Impact of COVID-19 on Customer's Perception About Purchasing Digitizable Products

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***Abstract*—As the Coronavirus Disease 2019 (COVID-19) pandemic forces governments from all over the world to apply many restrictions and regulations, our lives and economies are affected tremendously. Thus, also the E-Commerce (EC) faces new challenges it must tackle to succeed during the current situation. Therefore, the paper presents a survey addressing customer's perception about purchasing digitizable products (DP) and how it might have changed due to the COVID-19 pandemic. For this reason, four research questions have been formulated. They are answered by considering the results of the survey which had 42 participants in total. The results indicate that the COVID-19 pandemic has impacted the participant's perception about purchasing DP by boosting the EC and decreasing the commerce of traditional local stores. Furthermore, the participants clearly differentiate between all categories of DP by having different preferences for each that online retailers should carefully consider. Future work should continue focusing on the scope of this work by investigating the impact of the COVID-19 pandemic on the customers' buying behavior regarding DP and all other kinds of products or services offered, as the presented results only provide brief information on trends possibly occurring.**

I. Introduction

Since the new COVID-19 was firstly reported to the World Health Organization (WHO) on the 31st of December in 2019, already on the 11th of March in 2020 the WHO characterized the COVID-19 as a worldwide pandemic [1]. As COVID-19 caused many deaths rapidly (375,902 confirmed deaths by the 2nd of June in 2020 [2]), many state's governments from all across the world have imposed strict regulations by the middle of March [3]–[5]. These very similar regulations have impacted the world, the people's life, and many economies tremendously. E.g. the German government closed all public institutions and shops by the 16th of March preventing and prohibiting their people to purchase products in local stores (except for stores providing essential products such as food and drinkables) [5], [6]. By the 19th of April in 2020, the German government already allowed shopping in smaller stores (with a max. area of 800m^2) again [4], [6], [7]. By the middle of May, shopping in all kinds of stores was allowed again [6], [8], [9]. However, all stores must stick to strict conditions very carefully i.a. involving allowing only the maximum amount of customers in parallel [6], [9].

According to [10] and [11], the worldwide crisis caused by the COVID-19 pandemic threatens the global and many country's local economies tremendously due to missing revenues and strict restrictions. Additionally, both [10], [11] state that our world will not be the same as it was before the pandemic. Thus, new strategies and measures have to be adapted and developed to save robust and sustainable business models [10]–[12]. Moreover, in [13] a change in consumer's buying behavior is noted caused by the COVID-19 crisis and the people's worries alongside. The authors of [14] concluded that the EC takes advantage of the current COVID-19 crisis, as they noticed a rapidly accelerating growth in online shopping. Still, many customers pretend to plan reducing spending money during the pandemic [14]. According to [15], the demand for purchasing books online in Vietnam has increased as a result of the COVID-19 crisis. Similar effects have occurred for platforms like Amazon [16] or Netflix [17] and their provided products. Generally, [18] investigated an overall increase in online shopping and a slight decrease in conventional offline shopping. Moreover, the World Trade Organization (WTO) noted a generally increasing demand for EC due to the COVID-19 pandemic [19].

Hence, the objective of the paper is to study how customers perceive their buying behavior regarding Digitizable Products (DPs) and how it might have changed due to the COVID-19 pandemic. For this purpose, a survey has been carried out and evaluated. The paper solves the problem of analyzing customer's perceptions about purchasing DPs based on the carried out survey via answering the following Research Questions (RQs):

RQ 1: Did the COVID-19 pandemic change customer's perception about purchasing Digitizable Products?

RQ 2: Do customers (currently, sustainably) prefer purchasing Digitizable Products online over locally offline?

RQ 3: Do customers (currently, sustainably) prefer purchasing digital versions over physical versions of Digitizable Products?

RQ 4: How should (online) retailers offering Digitizable Products improve in order to succeed during and after the COVID-19 pandemic (when the pandemic-related restrictions are canceled)?

The scope of the paper is limited to answering the above RQs and does not include time series or similar analysis of the COVID-19 situation development (e.g., compared to [20]–[22]).

The paper is structured as follows. The next section introduces DPs and their delivery channels. It is followed by the description of the executed survey. Then, the survey results are analyzed. Section V discusses the findings. Some concluding remarks and future work outline are given in the Conclusion.

II. Digitizable Products and Their Delivery Channels

This section firstly investigates the nature and features of DPs by considering some definitions of that term. Afterward, it introduces and describes the main different delivery channels for DPs.

