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Digitization Levels Consumers Transaction Costs¹

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Abstract

Behavior of consumers is changing. We have the medial supported impression that more and more people consume through digital channels. The main research purpose of this paper is, to find out, if consumers harm their sovereignty by consuming via internet and if they are conscious of doing so. A related question is, if consumers' sovereignty needs to be protected by governmental rules. To understand consumers behavior companies active on digital markets are subject to this paper as well. Different business models of companies active on digital markets are compared in order to get a more detailed explanation of consumers' behavior. To prove the theory based outcomes a questionnaire based empirical research study was undertaken in Germany in 2018. The main research result is that consumers are quite aware of the provision of their personal data. They hesitate rather than provide their data, if there is no added value expected consuming via internet compared to analog consumption. Still consumers are not able to protect their sovereignty by themselves while surfing through the internet. Government regulation is necessary.

Keywords: Consumer Behavior, Digitization, Datafication, Business Model, Value of Data, Classic Transaction Cost, Online Transaction Cost, Consumer Sovereignty, Data Security.

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Introduction

In literature consumers' sovereignty is discussed since more than forty years for example by Lerner (1972). In context with digitization and datafication Schirmacher (2015) gives a broad overview on the developments in consumers behavior related to digitized processes. But not only in Germany consumers' sovereignty is an important topic in times of digitization and datafication: The European Union (April, 27th 2016) as well as the Congress of the USA (July, 10th 2008) outline advantages and disadvantages of the development in order to protect consumers sovereignty. More over the founder of the internet Berners-Lee (March, 12th 2018) stated that a closer look on developments harming consumers' sovereignty needs to be taken.

On behalf of analyzing if consumers willingly harm their sovereignty consuming via internet by providing personal data this paper starts defining digitization and datafication. The next step leads to the description of different business models, applied by companies. Depending on the degree of datafication online shops, internet platforms and blockchain technology based business models are differentiated. The value of data is being discussed in the next part of the paper aiming to calculate the 'price' consumers pay for providing their data in the internet. Chapter II begins outlining theoretical concepts of consumers' behavior in a dataficated shopping world. Transaction cost theory leads to answers concerning the decision to buy on dataficated markets rather than on analog markets. From the theoretical point of view consumers try to avoid transaction cost. But the question is eminent, if they are willing to pay with their data instead. To find out, how consumers decide, a questionnaire based empirical study has been undertaken. Questions on the consumption of daily life goods, durable long term consumption goods, and services have been addressed as well as payment habits and experiences with internet fraud, because especially those are an issue of confidence. In terms of confidence the third chapter discusses the tradeoff of data protection and transaction cost. Logically transaction cost rise, if data provision is restricted by rules, but consumers' sovereignty is protected. Therefore rules have to be introduced carefully balancing the advantages of transaction cost reduction in the digitized and dataficated shopping world on the one hand and the disadvantages of reduced consumers' sovereignty on the other hand.

Digitization and Datafication

The word 'data' is Latin and means, 'what is given' in the sense of facts. Analog data like we find it on vinyl records can be transferred into a binary code of the numbers zero and one. In this format they are digital data, which can be stored on a compact disc or server. Another dimension of digitization is the shift of tasks from human beings to computers. 'Compute' means calculate. Tasks, which can be translated into a binary code, can be operated by computers. Neither power nor knowledge of human workers is necessary

anymore. (Cukier, 2017, S. 84) In this context the internet plays an important role. (Berners-Lee, 2018, S. 1) Private households accomplish their banking activities via online banking applications and not with the help of a service person². Lots of people use WhatsApp, SMS or E-Mail and seldom yellow post services.

Companies care a lot about the (personal) data of their customers. They steer production processes via 'internet of things', develop advertisement strategies basing on big data, if possible, so it can be analyzed efficiently and applied effectively. (Hess, 2016) Digitization in this context is 'datafication'. It is the transformation of everything you can think of – even of things, which we would never have thought of being information like the position of a person – into binary data, to be able to quantify them. Due to this transformation data is used in many different ways. (Cukier, 2017, S. 20) In dataficated times causal analysis isn't important anymore; only the correlation of maybe arbitrary chosen characteristics is of interest. (Lobo, 2015, S. 109) This means as well, that probabilities of predicted developments are more important than the statistical analysis of accurate data. (Cukier, 2017, S. 46) Predictions tend to the average of mined data. Statistical spikes do not receive attention anymore. They are undervalued. In politics we would say democracy is fading out; in the consumers world it is the sovereignty that is unified by the average consumer.

