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Editorial

Blockchain meets marketing: Opportunities, threats, and avenues for future research

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ABSTRACT

Blockchain technology is having an increasingly profound impact on the business landscape. Blockchain—a means for storing information and transactions in secure, decentralized manner—has many potential applications for marketing. However, marketing research and practice are still tentative about the use of blockchain and are yet to fully understand it and embrace it. The goal of this editorial is to advance in this direction and offer a path toward incorporating blockchain technology into our scholarly marketing thinking. We review the basic terminology and principles of the blockchain process, provide a comprehensive overview of the potential impact of blockchain on several core marketing areas and propose research questions that can help advance both research and practice as this technology develops.

This editorial is accompanied by five research notes written by leading marketing scholars, which explore applications of blockchain to the following marketing topics: Advertising (Joo et al., 2022), Branding (Colicev, 2022), Creative Industries (Malik et al., 2022), Pricing (Zhang, 2022), and Privacy (Marthews & Tucker, 2022).

1. Introduction

Blockchain technology is a major technological development of this century. As a mechanism for storing information and transactions in secure, decentralized manner, blockchain technology has been mainly formulated to create cryptocurrencies such as Bitcoin (Nakomoto, 2008) and can still be primarily found in financial applications (Tapscott & Tapscott, 2017). Initial attempts have been undertaken to discuss the marketing applications of blockchain (Ghose 2018; Harvey, Moorman, & Toledo, 2018; Jain, Dash, Kumar, & Luthra, 2021; Kowalewski, Mclaughlin, & Hill, 2017; O'Leary, 2018; Stallone, Wetzels, & Klaas, 2021). This research stream is, however, in its infancy. The goal of this editorial is to encourage novel research that incorporates blockchain technology into scholarly marketing thought. This is in line with the editorial philosophy of IJRM to spur disruptive, innovative research that may define the future of marketing thought and practice (Schreier et al. 2021).

What are some potentially impactful research questions that emerge in a market that uses blockchain technology? Previous conceptual papers have mostly focused on specific practical uses of blockchain technology in marketing, such as operational benefits of enhanced security, fraud prevention, and reducing the number of intermediaries (Berkowitz, 2017;

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Ertemel, 2018; Kowalewski et al., 2017; Ghose, 2018; Antoniadis, Kontsas, & Spinthiropoulos, 2019; Boukis, 2019; Casino, Dasaklis, & Patsakis, 2019; Rejeb, Keogh, & Treiblmaier, 2020; Stallone et al., 2021). Our goal here is to provide an expanded view of the potential impact of blockchain on several core marketing areas and to propose research questions that can advance both research and practice as this technology develops.

To do so, we have assembled 5 teams of leading marketing scholars that are each detailing the role of blockchain technology in shaping marketing with regard to: Advertising (Joo et al., 2022), Branding (Colicev, 2022), Creative Industries (Malik, Wei, Appel, & Luo, 2022), Pricing (Zhang, 2022), and Privacy (Marthews & Tucker, 2022). We hope that these notes will help pave the way for innovative, relevant, and impactful future research on this topic. While not all opportunities might turn out to be mines of gold in the years to come (for marketing research and practice), we need to start exploring them thoroughly to find out.

This editorial is intended to serve as a common backdrop for these research notes, identifying areas in which we hope research will flourish. We first provide a short primer as to what blockchain technology is, and highlight the characteristics that have the potential to create value to marketing. We then review possible implications and the research questions emerging from them. We organize our insights around the strategic action of targeting, the 4 Ps of marketing mix (product, price, place, and promotion), and two fundamental market-based assets: brand equity and customer equity.