A. Digitizable Products (DPs)

In 2000, the United Nations Conference on Trade and Development (UNCTAD) discussed how to classify and handle goods that can exist both in a tangible or intangible state and how to distinguish them from (electronic) services [23]. According to the UNCTAD, DPs are those products that can be traded both in their physical and digital form [24]. The United Nations International Trade Statistics Database (UN Comtrade) defines DPs as "goods [...] which can be delivered both physically via a carrier medium and electronically via networks" [25], [26]. Moreover, the WTO defines digitizable goods as physical goods that can be digitized [27]. According to [24]–[27], DPs include five main product categories which can be divided into different sub-categories listed in Table I. Every single product being an instance of such a class of products has the capability to exist as a tangibly physical or intangibly digital object. In their physical state DPs require carrier media (such as CDs, Blu-Rays, hard disks, etc. or also paper for the printed matter) to properly store their data. [24]. Although copying or transforming a DP from one state to the other is possible due to its digital nature, such processes are commonly restricted in order to ensure copyright regulations. However, e.g. creating a private backup copy is generally allowed in Germany. To conclude, Digitizable Products (DPs) in this work are understood as those products having the feature to exist both in a physical or digital state. In order to exist in a physical state, a DP requires a carrier media which is capable of storing the DP completely. Additionally, DPs are divided into five main categories shown in Table I. However, they are slightly paraphrased and extended with additional examples to deliver a more precise understanding for every type of product actually covered by these categories:

1) Film – recorded or animated (movies, series, documentaries, videos, etc.).
2) Printed Matter (books, comics, newspapers, maps, papers, journals, images, etc.).
3) Sound (music, audiobooks, podcasts, other sound samples, etc.).
4) Software (operation system, anti-virus, specific software, etc.).
5) Video Games (computer games, console games, smartphone games, etc.).

B. Delivery Channels

As DPs can exist both in a physical and digital form, there are many possibilities for delivering them. [13], [24], [26] divide the delivery of DPs into two distinct classes: 1) The conventional approach where a DP is purchased and physically delivered (e.g. actually shipped from the seller to the buyer) and 2) The electronic or online approach where a DP is purchased and digitally delivered (e.g. downloaded by the buyer from the seller's server through the internet). However, in this work the conventional approach is split into two separate ones: 1.a) Purchasing a physical version of a DP in a local store & 1.b) purchasing a physical version of a DP in an online store. Since the goal of the paper is to check whether distinguishing between online and offline shopping is reasonable or not (see RQ 2), this allows comparing both conditions where the seller remains delivering the DP physically. Moreover, some local stores also provide their own online shops allowing the customers to pick up their purchased products later at the store instead of shipping them. Thus, this option is also considered as 1.c).

TABLE I. HS (Harmonized System) Codes of Digitized Products [25]

HS Heading	Commodity Description
37	Film (recorded)
3705	Photographic films
3706	Cinematographic films
49	Printed matter
4901	Books
4902	Newspapers
4903	Children's books
4904	Music
4905	Maps, atlases
4906	Plans (architect, eng., ind., commercial)
4907	Unused stamps
4908	Transfers
4909	Postacrds
4910	Calendars
4911	Commercial catalogues, pictures, designs
8524 (except 31, 40, 91)	Sound and media
852410	Records
852432	CDs
852439	CDs
852451-53	Tapes
852460	Cards
852499	Other (recorded disks)
8524	Software
852431	CDs
852440	Magnetic tapes
852491	Software on other recorded media
950410	Video games

Furthermore, [24], [26] term the online trade of DPs as Electronic Transmission (ET). Earlier, [23], [25] discussed whether the term ET should only describe the digital delivery of actual goods and exclude services or not. They conclude by distinguishing between services and products by stating that ET deals with goods that are transferable and that can be locally stored (i.e. DPs, as services cannot be actually stored). However, this strict separation blurred within the past years, as delivering DPs via streaming services became very popular among customers [24], [27]. E.g., the WTO states "music streaming [is] a digital service" [27], although music is commonly interpreted as a DP (Table I). [27] illustrates the increasing demand for music streaming services comparing the revenues gained by different delivery approaches. According to this, the streaming of music outperforms not just selling physical versions of that particular DP but also digital versions which are permanently downloaded by the customer. According to [24], this effect occurs for all other DPs categories as well. [24] summarizes that (from 2011 to 2017) "the global revenue of Netflix (films) grew on an average by