Digitization, Datafication, and Consumers Behavior

Digitization and datafication do neither stop in front of the consumer nor the producer. The transition of analog to digital buying and using plays an important role in many dimensions. We buy food at stationary, analog retail sale companies. The price we pay for the product does not include the cost of transactions. These individual transaction cost are transport costs, like searching and finding the appropriate store, contract negotiations, conclusion of the contract etc. We spend time and money. These are classic transaction costs.

Digital buying and consuming involves ordering of goods in the internet and their delivery at our homes. In a 'Smart Home' the fridge 'sends a message' to a shop ordering automatically fresh milk; hopefully there where the best milk including the classic transaction cost is lowest priced; delivery place and time are provided in the digitized system... (Lewrick, Michael and Christian Di Giorgio, 2018) Similar developments are reflected in entertainment industry: many people avoid video rental stores and even the cinema nowadays. They stream movies and series online and pay digital. (o.V., <http://www.faz.net/aktuell/wirtschaft/unternehmen/steigende-nutzerzahlen-netflix-boom-haelt-weiter-an-15545796.html>, 2018) Movies and series, which we really want to see, are supplied before we even know that we want to see them. That seems to be spooky; but it is just the result of data analyzing processes.

Because consumers move less, classic transaction cost is reduced in the

²In this text masculine wording is used and not the feminine or transgender form as well. We hope, this is not valued as discrimination, because it is not meant to discriminate.

digitized and dataficated consumption world. Delivery traffic will increase. Data volume, data traffic, and data storage capacity will soar disproportionately. These are online transaction costs. (Zeh, 2015, S. 35) So, what is the price of buying online? Does it include transaction cost other than the price of analog purchasing? Before we buy in the internet, e. g. while we surf through the pages, we leave a very valuable data trail. Our research behavior, the time we stay at a page, the number and speed of clicks are registered, analyzed and processed. Companies like Amazon, Google, Facebook, WhatsApp, YouTube e. g. analyze data trail information by mathematical algorithms³ and create user profiles which mirror the average user. The goal is designing adverts fitting exactly the user profile. (O'Neil, 2017, S. 84)⁴ When we are searching, before we are buyers, we pay with our data a non-monetary price for being able to visit internet pages and use online services. (Bundeskartellamt, 2015, S. 16) When we turn into being consumers more specific data about our name, place of living, possible delivery timeslots and therefore about our working times, our payment modalities etc. flow to the provider of the consumption good. These data, which we provide as consumers for companies, reflect online transaction cost as well. (O'Neil, 2017, S. 8)⁵ Are these online transaction costs the value of our data? How can we measure the value of our data?

As a matter of principle statistical probabilities reflect reality only partly. This isn't obeyed usually. Even if wrong conclusions are derived from data, the errors are not eradicated because of relatively high cost adjusting the algorithm. The same error will occur again and again. This will lead to disadvantages for internet users in general and especially online consumers. (Lanier, 2015) They are another component of online transaction cost. And, if third parties get access to our data, it might be misused. This represents another possible kind of online transaction cost.⁶

We reduce classic transaction cost shopping online and have to take into account that online transaction cost occur. The problem is that they are less transparent than classic transaction cost. This restricts consumers' sovereignty. But knowing this, why do we publish our data? Firstly, it is possible that individualized adverts are welcomed by users and buyers. Secondly, if the user is conscious publishing his data for third party access as well, his sovereignty

³An algorithm is e. g. a cooking recipe: a very strict sequencing of actions leading to a result. The word is derived from the name of a very famous mathematician from Arabia Ibn Musa al-Chwarizmi, who lived 825 AD.

⁴For different kinds of advertisements cost benefit relations are calculated using an algorithm taking the buying probability of each user (profile) into 'statistical' account. So, to every internet user appropriate advertisements are presented.

⁵Mathematicians and data scientists analyze our wishes, our movements on internet platforms, our purchasing power. They predict our credibility. They 'calculate' characteristics e. g. of pupils, students, colleagues, lovers, and criminals.

⁶Actually lots of comments in media explain how companies like Facebook and Cambridge Analytica work with consumers data (Steiner, 2018). Some authors point at expected problems resulting of data about our working behavior (Holzki, 2018). In literature we find more examples warning us like Georg Orwells '1984' (1949) and Steven Spielberg's 'Minority Report' (2002).

still is protected and he does not feel limited. Only while surfing internet pages it was different: Until 25th of May, 2018 there was no possibility to oppose third-party's-access to behavioral data.⁷ Since then we are asked to allow the collection of data when surfing through web pages.