2. Blockchain technology

Blockchain is a technology for storing and logging transaction data. It is defined as a "digital, decentralized and distributed ledger in which transactions are logged and added in chronological order with the goal of creating permanent and tamperproof records (Treiblmaier 2018, p. 547)". Blockchain is a form of ***Distributed Ledger Technology (DLT)***, which is comprised of a chain of blocks that contains an ever-growing digital list of data records without the need for a central server and that is set up in a way that cannot be altered or changed. Blockchain is used for the secure logging of transactions that can be related to money, property, information, and authorization rights without requiring a third-party intermediary such as a bank or a government (Swan, 2015; Yli-Huumo, Ko, Choi, Park, & Smolander, 2016; Zheng, Xie, Dai, Chen, & Wang, 2017).

A block in the blockchain contains coded transaction data. The data can include information such as date, time, location, money transferred, buyer's and seller's identity, and also any image, text, sound, or other relevant information. All transactions in a block share the same time stamp. Each block has a unique fingerprint, called ***hash***. The hash uniquely identifies a block and all of its contents. Once a block is created, any change inside the block will cause the hash to change. Thus, the hash forms a cryptographic signature that protects the block and cannot be easily manipulated or attacked. Each new block in the chain is linked to the previous block – the last line in the block is the first line of the next block (Risius & Spohrer, 2017). The first block is called the Genesis Block.

Blockchain transactions occur within a peer-to-peer network of globally distributed computers, called ***nodes***, as illustrated in Fig. 1. Each node maintains a copy of the blockchain and contributes to the functioning and security of the network. Any time a node wants to integrate the new block into an existing chain, all the other nodes must verify the block to ensure that it hasn't been altered. Once verified, each node adds this block to their blockchain. The transaction is sealed and a block is formed only when nodes in the network reach consensus (Zheng et al., 2017). Any change in the block will cause the hash to change and create an interruption in the chain that becomes known to the entire network. Therefore, the history of the block cannot be altered a-posteriori. Blockchain users operate under a pseudonym, or disguised identity. Transactions are linked to addresses that correspond to public keys derived by user-held private keys, not by username or password. Therefore, the users can remain anonymous while still prove their identity on the protocol level (Pfitzmann & Hansen, 2010; Ertemel, 2018).

To avoid hacking the hashes of the blockchain, safeguards must be in place to eliminate the possibility that one could alter a block and then quickly recalculate all the other block hashes before the other network members notice. This is done by ensuring that any addition to the blockchain requires notifying the entire network and their participation in the validation process. Specifically, for a block to be formed, the nodes compete among themselves to solve a complex mathematical problem, until they reach a consensus. Various mechanisms were suggested for reaching consensus – proof of work, proof of stake, byzantine fault tolerance, proof of elapsed time, proof of burn – depending on the specific blockchain configuration (Wang et al., 2019).

A ***token*** is a digital asset stored in the blockchain. A token can be any digital entity – a digital coin, an image, a vote, or a license of ownership of a song. Today, the most well-known tokens are the cryptocurrencies (e.g., Bitcoin, Ethereum). Tokens can be exchanged among the network members and form a way to create and exchange value directly, without the need of third parties. They are used in various ways among the network nodes, including the facilitation of transactions in form of digital payment (cryptocurrencies) or validating the right to perform an action.

The creation of tokens is part of the blockchain transaction securing mechanisms. The joint effort of the nodes in securing the transaction and solving the computational task results is a creation of tokens, so that each addition of block to the chain is actually a process of token ***mining***. In the Bitcoin blockchain, for example, the tokens are the Bitcoins and the result of each transaction is a new Bitcoin. The blockchain is constructed so that mining becomes increasingly computationally complex as the chain grows. As the Bitcoin chain has been around for a while, the mining of new Bitcoins requires a large computational