37% annually, music streaming (sound) by 50%, e-books (printed matter) by 44%, video games by 10% and global revenue of Microsoft (software) by 10%. In consequence, delivering DPs via streaming takes a huge part in delivering DPs to the customers. Thus, this approach is considered in this work as well, although it is not commonly considered as a delivery method in the context of ET. Moreover, streamed media is (temporarily) locally stored actually matching the ET requirements defined by [23], [25]. However, the special revenue model commonly used by streaming providers is taken into account, as usually, customers purchase DPs bundled via a subscription over a specific period of time than singly via a single price, e.g. Spotify (https://www.spotify.com/premium/), Amazon Prime (https://www.amazon.com/prime/), Netflix (https://www.netflix.com/), Office 365 (https://www.microsoft.com/en-ie/microsoft-365/), etc.

Nevertheless, different approaches where the customers can purchase a DP permanently while only being able to receive their purchased DP via streaming are also considered. Therefore, the online approach of delivering DPs earlier mentioned is split into two parts. To reduce complexity, the paper is focused on whether a digital version of a DP was purchased permanently (2.a) or temporarily (2.b), as actually owning a DP seems more meaningful than just focusing on whether it is downloaded or streamed. In addition to purchasing DPs via subscription, purchasing DPs via borrowing for 2.b is also considered, as some companies like Amazon are providing that as well.

To conclude, the following four ways of delivering DPs are considered in this work:

1.a) Purchased physically in a local store
1.b) Purchased physically online and delivered via shipping
1.c) Purchased physically online and picked up by the customer
2.a) Purchased digitally and permanently bought by the customer (usually downloaded)
2.b) Purchased digitally and temporarily borrowed by the customer (usually streamed)

III. THE SURVEY

To answer the RQs from section 1, a survey has been carried out. The survey started on the 15th of June in 2020 and lasted two weeks until midnight between the 29th and 30th of June in 2020. Google Forms have been used for the design and execution of the survey, as it provides a very quickly understandable user interface for both the designer and the participants. To reduce the risk of receiving multiple answers from a single participant, a Google account for submitting answers was required. Still, no personal data such as email addresses were stored.

A. Survey Structure

In total, the survey consists of eight sections and two additional ones added to reduce the risk of trolling or receiving answers from people who definitely have not understood the characteristics of DPs. Therefore, a brief introduction to the topic alongside a checking test question has been added before asking the questions providing the data to answer the RQs. It requests marking the one out of five example products not being digitizable. To strengthen the participant's understanding for distinguishing between digitizable and non-digitizable Products, very obvious examples have been used that most people should immediately recognize. If the participant detects the non-digitizable example product, access to the actual survey is provided. When submitting a wrong answer, the participant receives another section clarifying the mistake. There, the participant is requested to re-think and re-evaluate his/her given answer allowing going back to the checking test. Moreover, the participant has the opportunity to continue leaving the survey underlining their decision on the last section very specifically clarifying this consequence. This was applied with the hope to strengthen the trustworthiness of the submitted answers.

The first section of the survey is a welcoming page providing information about this study's background, the survey's content, and the estimated time needed to submit all answers. To not decrease the participant's motivation by requiring too much of his/her time, submitting all answers after was planned within a maximum of 20 minutes. Therefore, only 18 mandatory questions and one last optional question were asked.

The first three questions are part of the second section asking for general information about the participant (such as age, profession, and gender) to enable finding differences between different groups of participants. The next question contains the introduction to the topic alongside the checking test question described earlier in this section.

Afterward, the next three sections share the same structure each asking in total three questions regarding the participant's buying behavior from before, since, and after the COVID-19 pandemic (when the pandemic-related restrictions are canceled). In all questions, DPs are split into the categories introduced in section 2.A to enable distinguishing possible differences between these categories. The first of these questions asks about purchasing DPs physically. The participant must mark his/her most used way of purchasing DPs physically containing the three different approaches introduced in section 2.B. In addition, the participant can state not purchasing DPs this way. The second of these three questions is exactly the same but addressing purchasing DPs digitally. The third of these three questions combines then purchasing the different categories of DPs either physically, digitally, or not at all. Comparing the results of those three similar sections of the survey shall assist in answering the RQs 1, 2, and 3 very precisely.