From the point of view of companies data generation is not a fall out-product. (Schirmacher, 2015, S. 64) Next to human labor, capital, and ground (big) data is a production factor of increasing importance. How do companies implement data as a production factor? We consider three business models differing in the degree of datafication.

Online Shops, Internet Platforms, and Blockchain Technology

The above mentioned business models show an increasing level of datafication at each value creating step: producing, vending, carrying out orders, and delivering to the customer. All business models have in common that data is collected wherever possible. Some companies analyze their data by themselves others sell it to third parties.

Online Shops

An online shop is a mail-order firm. Suppliers of goods and services communicate via internet with potential consumers. Online shops register at an internet search engine, so potential consumers are able to find them in the internet and watch product photos or videos, read product descriptions, get information on the buying process and the online payment requirements.⁸ The buyer provides the data necessary for delivery and online payment. While the digital payment is processed by a banking computer, the delivery is organized partly digital, partly analog – as long as drones do not deliver.⁹

Internet Platforms

Internet platforms connect miscellaneous user groups and provide several possibilities for research, information, communication, and execution of transactions. (Bundeskartellamt, 2015, S. 4) Amazon Marketplace¹⁰, Ebay, and

⁷But, even this limited sovereignty might be justified, when society benefits from data analysis e. g. from the Google-flu-algorithm. If a government would use searching engine data to publish predicted spatial developments for example of the flu, then governmental action can be justified, because it leads to a benefit for the whole society. (Musgrave, 1994) and (Cukier, 2017, S. 7f.). Concerning the sequencing of genome to predict genetic diseases we have prominent examples like Angelina Jolie (Jolie, 2013) und Steve Jobs (Cukier, 2017, S. 32ff.) If genetic predictable diseases are avertable cost of health insurance can probably be reduced.

⁸Mobile shopping is consuming or renting goods supported by shopping Apps, which are available on mobile devices.

⁹ Amazon started its online book store in 1994.

¹⁰Amazon is an online shop while Amazon Marketplace is an Internet platform. Amazon marketplace represents an intermediate company between company and consumer. This fact describes particular data mining possibilities of online shops which are platforms as well.

Google Shopping are examples. Some technological, internet based innovations, which are organized by platforms provide new possibilities of consumption e. g. sharing economy. (Boesch, 2018) Platform economies came into existence with the collection, analysis, and evaluation of big data volumes providing information about the behavior of (potential) consumers. In the entertainment sector (movies, series, E-books etc.) not only the internet search, order and payment process are digitized and dataficated, but the product or service itself as well. The whole value added chain is dataficated.¹¹

The economic problem resulting from platform based services is that they collide with competition rules: "[...] dominant platforms are able to lock in their position by creating barriers for competitors. They acquire startup challengers, buy up new innovations and hire the industry's top talent. Add to this the competitive advantage that their user data gives them and we can expect the next 20 years to be far less innovative than the last." (Berners-Lee, 2018) Google's searching engine for example has got a 90 percent market share in several economies of the world. (Steingart, 2015, S. 245) Because using another searching engine is unfavorable for advertising suppliers and searching demanders in terms of less effective in advertising and less informative; both market sides are locked in on the monopolist's online platform. (Maier, 2015, S. 125)

Actually limited competition in the searching engine market means, that Google puts products traded by its daughter Google Shopping on a predestinated place in the result list of searches.¹² Because consumers pay due to the 'monopoly' of Google's research engine prices higher than necessary (including online transaction cost), and the supply of some companies is replaced on the list, there is a severe need for action of competition policy institutions. In context with the Facebook Cambridge Analytica scandal in 2018 it is obvious, that data usage has to be regulated especially regarding third party access, because consumers' sovereignty is restricted. (o.V., <https://www.zeit.de/digital/datenschutz/2018-03/cambridge-analytica-facebook-affaere-donald-trump-wahlkampf/komplettansicht>, 2018).

Blockchain Technology

The greatest difference between blockchain based business models and internet platforms is that there is no intermediate institution necessary between supply and demand.¹³ A blockchain is a chain of data packages. The packages are stored on many computer hard disks. The data package chain is up dated continuously. The up-dating process is steered by an algorithm and

¹¹Netflix has got more than 100 Mio. customer (Lindner, 2017). Markets for music streaming services (Theurer, 2018) and online computer games are booming as well (Jansen, 2018).