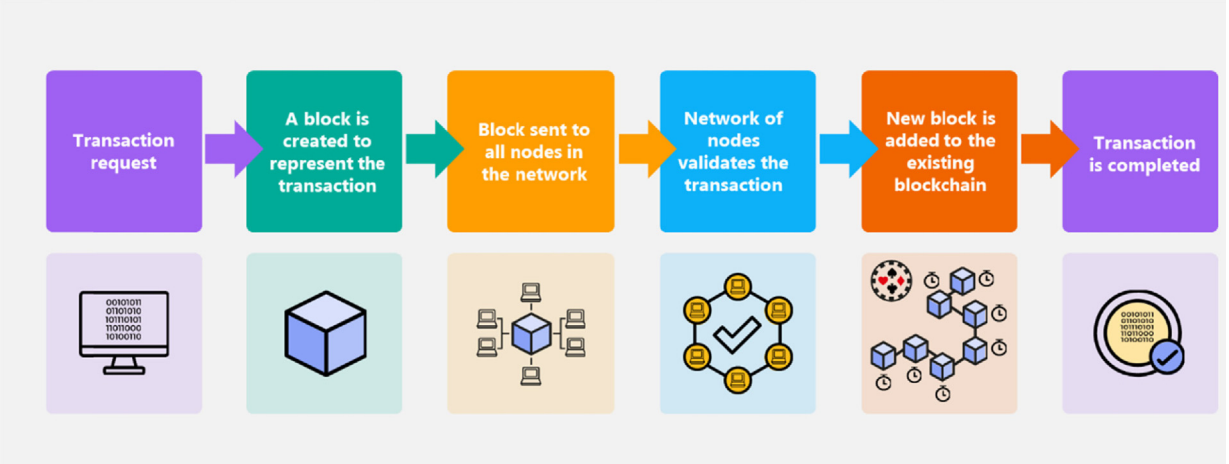

Fig. 1. Logging transactions on blockchain.

power, and therefore most Bitcoin commerce is done through exchange of existing currency. The mining process is a main source of concern when discussing the pros and cons of the technology since the mining in established chains is concentrated among a small number of players who can afford the cost of high computational capabilities, and these players form a de-facto oligopoly. Also, mining involves high energy consumption, which is a source for significant environmental concerns – the electricity used for mining new Bitcoins is equivalent to the energy consumption of an entire country (e.g., Sweden).[1]

Tokens can be either fungible or non-fungible. Fungible tokens can be traded, substituted and exchanged. Cryptocurrencies are fungible, since each Bitcoin, for example, is identical to other bitcoins and therefore, it can be exchanged and used as a medium for commercial transactions. ***Non-fungible tokens (NFT)*** are cryptographic assets on a blockchain with unique identification codes and metadata that distinguish them from each other. For example, a painting, a logo, or a record of a consumer transaction. Unlike cryptocurrencies, each NFT is unique and cannot be traded or exchanged at equivalency.

An important mechanism embedded in blockchain processes is the use of smart contracts. A ***smart contract*** is a self-executing contract between a buyer and a seller being directly written into lines of code (Buterin, 2013). It can be regarded as an encoded set of rules. The code and the agreements contained therein exist across a distributed, decentralized blockchain network. The code controls the execution, and transactions made according to this contract are trackable and irreversible. Smart contracts permit trusted transactions and agreements to be carried out among disparate, anonymous parties without the need for a central authority, legal system, or external enforcement mechanism. Ethereum is a popular implementation of a smart contract blockchain. Imagine the paperwork needed to apply for a mortgage being streamlined, with approvals being automated based on validation of the requested documentation that an applicant submits to the mortgage provider.

Combining NFTs and smart contracts opens a broad range of possible applications. Users can create complex contractual arrangements pertaining to the licensing, distributing and protecting of NFTs. Such technologies can also be applied to the compensation of content creators based on content consumption, as discussed by Malik et al. (2022). As Joo, Kim, Ghose, and Wilbur (2022) discuss, smart contracts may also be used to offer flexibility in the relationship between advertisers and publishers. These contracts will be tamper-proof, transparent, and auditable in real-time due to blockchain mechanisms. Arbitration processes, when needed, will be simplified and accelerated.