Afterward, the seventh section contains the last 5 mandatory questions and the one optional one to gather ideas that can be used to answer RQ 4. The first of those six questions asks the participants about their general preferences (e.g. not specifically purchasing) about the manifestation of the different categories of DPs (e.g. either physically, digitally, or no preference). The next question then asks the participant about how much he/she values actually owning a DP for each category. The third and fourth of those six questions address the actual impact of the participant's preferences on his or her buying behavior. Therefore, it is first asked whether the participant would buy the desired DP in his/her least favorite manifestation (reduced price) or stick to his/her preferred form (more expensive). Then, the participant is asked which discount (in %) would make him/her to buy his/her least favorite manifestation over his/her preferred form. As a discount of 0% indicates not caring at all about the DPs manifestation (which is offered as an option in the questions before), this implication is also added as information to this question. Forcing everyone to submit a discount hopefully will let to receive a more meaningful result. Afterward, the type of store the participant usually likes purchasing the most is asked. Therefore, local shops, online market places (e.g. eBay or Amazon), source retailers (e.g. Microsoft's online shop for products such as Microsoft Office Word), and streaming providers (e.g. Netflix or Spotify) are considered as options to choose. The last question asks explicitly. As there is no intent to affect or frame the participant's opinion, the participant can briefly enter his/her thoughts as a brief text. As gathering ideas without any pre-given clues can take some time, this question is declared as optional allowing the participants to submit their answers without answering this last question.

The last section contains a note of thanks for the participant. Moreover, the information on how the participant can receive the results of this work when being interested is provided.

B. Execution of the Survey

Google Forms provide extracting the gathered data as a CSV file. As the most of questions only offer results as nominal scaled data, analyzing these data is limited. For nominal-scaled data, only compare the actual distribution (also in %) or the actual amount of the selected answers can be analyzed. There is no possibility to calculate these data (e.g. medians, box plots, etc.). Such operations can be applied only to two questions: the age (from section 2 of the survey) and the discount (from section 7 of the survey).

The survey participants were recruited via personal contacts (mostly among university students) and indirect personal contacts (e.g., friends of colleagues). In total, 42 answers were received.

IV. RESULTS

This section does not include diagrams for each question automatically created by Google Analytics. Instead, the results are shown as tables comparing the main question's results in a more compact way.

A. Results Overview

Firstly, 66.7% of the participants were male (in total 28 persons), 31% were female (in total 13 persons) and 2.4% were divers (in total 1 person). Moreover, the oldest participant was 58 years old, whereas the youngest was 16 years old. Table II illustrates that most participants were very young, as the average age was 29 years (with a standard deviation of 9.75 years), the modal value was 23 years. Additionally, the upper quartile was 35 years and the lower 23 years. Moreover, the two participants with the age of 54 and 58 years were calculated as outliers from the whole distribution. Most participants were either employees (45.2% or in total 19 persons) or students (38.1% or in total 16 persons). The amount of each unemployed and officially working participants were in total both 3 persons or 7.1%. However, only one employee with a short-time allowance (2.4%) and no self-employed person participated. Out of all 42 participants, only one left the survey before submitting the desired answers by failing the checking test, so the number of received correct answers is 41.

TABLE II. AGE DISTRIBUTION

Type	Value (in years)
Max	58
Upper Quartile	35
Average	29
Lower Quartile	23
Min	16
Modal	23
Standard Deviation	9.75
Outliers	54, 58

B. Purchasing DPs Physically

Table III combines all results related to purchasing DPs physically before the COVID-19 pandemic restrictions, since the beginning of the pandemic restrictions, and expectations after the pandemic restrictions are canceled, Table IV combines the results regarding purchasing DPs digitally, and Table V combines all answers on purchasing DPs either physically or digitally.

TABLE III. ANSWERS REGARDING PURCHASING DPS PHYSICALLY

Category	Answer	Before	Since	After
Film	Local store personally	6	1	4
	Online shop with shipping	17	19	18
	Online Shop with self pick up	0	1	1
	I (didn't/haven't/won't) (buy/bought) them anyway this way	18	20	18
	Total	41	41	41
Printed	Local store personally	16	6	16
	Online shop with shipping	9	12	11
	Online Shop with self pick up	3	4	3
	I (didn't/haven't/won't) (buy/bought) them anyway this way	13	19	11
	Total	41	41	41
Sound	Local store personally	6	1	9
	Online shop with shipping	11	9	9
	Online Shop with self pick up	0	0	1
	I (didn't/haven't/won't) (buy/bought) them anyway this way	24	31	22
	Total	41	41	41
Software	Local store personally	3	0	3
	Online shop with shipping	13	12	12
	Online Shop with self pick up	0	2	1
	I (didn't/haven't/won't) (buy/bought) them anyway this way	25	27	25
	Total	41	41	41
Games	Local store personally	4	0	7
	Online shop with shipping	16	12	11
	Online Shop with self pick up	1	1	0
	I (didn't/haven't/won't) (buy/bought) them anyway this way	20	28	23
	Total	41	41	41
Aggre-gated	Local store personally	35	8	39
	Online shop with shipping	66	64	61
	Online Shop with self pick up	4	8	6
	I (didn't/haven't/won't) (buy/bought) them anyway this way	100	125	99
	Total	205	205	205

