised collection systems. Furthermore, regarding SUP consumption, we found an opportunity to recycle cardboard and paper produced by courier, package delivery and mail services, which has been intensively used during pandemic lockdown.

Everything learned during the DE project and the obtained findings are currently being used for exploring possibilities to properly conceptualise and design innovative and emergent solutions that use waste materials to face problems such as land degradation and food safety.

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