¹²Google shopping is a daughter of Google. In June 2017 the European Commission imposed a penalty of 2,42 billion Euros against Google shopping because the listing was regarded to be unfair. (o.V., <http://www.faz.net/aktuell/wirtschaft/netzwirtschaft/google/urteil-gegen-google-eu-kommission-verhaengt-rekord-busse-15079508.html>, 2017) and (Maier, 2015, S. 120).

¹³Cost due to intermediate institutions like platforms account for 15 to 30 % of net value.

cryptographically secured. Confidence into institutions is not necessary anymore! (Behrens, 2018) It is possible to save an 'unconfidently' contract of purchase on a blockchain. Such a smart contract could steer a car. The blockchain program could determine that each month a fixed amount of money has to be transmitted. If it is not transferred, the car doesn't work until a payment is booked. Because the program works absolutely automatically, there is no need for a third party like a platform. The payment is controlled by the blockchain and not by a financial institution. Confidence between bank and debtor is exchanged by technics. (Behrens, 2018)¹⁴ Classic transaction cost is less than in the analog and even in the platform world. In such a system the whole value added chain is digitized and dataficated. Data is collected, processed, and analyzed decentral – maybe several times. Online transaction cost boosts.

The Value of Data

What is the appropriate value of data as a production factor? Because data can be analyzed endless times in different combinations without losing impact, it seems to be impossible to value data. The valuation of data isn't trivial, because data doesn't lose value by using it several times. In contrary: because there is no rivalry 'consuming' data, but third parties can be excluded from consumption, data has to be regarded as a club good. Only some companies have access to data. To generate even big data customer numbers have to reach critical mass. If we estimate the market value of data generating companies and put it in relation to the daily collected data volume, we can rate the value of data. Dough Laney states in an article published in Wall Street Journal: 'To Facebook You're Worth \$ 80,95'. (Laney, 2012) Each Facebook user adds data to Facebook, which can be processed and sold. The non-monetary, multiple use of these data helps social networks to increase their market value.¹⁵ Again we have to start in the beginning: the value of data can be hardly measured exactly. Probably it is higher than we want to admit today because innovation for example in various fields of artificial intelligence is only possible creating big data based analysis. These developments are going to be more dynamic in the near future. (Knop, 2018)

Consumers Behavior

In the following part findings about transaction cost, digitization and datafication are combined with the classic theory of consumers' behavior and results of a questionnaire based study undertaken in April 2018 are presented.

¹⁴Even for Smart Home application of blockchain technology can be imagined.

¹⁵Finally the value of data consists of every imaginable use and utility. (Cukier, 2017, S. 112).

Theoretical Concepts of Consumers Behavior

Consumers Behavior in the Dataficated Shopping World – An Expansion of Transaction Cost Theory

New Institutional Economics is based – other than classic economics – on the assumption, that decisions on markets are undertaken in a situation of limited rationality and expectations. Especially the theory of market transaction cost explains changes of consumers’ behavior in times of digitization and datafication. Bounded rationality of consumers’ shouldn’t be understood in the common sense: in this context the consumer is not able to maximize utility like in classic microeconomics. The reason: There is no transparency regarding market conditions like prices, quality, alternative products, and behavior of every market participant. More over the consumer is confronted with uncertainties. It is impossible to weigh advantages and disadvantages of each alternative available at the market in terms of individual preferences so that the consumer is perfectly satisfied. Uncertainties involve in any case transaction costs which reflect costs of having access to a market and ‘using’ it. Transaction costs determine consumers’ behavior next to the price of goods and services.

Transaction costs have two dimensions nowadays: classic and online transaction costs. Classic transaction costs comprise research, information, decision costs and several costs concerning the contract itself like negotiating, completing, controlling, and executing the details. Moreover there are costs linked to mobility and transportation in means of time and financial effort.¹⁶ Online transaction cost is scalable in data volumes, but consumers often do not know how high these costs are. “Most consumers are either unaware of the personal information they share online or, quite understandably, unable to determine the cost of sharing it – if not both.” (John, 2018)

Table 1. *Monetary Price and Classic Transaction Cost on Analog Markets*

expenditure on analog markets from consumer’s point of view	
monetary price in €	classic transaction costs (time and effort)

Consumers try to optimize transaction cost. Intuitively consumers weigh cost and utility of e. g. additional information sourcing. Search and information cost explain why consumers favor online shopping (at online shops or internet platforms) over buying at stationary sales retail stores. Cost in terms of time and money occur like it is mentioned in Table 1.