For purchasing DPs physically, Table III shows that the participants generally decreased purchasing DPs physically since the COVID-19 outbreak. However, they plan to increase purchasing DPs physically afterward. The local shops were affected the most, as purchasing there decreased from 35 answers to 8 answers given. Still, in total 39 participants answered planning to buy DPs physically in a local store after the COVID-19 outbreak. Only for online shops with self pick up, the participants increased purchasing DPs since the COVID-19 outbreak but plan to reduce it afterward again. For each categorization of DPs, the participants mostly purchase DPs physically via online shopping with shipping or not all, with the exception of printed matter and slightly sound. The participants bought printed matter physically mostly in local stores before the COVID-19 outbreak and plan to do so afterward. Since the COVID-19 outbreak, the participants purchased printed matter physically mostly via online shopping with shipping as well. In addition, as many participants plan to purchase sound physically in local stores as others do via online shops with shipping after the COVID-19 outbreak. However, for all other categories, the participants mostly answered not purchasing DPs physically at all at any time.

C. Purchasing DPs Digitally

For purchasing DPs digitally, Table IV shows that the participants generally purchased DPs digitally rather via a fixed price than temporarily before the COVID-19 outbreak and plan to do so afterward. However, purchasing DPs digitally rather temporarily was higher than permanently or not at all since the COVID-19 outbreak. Still, all three numbers are very close to each other. The number for purchasing DPs digitally rather temporarily remained almost the same for the time after the COVID-19 outbreak, whereas the number of not purchasing DPs digitally at all decreased. For each categorization of DPs, most of the participants have not selected not buying DPs digitally at all, with the exception of printed matter. For printed matter, the numbers remained very constant comparing before and since the COVID-19 outbreak. Afterward, the participants increase planning purchasing printed matter digitally rather permanently, whereas the number temporarily remains almost the same and the number for not buying them at all decreases. The categories film and sound are dominated by purchasing DPs digitally rather temporarily, whereas the categories software and games are dominated by purchasing them permanently. However, for each categorization, the number for purchasing DPs digitally rather temporarily increased since the COVID-19 outbreak compared to before, with the exception of printed matter where the number remained the same. Moreover, for each categorization, the numbers for purchasing DPs digitally rather permanently decreased since the COVID-19 outbreak, with the exception of printed matter. With the exception of films, the participants plan to purchase DPs digitally more permanently again after the COVID-19 outbreak. Still, for films and sound, these numbers remain smaller than those for purchasing them temporarily. For all periods of time and the categories film and games, the numbers for not buying DPs digitally at all remained almost the same. For printed matter, sound, and software, these numbers decreased after the COVID-19 outbreak. Generally, the numbers for the categories film and games seem to be very constant.

D. Purchasing Preferences

Table V shows that the participants generally buy DPs rather digitally than physically. Moreover, they decreased buying DPs physically and increased buying DPs digitally or not buying DPs at all since the COVID-19 outbreak. For the future, they generally plan to buy more DPs physically and digitally than during the COVID-19 outbreak. However, they bought more DPs physically before the COVID-19 outbreak than they plan to do afterward.