3. Key benefits for marketing

Blockchain technology offers a decentralized, peer-to-peer, secure, immutable, tokenizable, public, pseudonymous and open-source logging, which makes it potentially valuable for marketing applications (Ertemel, 2018; Harvey et al., 2018; Boukis, 2019; Antoniadis et al., 2019; Jain et al., 2021). Fig. 2 illustrates the main technological capabilities of blockchain technology, and 5 key benefits they create for marketing.

A first key benefit is the ability **to log transaction data from different sources into a distributed database**. This enables firms to document, in real time, a large number of actions and transactions that occur on the distribution chain across outlets, and through multiple communication channels. For example, such a database can store the exposure of a customer to digital advertising on multiple devices and through multiple channels (Schweidel et al., 2022). Unlike traditional databases, the distributed nature of the database ensures that these logs are not owned by a specific firm or organization, and their usage and access permissions can be handled through smart contracts. The deployment of smart contracts offers a range

[1] https://ccaf.io/cbeci/index.

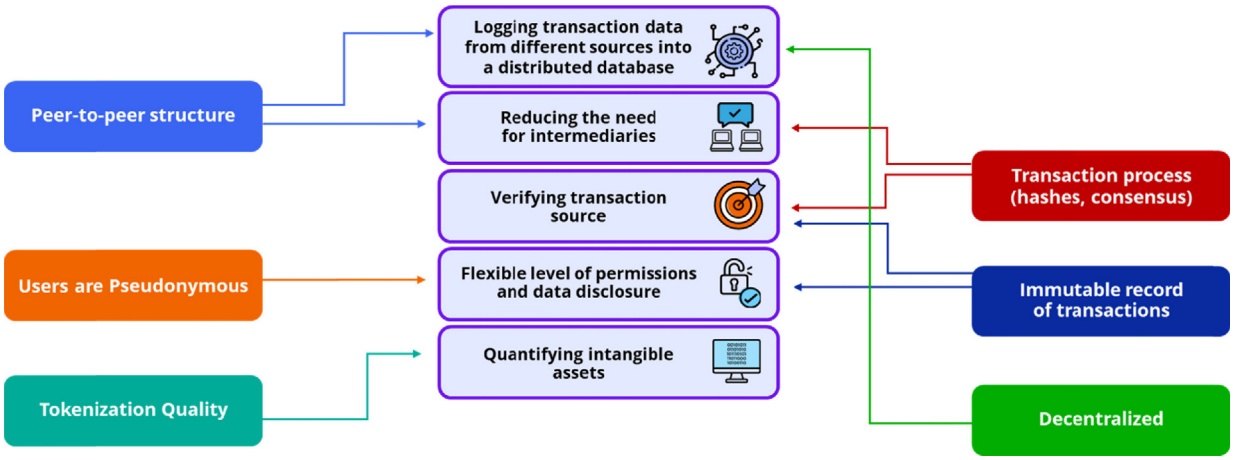

Fig. 2. Blockchain technological features and the key benefits they create for marketing.

of opportunities within marketing, from compensating content creators based on consumption (Malik et al., 2022) to more efficiently connecting advertisers to consumers (Joo et al., 2022). Lucidity,[2] a startup founded in 2017, uses blockchain to gather information from real-time marketing campaigns, and combine it with information from all touchpoints along the supply chain.

A second key benefit of blockchain results from the peer-to-peer structure of the blockchain network, which enables direct communication between the members of the network, and offers enhanced levels of security that allow participants to safely conduct transactions without the extra layers of security provided by intermediaries such as banks or social network platforms. As a result, network members can exchange tokens, view information, and co-create value with **reduced need for intermediaries**, resulting in lower processing fees**.** While the Internet already facilitates direct transactions, and services such as PayPal and Alipay allow micropayments, blockchain can bring true multi-sided markets closer to reality. Envision, for example, fast moving consumer goods companies selling cleaning products directly to customers, without the need of banks, credit card companies, wholesalers, and retailers, where all relevant parties can connect, communicate, and pay directly through the blockchain. The distributed network that enables blockchain can also be used as an intermediary-free network for various other purposes: it could be a social network that is not owned by a large conglomerate such as Facebook; a crowdsourcing network that does not need the mediating role of Amazon Mechanical Turk; or a media purchase network where advertisers, publishers, and media outlets can directly buy and sell advertising media, while consumers can be compensated directly for creating content or viewing the ad (Jain et al., 2021).