Internet trade reduces both types of cost: comparing prices and products is easy and fast. It eradicates personal mobility cost. Online shopping involves less classic transaction cost, but introduces online transaction cost: the data trail

¹⁶The division of different types of transaction cost was introduced by (Williamson, 1990, S. 22ff.).

reflecting our research behavior and our individual data when we buy. Consumers pay with their data. In contrary to classic transaction cost user data is an input factor for companies.

Table 2. *Monetary Price, Classic and Online Transaction Costs of Online Shopping*

expenditure at online shop from consumer's point of view		
monetary price	transaction costs	
monetary price	classic transaction cost	online transaction cost: data

Using an internet platform is even more interesting for consumers, because research and information cost can be reduced further. Table 2 shows that consumers save classic transaction cost and cash. Platforms bring together both market sides, demand and supply, without being trading partner itself. The advantage of platforms is their possibility to collect data, save, process and maybe sell it. Because well used internet platforms can generate big data in various forms it is efficient for analysis. Data value increases due to multiple uses. That's why the value of data is hardly measurable (cp. I.3.).

Table 3: *Monetary Price, Classic and online Transaction cost with Platform*

Expenditure in online shop with internet platform as intermediate institution		
monetary	transaction costs	
price in €	classic	online (data)

Consumers provide their (personal) data at digitized and dataficated markets for free up to now. There is no price like wage (labor), interest rate (capital) or rent (soil).¹⁷ There is no taxation on the production factor data. In the future cost of classic production factors and cost due to data collection und storing tend to decrease, while cost of data analysis and proccession will surge. More data scientists like IT professionals, mathematicians, and statisticians will work in this field. But consumers do not know the amount of online transaction cost appearing during online shopping nor do they know anything about the value of their data. Intense use of Google for example indicates the relevance of transaction cost for consumers' behavior: Consumers minimize classic transaction cost by searching and buying in the internet and they are often not self-conscious about online transaction cost (cp. Table 3).

An internet supplier can reduce the market price payed at the analog market (therefore we implement the monetary price in context with digitized markets) because an internet based company can earn money by using personal data as production factor. The access to the club good data generates rents for producers; and due to the fact that these can be used several times these rents are dynamic.

¹⁷In the end of May 2018 German chancelor Merkel suggested to tax customer's data generated by companies. The idea is to identify a price for data (o.V., 2018).

From the point of view of societies benefit this leads to more wealth, if the rent of consumers' isn't reduced. Net wealth, the sum of consumers' and producers' rents, increases (cp. II.1.b.).

In the future data based services will be steered by blockchain technology. 'Smart Homes' and car leasing via blockchain lead to less classic transaction costs and to bigger data volumes, more data procession activities and to severely surging online transaction costs (cp. Table 4), so that data packages which are cryptographical decentral protected and stored on lots computers can be used by blockchain algorithms (cp. I.2.c.).

Concerning the monetary price of blockchained products a preview isn't easy as well, because the limiting factor is the infrastructure necessary for dataficated processes. When this infrastructure is accessible for every potential consumer a monetary price can be determined. This price will meet the preferences of consumers.

Table 4: *Monetary Price, Classic and Online Transaction Cost in Blockchain Contracts*

expenditure in blockchain contracts from consumer's point of view		
monetary	transaction cost	
price	classic	online: data

Taking into account that monetary prices are less in digitized or dataficated markets the question is, why consumers still buy products in stationary sales retail stores; even when they are common with using the internet (cp. II.2.). Transaction cost theory supplies the answer: transaction cost fall in general with reduced uncertainty. Social interaction between customers and sellers limit uncertainty especially when rationality is bounded. Confidence between market sides develops when the relationship has a continuous character. Investments in social relations support confidence. This leads to higher classic transaction cost in terms of time and monetary effort, because buyer and seller invest in the relationship. Obviously the investment in confidence and social relations implies a benefit when transaction cost like returning products, contract control and execution cost (legal disputes etc.) do not occur. Furthermore consumers do not have to publish their data. They can consume quasi incognito.