TABLE IV. ANSWERS REGARDING PURCHASING DPS DIGITALLY

Category	Answer	Before	Since	After
Film	Permanently via a fixed price	10	8	7
	Temporarily via subscription or borrowing	26	28	28
	I (didn't/haven't/won't) (buy/bought) them anyway this way	5	5	6
	Total	41	41	41
Printed	Permanently via a fixed price	13	14	19
	Temporarily via subscription or borrowing	7	7	6
	I (didn't/haven't/won't) (buy/bought) them anyway this way	21	20	16
	Total	41	41	41
Sound	Permanently via a fixed price	12	7	10
	Temporarily via subscription or borrowing	17	22	22
	I (didn't/haven't/won't) (buy/bought) them anyway this way	12	12	9
	Total	41	41	41
Software	Permanently via a fixed price	21	15	23
	Temporarily via subscription or borrowing	7	9	8
	I (didn't/haven't/won't) (buy/bought) them anyway this way	13	17	10
	Total	41	41	41
Games	Permanently via a fixed price	26	23	24
	Temporarily via subscription or borrowing	2	4	5
	I (didn't/haven't/won't) (buy/bought) them anyway this way	13	14	12
	Total	41	41	41
Aggre-gated	Permanently via a fixed price	82	67	83
	Temporarily via subscription or borrowing	59	70	69
	I (didn't/haven't/won't) (buy/bought) them anyway this way	64	68	53
	Total	205	205	205

For each category, the participants reduced buying DPs physically and increased buying DPs digitally, with the exception of software. For software, at no time no one answered buying software usually physically. Moreover, the participants reduced purchasing software digitally since the COVID-19 outbreak but plan to purchase more afterward. Generally, the participants plan to increase purchasing DPs after the COVID-19 outbreak compared to currently and slightly compared to before. Moreover, all categories are dominated by purchasing DPs digitally, with the exception of printed matter. Printed matter is the only category where the participants bought more DPs physically before the COVID-19 outbreak and they plan to do afterward. However, during the COVID-19 outbreak, most participants purchased printed matter rather digitally than physically. In addition, they bought printed matter more physically before the COVID-19 outbreak than they plan to do afterward. This effect occurs also for the other categories, with the exception of software and films. For films, the participants plan to purchase DPs physically afterward as often as they have purchased them since the COVID-19 outbreak.

TABLE V. ANSWERS REGARDING PURCHASING DPS EITHER PHYSICALLY OR DIGITALLY

Category	Answer	Before	Since	After
Film	Physically	6	3	3
	Digitally	29	33	33
	I (didn't/haven't/won't) (buy/bought) them anyway	6	5	5
	Total	41	41	41
Printed	Physically	22	12	20
	Digitally	11	14	13
	I (didn't/haven't/won't) (buy/bought) them anyway	8	15	8
	Total	41	41	41
Sound	Physically	8	3	5
	Digitally	26	31	30
	I (didn't/haven't/won't) (buy/bought) them anyway	7	3	6
	Total	41	41	41
Software	Physically	0	0	0
	Digitally	30	27	31
	I (didn't/haven't/won't) (buy/bought) them anyway	11	14	10
	Total	41	41	41
Games	Physically	7	2	5
	Digitally	22	24	24
	I (didn't/haven't/won't) (buy/bought) them anyway	12	15	12
	Total	41	41	41
Aggre-gated	Physically	43	20	33
	Digitally	118	129	131
	I (didn't/haven't/won't) (buy/bought) them anyway	44	56	41
	Total	205	205	205

Table VI shows that most participants significantly prefer DPs rather digitally than physically for each categorization, with the exception of printed matter. Although all of these numbers remain very small, games received the highest amount of participants not caring about their manifestation.

TABLE VI. ANSWERS REGARDING PREFERRING DPS EITHER PHYSICALLY OR DIGITALLY

Category	Physically	Digitally	I don't care	Total
Film	4	36	1	41
Printed	25	9	7	41
Sound	6	33	2	41
Software	0	34	7	41
Games	6	23	12	41
Aggregated	41	135	29	205

Table VII shows that most participants do not value actually owning a DP that much. For each categorization, the numbers are very equally distributed, with the exception of option "3: Tremendously Important!" where the numbers are significantly lower. Just for games and sound, the gap between the options "0: I don't care at all" and "1: Slightly important" significantly differs, showing that the participants value owning sound more than owning games.

Table VIII shows that the participants have different preferences of where to buy DPs for each categorization. They like to purchase films and sound via streaming providers the most, whereas they like to purchase software directly from the original source retailer, games at online market places and printed matter in local stores.