A third key benefit is the ability to **verify the transaction source**. Each blockchain transaction has a clear owner, and the data reside in a block cannot be edited by anyone. This high level of verification could enable the monitoring of important marketing processes. For instance, blockchain could be used to certify the authenticity of products. IBM, for example, has launched a blockchain service, used by retail chains such as Walmart to track the journey of grocery products, from growers to the end selling point (O'Leary, 2018; Antoniadis et al., 2019). In online advertising, source verification can help to make sure that the recipients of advertising campaigns are the real target users. Blockchain can furthermore help combat click fraud (e.g., bots or people who are hired to induce fake clicks and drain one's digital advertising budget; Rejeb et al., 2020).

Fourth, blockchain enables a high level of **flexibility of usage permissions and data disclosure**. The pseudonymity, hashes, encryptions, and smart contracts can be built so that information is only available to those who are authorized to have access. That is, while the entire data is stored in the ledger, the owner has flexibility in granting permissions to access it. This is desirable in many marketing contexts that require privacy, such as the handling of customer data where fraud is a concern (Marthews & Tucker, 2022). While the customer may be the owner of the data and her true identity is disguised, other parts of the data such as transaction histories or customer-firm interactions might be available to use. Brand licensing and brand elements, as well as name, image, and likeness (NIL) rights, can also be protected and licensed efficiently and safely through NFTs with the brand owners approving and tracking the usage. Such solutions can be an elegant, technology-based answer to regulatory concerns, as expressed by the General Data Protection Regulation.

Finally, blockchain has the potential to revolutionize the **quantification of intangible assets**. Brand equity and customer equity are important firm assets that are difficult to measure and manage and so is trading them and managing their disclosure and licensing. The tokenization quality of the blockchain allows the quantification a range of intangible assets (Chen, 2018). Each time nodes arrive at a consensus, a token is created that represents the transaction. If the transactions involve customer data, customer word-of-mouth, viewer impressions, or brand mentions, for example, the tokens created through their logging can be used as a currency to assess and compare their value. Thus, marketers can create brand-specific tokens

[2] https://golucidity.com/.

whose value encompasses a variety of brand actions and characteristics. In addition, customer activities of different types such as transactions, brand-related social interactions, and brand-related information search, can be logged and counted through a customer-specific token that can help to better estimate customer value.

4. Research questions

In the following section, we will discuss the possible impact of blockchain technology on a set of core marketing topics. For each topic, we elaborate on its impact on the marketing constructs in play, and suggest relevant research questions.

4.1. Marketing strategy

4.1.1. Return on marketing

Marketing data are either collected at the firm level or through specific organizations (e.g., Nielsen). The distributed databases enabled due to the blockchain applications could create an ongoing stream of data that encompasses in real time all the marketing activities across marketing channels, and their consequences. This stream of data can be leveraged to assess the return on marketing actions for any desired time horizon. In addition to a finer-grained—as well as more complete—analysis of the effectiveness of a given marketing action, such an operation might also support the following investigations into:

1. *The relative impact of marketing actions along the marketing channel* – What are the conditions under which various players along the marketing channels create a synergetic effect? When do they increase each other's impact and when to they diminish each other's effectiveness? By having a complete record of marketing across time and channels, such interactions can be more comprehensively explored.
2. *The effects of time delays* – The exact timestamps created through blockchain logging enable to study and optimize the temporal series of marketing actions and examine the time impact of their consequences. This will enable to estimate "half-life" constants for the buildup and decay of marketing actions. For example, a campaign through a retailer might take a certain time to take-off, but also last longer. In such sequences, it might be that sometimes, delaying actions that could have done earlier (such as delivering new merchandise to a store), create better consumer response.