The Welfare Economic Point of View

In a world with transaction cost, where uncertainties and incomplete information exist, institutional rules are necessary to increase economic efficiency. Societies' welfare surges when transactions in the sense of trade take place. Because low transaction cost support trade, institutions are a central requirement for societies benefit. When consumers and producers trust market rules transaction cost is reduced for individuals and society. Economic activity is more efficient. In contrast a confidence loss occurring due to no or low data protection is a welfare economic problem. Two reactions on confidence loss can be figured out: On the

one hand governmental actions (national (Bundesministerium der Justiz und für Verbrauchers, 2017) and supra-national level (European Union (April, 27th 2016)) introduce more efficient regulation of markets pointing at consumer data protection and implementing competition policy measurements. On the other hand new business models with decentralized supply introduced by blockchain technology increase transparency on markets. Confidence doesn't matter anymore because technics solve problems if the underlying contract is well configured. But: technics involve transaction cost as well. Bitcoin transfer fees show this. And: Finally every blockchain contractor needs confidence in programs, algorithms, and software engineers.¹⁸

How can governmental institutions provide efficient rules to protect consumers and societies concerning the collection and processing of big data by internet based companies? Actually data use would be helpful for governmental institutions as well (Google-Flu-Algorithm, prevention of genetic diseases etc.). Public research institutions like universities have an interest in data as well. But: Who is the owner of (personal) data? Who should have access to the club good? Does the right to use data belong to those companies which collected it? Or should these rights be controlled by governmental institutions? And: Should government be able to analyze and process data if societies welfare will increase and otherwise not? Each mentioned possibility would require special constitutional rules.¹⁹

Finally, another aspect of digitization and datafication has to be mentioned, because consumers behavior changes. Platform companies and online shops differentiate prices via algorithms which are feed with data about the expected individual willingness to pay of each potential consumer.²⁰ Airlines use these algorithms for example. This is possible because there is no market transparency. (Heidenreich, 17.09.2018) If the monetary price is too high, or the value of the data trail for the internet based company is especially high, can't be overlooked. Therefore market transparency is reduced when each supplier can set prices for the same service or product depending on its potential consumer. From the point of view of welfare economics consumers' sovereignty and rents are inefficiently reduced.

Results of an Empirical Study on Consumers Behavior on Digitized and Dataficated Markets

The empirical study was undertaken in April 2018 at the Federal University of Public Administration in Germany. Based on a questionnaire 80 students have been asked about their behavior as consumers. To avoid confirmation biases a questionnaire was structured that does not lead to general if-then-statements. So correlations which are the result of big data analysis did

¹⁸On confidence and blockchain technology compare (Behrens, 2018).

¹⁹The context between digital technology and societies benefit is explained well at (Morozov, 2018).

²⁰Already in 2011 Google registered a patent on its dynamic pricing algorithm. (Lobo, 2015, S. 113)

not occur.²¹ Round about 80 percent of the students are between 18 and 23 years old. Two thirds are male. 17 percent have a monthly income after subtraction of home rent, electricity, heating and health insurance of under 500 €; 30 percent can spend between 501 und 750 €, 40 percent between 751 and 1000 € and 11 percent have more than 1000 €. ²² 72 percent use Facebook, Snapchat and Instagram. 97 percent communicate with WhatsApp; 67 percent write SMS. Twitter (10 percent), StayFriends (1), Xing (4), LinkedIn (7) are not that commonly used. More than 90 percent state, that quality of the product is relevant for buying. 60 percent mention the price as relevant. Sustainability of the product and its production plays a minor role for the decision to buy a product. And: Two thirds do not find it important that the purchase is undertaken quickly.

Consumption of Daily Life Products

Daily life products are food, public transport etc. 98 percent state that they buy these goods primarily in stationary retail sales stores. 90 percent mention that they cook their dinner at home and do not eat in a restaurant. Only four percent order dinner mostly in the internet. Concerning public transport 90 percent book flights in the internet and 70 percent buy train tickets online. Only a quarter buys tickets for short distance mobility in the internet. Car and Bike sharing offers are used by four respectively eight percent; lifts booked in the internet are more popular. 20 percent used such a service already.

Consumption of Durable Goods of Daily Life

Durable goods of daily life are products and services which can be used during a longer time period. We have a look at daily life products like apparel, pens, books, streaming services firstly. 90 percent state, that they buy these products mostly at stationary retail sales stores. Round about 30 percent inform themselves in the first step at stationary stores and compare the offers with the internet supply afterwards; a quarter does it the other way around. 40 percent buy durable goods regularly at internet stores and platforms like Amazon, Ebay etc. A third states to buy computer games in the internet and to play online. Two thirds stream music on streaming platforms. Movies and series are streamed by 75 percent. More than 50 percent read online papers for free. It is different with books: 80 percent do not read e-books. Only 5 percent of those reading e-books use an online library. The majority buys e-books online. It is similar with audio-books. Round about two thirds still buy books in stationary retail sales stores. A quarter borrows books in a public library. 80 percent consume entertainment services with their Smartphone; 95 percent use a Computer as well; only 40 percent use tablets.