TABLE VII. ANSWERS REGARDING THE DESIRE TO ACTUALLY OWN DPS

Category	0: I don't care at all	1: Slightly important	2: Important	3: Treme-ndously impor-tant!	Total
Film	14	13	11	3	41
Printed	10	11	13	7	41
Sound	9	14	13	5	41
Software	11	12	11	7	41
Games	16	10	9	6	41
Aggregated	60	60	57	28	205

TABLE VIII. ANSWERS REGARDING WHERE LIKING BUYING DPS THE MOST

Category	0: I don't care at all	1: Slightly important	2: Important	3: Treme-ndously impor-tant!	Total
Film	1	6	2	32	41
Printed	16	10	9	6	41
Sound	3	7	3	28	41
Software	2	12	23	4	41
Games	4	21	12	4	41
Aggregated	26	56	49	74	205

Table IX shows that most participants would consider buying their desired DP in their least instead of their preferred form if it is discounted. However, the data from both questions do not seem to perfectly fit each other. Although each row should represent the exact opposite of the other (the first explicitly asked for buying the least favorite form, whereas the second asked explicitly for sticking to the preferred form), their numbers look very similar. Especially the answers for the options "0: Hell yeah!" and "3: No, never!" differ tremendously. Still, the participants have and value their preferred manifestation of a DP. The average discount which would make the participant buy their least preferred manifestation of their desired DP is 30% with a standard deviation of 26.82% and the modal is 50%. Whereas the minimum discount answered is 0% and the maximum is 100%, the two participants answering 100% were calculated as outliers to the box plot. Its upper quartile is 50% and its lower quartile is 20%. Thus, the most answers given lay below the discount of 50%.

TABLE IX. ANSWERS REGARDING WHETHER STICKING TO THE PREFERRED FORM OF A DP OR BUY THE OTHER

Answer	0: Hell yeah!	1: Maybe...	2: I don't think so...	3: No, never!	Total
Buy?	10	17	12	2	41
Stick?	8	22	10	1	41

The survey's last question shows the list of all optional answers given (in total 9) regarding what online retailers should improve from the participant's opinion:

- Tutorial for software; "trailer" for DP; online-support
- Easy to navigate homepage…
- The way of moving subscriptions between services/providers.
- DRM

- Gender-neutral product descriptions
- Availability of a DP when streaming
- Never thought about it
- Beeing Enviromentally Friendlier
- No freaking DRM.

Two participants named Digital Rights Management (DRM) and one of them explicitly its prevention. DRM is a term for systems ensuring product creators being able to manage and execute their rights for their digitized creations. Moreover, some kind of trailer for a DP and online support were requested. Additionally, one participant wants a homepage easy to navigate, whereas another wants gender-neutral product descriptions. While one other participant called the switching of subscriptions between different services/providers, another one highlights the availability of streamed products. One of the last two remaining answers focuses on environmental friendliness, whereas the other just states that he or she have never thought about it yet.

V. Discussion

The 1st RQ asked if the COVID-19 pandemic had an impact on customer's perception about purchasing DPs. The results clearly indicate that the survey participants perceive a slight difference in their individual buying behavior regarding DPs comparing the time before and since COVID-19. For instance, when asking about purchasing DPs physically, the absolute amount of answers for purchasing DPs personally in a local store decreased tremendously for each categorization of DPs. This could be caused by the strict regulations many governments enacted prohibiting most local stores from opening and selling their products. Moreover, both absolute amounts of answers for purchasing DPs rather digitally or not at all increased noticeably, whereas the one for physically decreased significantly. Additionally, when asking about purchasing DPs digitally, the absolute amount of answers for purchasing DPs permanently decreased, whereas those for temporarily increased. All these changes indicate that the participants perceive a difference in their buying behavior regarding the time before and since the COVID-19 outbreak.

The 2nd RQ asked if customers prefer purchasing DPs rather online than offline currently (since COVID-19) and sustainably (if the participants believe they think so after the COVID-19, i.e. when the pandemic-related restrictions are canceled). Firstly, the results already discussed in the paragraph before also indicate that the participants significantly prefer purchasing any DPs online than locally offline since the COVID-19 outbreak. For all categorizations with the exception of printed matter, this preference remains the same for the time after COVID-19. This impression is due to consideration of both answers for asking about purchasing DPs physically (the only question containing purchasing DPs locally offline as an option) and purchasing DPs either physically or digitally (to compare and check if the result from asking about purchasing DPs physically is actually meaningful for a more general statement). For instance, the result for purchasing sound physically (after COVID-19, the amount for purchasing DPs offline is almost equal to online) is not as meaningful as the one for printed matter. Because an outstanding majority generally prefer purchasing sound digitally, which is only possible by online distribution. Additionally, all results regarding the time before COVID-19 are pretty similar to those after COVID-19. However, the most results for after COVID-19 are not as high as those for before. Still and although purchasing printed matter in local stores received the highest amount of answers, in total more people generally prefer purchasing printed matter via one of the other possible online distributions. All this information indicates that the participants generally prefer purchasing DPs online instead of offline, with the slight exception of printed matter where this effect is not as significant as for the other categorizations of DPs.