4.1.2. Competition and market structure

The peer-to-peer nature of the network enables direct transaction, reducing the need for intermediaries. As discussed in the research notes that accompany this editorial by Marthews and Tucker (2022), blockchain technology can pose a risk to users' privacy, but recent advances can mitigate these concerns. This might change the power balance in many industries, opening the door to many small players. Current intermediaries, such as Google, Facebook, and Amazon might lose their de-facto power (Ertemel, 2018; Harvey et al., 2018). Research questions and topics arising from this situation could be:

1. *Targeting and stakeholder mix* – The use of cryptocurrencies has a strategic impact on firms' stakeholders' composition. Blockchain enables purchase, collaboration and investment under relative anonymity. On one hand this might create more stability by broadening the stakeholders' base. On the other hand, might invite business with an undesirable mix of customers and other stakeholders. These effect of the segmentation, targeting, and stakeholders' strategy, should be further studied.
2. *Is direct(-to-consumer) marketing really possible?* – This is a theoretical question which relates directly to the perceived transaction costs of marketing through intermediaries. The Internet was first considered to be a realm without intermediaries, where firms could communicate and advertise directly to their customers, but it has evolved into a complex ecosystem, largely governed by a new crop of information gatekeepers (Wu, 2011). The advent of blockchain raises again the question of whether a true direct-to-consumer market is theoretically possible, or whether, due to some inherent transaction cost structure, users will still need an intermediary, whereby the old intermediaries may simply be replaced by new ones with redefined roles.
3. *Competitive structure and power balance* – A related research question is to what extent the power balance in a given industry is correlated with the information shared. In blockchain, the information is presumed to be more equally spread. Does this translate directly to a transfer of power within an ecosystem, or between the members of a distribution chain? Moreover, if information is decentralized and potentially available to competitors within the industry, it raises the question of to what extent such information can serve as a sustainable advantage for growth (Du, Netzer, Schweidel, & Mitra, 2021).

4.2. Marketing mix elements

4.2.1. Product

The questions below relate to the development, design, and authenticity of products, and can be studied for a broad range of industries. One of the research notes that accompany this editorial (Luo, 2022), discusses issues from the perspective of the entertainment industry.

1. *Distributed new product design* – Blockchain technology provides a basis for productive and effective co-creation of products by multiple parties, where each party contributes its part to the overall design, and parties are compensated according to their contribution (Bayus, 2013). For instance, a blockchain-based platform could help better track the design process and see whether contributions are serial or parallel, whether design parties truly build on each other's ideas or tend to focus on developing their own set of attributes, what attributes receive more attention etc. At the same time, it is not yet clear whether this design method generates products and services that are different and/or superior compared to those designed by more centralized teams (e.g., with respect to creativity, aesthetics, or innovativeness).
2. *Maintaining product provenance* – Recent implementations of blockchain technology are used to track food production. Provenance,[3] a UK based start-up has also developed a blockchain-based system to verify the origin, journey and impact (e.g., carbon footprint, social impact) of various consumer products. Such an initiative raises many questions with respect to ethical consumption (Amatuli, De Angelis, Pino & Guido, 2020). At the same time, full transparency could lead to consumers being turned off by some products, or avoiding the ones that leverage this technology altogether (Reczek, Irwin, Zane, & Ehrich, 2018).

Tracking product origin can also help in identifying counterfeits. Devery[4] and Seal[5] are companies which use NFT tokens to create records and verify authenticity for each individual item manufactured and sold by a company. Data from such services enable further inquiry into research problems that were already discussed in the marketing literature (Appel, Libai, & Muller, 2018) and can be applied to fashion, entertainment, luxury brands and collectibles. Specifically, we could gain a better understanding of how harmful counterfeits are to the overall brand perception and profits of the firm. Are there different hierarchies of product fraud (e.g., is buying from a not authenticated manufacturer perceived better or worse than buying from non-licensed distributors)? How does this depend on the type of customer, the type of product and its location in the lifecycle?