²¹Compare (O’Neil, 2017, S. 29ff.) on behalf of consequences of data collection and (Kahnemann, 2012) for explanation of the „confirmation bias“.

²²Two percent didn’t mention their income situation.

On the Purchase of Long Life Consumption Goods

Smartphones, tablets, personal computer and fridges, washing machines, bikes and cars are long term durable consumer goods. Buying these goods consumers usually need more time and money to decide where they purchase compared to buying short term durables because they spend a bigger part of their income for these goods. This implies higher transaction cost. 60 percent state that they buy goods like fridges, cars, and bikes at stationary retail sales stores. Computer screens, TVs etc. show a differing picture: 15 percent buy these goods in the internet, 17 percent don't do so and the rest sometimes buys in the internet and sometimes in stationary retail sales stores. 45 percent collect before buying information in the internet and then in analog stores. 30 percent do it otherwise. 10 percent search for information exclusively in the internet.

Usage of Digitized Public Services

Relatively scarcely digitized public services are demanded: When services like ordering a new passport are questioned 22 percent book a time slot in the internet. The eID-function of the identity card is used by 17 percent. Only six percent ordered their certificate of good conduct online.

Payment Habits in the Internet

Payment habits differ a lot: 55 percent transfer money after receiving the product bought. Financial intermediate like PayPal are used by 50 percent. A third pays per Giropay with an internet-PIN or uses their credit card. Electronic Cash like crypto money is used by 12 percent.

Data Security

More than 50 percent already had a virus, spyware or similar on their computer. 96 percent never made bad experiences paying online. Five percent have been contacted by their bank because they had the impression that money was withdrawn unauthorized of their account.

Intermediate Results

Short and long term durable goods are bought mainly at analog retail stores. Before purchasing consumers mostly do some research on goods they want to buy in the internet. But they try to get information in the stationary retail sales as well. Public services are primarily used analog. Obviously habits play a big role due to the fact that less uncertainties and therefore transaction costs result from doing so even if the product is the same.

In contrast flights, train tickets, concert tickets etc. are bought mostly online. This behavior saves classic transaction costs like mobility costs and time, but it causes online transaction cost. It is the same with streaming

services: these are bought, used and payed online. The main reason is that streaming implies quasi unlimited possibilities to choose from a wide range of music and movie services. This added value seems to be so high, especially if there is no alternative that consumers take into account paying with their data.²³ Concerning paying modalities users´ like paying after receiving the product the best. Financial intermediates receive less confidence, even though 95 percent did not experience anything undesirable.

Data Protection versus Transaction Cost

The safety of (personal) data is focused in context with digitization and datafication of value added chains, because each user leaves a data trail surfing, buying, paying, and communicating via digital channels. But, is it reasonable to protect our data against the access of third parties? Do classic transaction cost increase while we `save´ online transaction cost after data protection rules are imposed? Does data protection limit our freedom to choose from the whole offered range of products or does it defend consumers´ sovereignty?

Data Protection versus Data Security

Data protection and data security provide different types of safety. Data protection shall provide the constitutional right of informational self-determination. Not (personal) data itself, but the freedom of citizens to decide who what when and in which context citizens search or purchase online is protected. (Die Bundesbeauftragte für den Datenschutz und die Informationsfreiheit, 2018) In contrary data security involves that data is technically sheltered, so that it is not manipulated, eradicated or given to third, unauthorized parties. We do not refer to attacks on hard and soft ware. These are illegal activities. In this paper data protection rules provide data security of personal data to avoid data use by third parties, data procession by companies or other institutions via algorithms, which are designed by data scientists aiming at commercial or political use.

Data Protection and Consumers Sovereignty

General Data Protection Rule (GDPR) became enforced on May, 25th 2018 in the European Union. GDPR provide “data protection and privacy for all individuals within the European Union (EU) and the European Economic Area (EEA). It also addresses the export of personal data outside the EU and EEA areas. The GDPR aims primarily to give control to individuals over their personal data and to simplify the regulatory environment for international business by unifying the regulation within the EU.” (European Union, April

²³In this context it is interesting, that three quarters of interviewees are joining Facebook and nearly 100 percent using WhatsApp.