The 3rd RQ asked if customers prefer purchasing DPs rather digitally than physically currently (since COVID-19) and sustainably (if the participants belief they think so after COVID-19). Therefore, the results show that the participants significantly prefer purchasing DPs digitally since COVID-19. Just for printed matter, the difference between physically and digitally is very low (in total just 2 answers). Moreover, with the exception of printed matter, these preferences seem to remain and for software even slightly to increase for the time after COVID-19. Most participants answered planning purchasing printed matter rather physically than digitally after COVID-19. Additionally, all results regarding the time before COVID-19 are pretty similar to those for after COVID-19. However, the most results for after COVID-19 are not as high as those for before. All these answers indicate that the participants generally prefer purchasing DPs digitally than physically, with the exception of printed matter.

The 4th RQ asked what and how online retailers offering DPs should improve to succeed during and after the COVID-19 pandemic. Firstly, the results indicate that most participants actually have a preference for a DP's manifestation. Moreover, they actually value their preferred form more than their least preferred form of the desired DP. Most participants answered that they would have to think about whether they purchase their desired DP in their least favorite but discounted form or stick to their preferred but more expensive form. Therefore, most participants answered that a discount between 20% and 50% would make them purchase their desired DP in their least favorite form. As this clearly indicates that the participants differentiate between both manifestations of DPs, online retailers should consider which manifestations they primarily offer. With the exception of printed matter, most participants prefer purchasing DPs digitally. Moreover, online retailers should consider how to distribute their offered DPs. For instance, the participants mostly like to purchase films and sound via streaming, whereas they prefer to purchase software from its original creator, printed matter locally, and games at online market places. As these data indicate significant differences in the participants' preferences, online retailers must consider which categories of DPs they want to sell and how to properly distribute them. As most participants do not significantly care whether they actually own their purchased DP or not, online retailers should consider selling DPs permanently or temporarily in addition. Furthermore, some participants answered this RQ explicitly. According to them, online retailers should provide trailers for DPs, provide good usability on their homepage and consider both gender-neutral texts and DRM. As one participant complained about DRM existing, online retailers should search for a better and more user-friendly solution to ensure protecting their rights by improving their current DRM solutions. In terms of streaming DPs, the participants demand good solutions for the availability of their purchased DPs and user-friendly subscription models.

All these information indicate that online retailers should consider which categories of DPs they want to offer and how to distribute them. Additionally, they should provide user-friendly business models and good usability.

VI. Conclusion

To conclude, the results indicate that the participants perceive a change in their buying behavior regarding purchasing DPs comparing the times before, since, and after the COVID-19 pandemic. It seems like the COVID-19 pandemic boosts the EC and streaming providers, whereas it decreases the commerce of the traditional local stores. Except for printed matter, the participants prefer purchasing DPs digitally and online instead of locally offline. Moreover, for each category, the participants have different preferences for the distribution of their desired DP. Additionally, they value their preferences noticeably. Online retailers should carefully consider all these factors in order to succeed during and after the COVID-19 pandemic, as the results indicate a change in the participant's perception about purchasing DPs.

The work has some limitations. The results firstly indicate that the survey reached mostly young people between approximately 20 to 40 years. No answers were received by people older than 58 years. These results fit to the fact that most participants answered being either a student or employee. Furthermore, only 42 participants in total were reached. Thus, the participants are not representative for the general population. Moreover, some potential participants might have been excluded by requiring a google account for submitting answers, although this reduced the risk for receiving multiple answers given by a single user. Still, the most crucial limitation is not providing 3 separate survey for the times before, since, and after the COVID-19 pandemic. However, this was not possible, as predicting such a scenario beforehand is utopian and waiting for the pandemic to end was not an option due to time restrictions.

These limitations make the results not generalizable. Instead, they provide brief hints for trends possibly occurring. Thus, future work should continue focusing on the scope for this work by investigating the impact of the COVID-19 pandemic on the customers' buying behavior regarding DPs. It could take the results from this work to create hypotheses stating that the COVID-19 pandemic has an impact on customer's perception about purchasing DPs and that it boosts the EC and streaming providers, whereas it decreases the commerce in traditional local stores. Moreover, future work could extend the scope of this work by also considering all other kinds of products or services offered by online retailers.

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