27th 2016) Article 5 GDPR “Principles relating to procession of personal data” formulates basic requirements:

- lawfulness, fairness and transparency;
- purpose limitation (“collection and procession only for specified, explicit and legitimate purposes”);
- data minimization (“adequate, relevant and limited to what is necessary in relation to the purpose”);
- accuracy (inaccurate data has to be erased or rectified without delay);
- storage limitation (“personal data may be stored for longer periods insofar as the personal data will be processed solely for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes”);
- integrity and confidentiality (“appropriate security of the personal data against unauthorized or unlawful processing, against accidental loss, destruction or damage”).

There are two exceptions of these principles, which are mentioned in article 18 GDPR: “for the protection of the rights of another natural or legal person or for reasons of important public interest of the Union or of a Member”.²⁴ Public interest rules out private interest. Prior condition for (personal) data protection is that each consumer acts responsible with his data. Everybody has to take care actively about who gets his (personal) data and if he allows third parties access. Each internet user must be sensitized for problems resulting from publishing personal data in the internet. The former German Minister of the Federal Ministry of Economics Sigmar Gabriel mentioned the opinion, that GDPR shall support the advantages of internet users and level the disadvantages. Therefore data shall not be collected and processed and no profiles shall be created without the expressed consent of the citizen in principle. Moreover the consent must be withdrawable. (Gabriel, 2015, S. 212) Summarized GDPR safeguards consumers which transmit personal data when they purchase and consume in the internet; assumed that wrong doing will be sanctioned and damage compensated.

Data Protection and Transaction Cost

With the implementation of GDPR classic transaction cost will surge, because consumers are obliged to express their consent for data collection, procession and storage or to express their denial. In contrast online transaction cost sink when consumers limit data usage of online companies.

From the point of view of data collecting companies advantages deriving from online trades and therefore (personal) data are reduced; this is especially the case, when the consent of consumers wasn't obtained before GDPR came

²⁴US American law allows unlimited usage of personal data of non-us-citizens. (Congress of the USA, 2008).

into force. Because there isn't any empirical study on the change of consumers behavior since May 2018 yet, it can't be overseen how grave the effects are. But we can assert: When advantages disappear monetary prices of online shops probably come closer to market prices on analog markets. Monetary prices will increase.

Concerning online platforms, acting as intermediates between sellers and buyers, advantages of online purchases will even sink farther due to GDPR. The reason: Access to (personal) data and their multiple uses is reduced or even prohibited. Depending on the competition intensity this can lead to increasing prices of online traded goods.

Looking at blockchain contracts GDPR will not change anything, because contract partners had to agree to personal data use so that the blockchain technology can work.

It remains the question, if GDPR protects citizens just searching for information in the internet as well. Here the legislative body expresses not very accurate what is meant. Personal data are defined as data which do not allow to backtrack single users without extensive effort. If this is the case with internet searching engines like Google is left open. Actually collected data implicates commercial benefit for third parties and they can produce social benefit as well (Google flu algorithm). The sword GDPR is double-edged in this context: On the one hand valuable innovation can be invented analyzing big data volumes. On the other hand citizens will experience a loss of personal freedom, because their behavior gets predictable. Independently if a private company or a public institution generates big data, politicians and the legislator have to weigh priorities as well with GDPR in force.²⁵

Conclusions

Digitization and datafication change consumers' behavior. When consumers expect additional advantage or less transaction cost, they are willing to pay with (personal) data. Products which can be purchased and consumed in the traditional analog way do mostly not change consumers behavior instantly like the empirical study shows. This paper explains that transaction cost play an important role in consumers decision making. Consumers pay classic transaction cost like time and monetary effort purchasing at stationary retail sales stores. If consumers surf in the internet and buy online, classic transaction cost is usually reduced, but online transaction cost like (personal) data arises. Online transaction cost is less transparent than classic transaction cost. Here GDPR aims at protecting consumers. Internet users in general and online consumers in particular shall be sensitized to act self-responsible concerning their (personal) data. „How do I make the best of the trail of data that my every step in the modern world leaves? Every transaction works on two levels: what it accomplishes for you and what it teaches

²⁵„Das Öl des 21. Jahrhunderts: Die Kommunen sollten ihre Datensätze künftig verkaufen, fordert der deutsche Städte- und Gemeindebund. Kritiker sind entsetzt.“ (o. V., 2018).

the system you just interact with. Being aware of this is the first step to a happy life in the twenty-first century.” (Domingos, 2015, S. 44) With regard to the data trail we leave surfing in the internet, not purchasing or paying, it is not clear yet, if GDPR can be applied. Sovereignty of consumers and their right for informational self-determination imply that data trail information should be included.

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