Marthews and Tucker (2022) discuss the application of blockchain technology to support transactions between buyers and sellers in the absence of a centralized authority. By verifying the transactions, buyers are afforded trust in the authenticity of their purchases without the need for an intermediary. As discussed in Malik et al. (2022), this is particularly appealing for creative industries. In particular, one of the potential applications of blockchain technology in marketing is to ensure that content creators receive value for their work. This may result reducing or even eliminating content creators' reliance on intermediaries.

3. *Internet of Things* – The term "Internet of Things" (IoT) refers to everyday physical objects that are connected through the cyberspace. They can be, for example, step-counters and other wearables connected to a central server to monitor physical activity, or diabetic sensors, inserted under the skin, monitoring the blood sugar level and transmitting it to a monitor. The main issue with current implementations of IoT is their dependence on central servers for data storage and maintenance – this is costly, vulnerable to fraud and failures, and limits the type of connected units. The decentralized nature of blockchain enables network members to directly log activities into the ledger, and communicate directly with each other (Fernández-Caramés & Fraga-Lamas, 2018; Casino et al., 2019). Thus, for example, a person's step counter can link to her diabetes sensor, which connects to the smart refrigerator, to offer healthy meal choices and monitor calorie consumption. Pseudonymity and embedded smart contract mechanisms can manage the usage of the data, and ensure privacy and security. Reliable IoT databases open the opportunity to study a broad range of experiences in the moment (Tax, Brown, & Murali Chandrashekaran, 1998), to study preferred configurations, disposition, connect experiences to physical devices, and explore adoption behaviors, evolvement of habits, and social influences on purchase and usage (Ng & Wakenshaw, 2017).
4. *Network externalities* – Network externalities refer to the added utility someone has from a product or service due to the adoption of other users (Katz & Shapiro, 1985). Blockchain technology might introduce new dimensions and dependencies to the concept of network externalities. Since blockchain enables co-creation of value and shared ownership by customers (Ertemel 2018), does it enhance or diminish network externalities, and under what conditions? For example – if one's social media posts are tokenized and part of a peer-to-peer social network, how does their motivation depend on other people postings? How does it depend on the monetization structure? On the division of compensation? Do these network externalities depend on the entire network or on sub-clusters within the network? Blockchain can open the door to both the theoretical questions, as well as empirical insights.

4.3. Price

One of the research notes which accompany this editorial (Zhang, 2022), elaborates on pricing issues in a blockchain environment. To the extent to which pricing represents value, then what is the source of value of blockchain entities such as cryptocurrencies and NFTs? Zhang (2022) proposes that the value of a cryptocurrency hinges on the collective belief in the marketplace in its long-term survival as a store of value and a unit of exchange. NFT prices find their value bases in people's willingness to pay, as is the case with art and music.

[3] https://www.provenance.org.
[4] https://devery.io.
[5] https://seal.network.

Apart from the value question, blockchain entities raise many interesting questions related to price perceptions (Nazifi et al., 2021). An obvious area in need of research is that of customer perceptions of cryptocurrencies compared with traditional currencies. For example – if one buys a Tesla in Bitcoin, did she pay more or less than if she paid in dollars? What determines the perceived exchange rate vs. the real exchange rate? Cryptocurrencies have suffered thus far from relatively high volatility, which might be an important factor in price perception. For example, propensity of spending on utility versus hedonic products may be driven by perceptions of how volatile the particular currency is. New cryptocurrency companies such as Ovato,[6] who offer multicurrency wallets, can provide data to explore these interrelationships in price perception.

Another interesting pricing issue emerging from blockchain is non-monetary pricing. The tokenization feature of blockchain enables currencies that represent many intangibles assets that are non-monetary by nature such as customer interactions or carbon emission. The perceived value and exchange rates within and across these assets are fascinating research issues since they attach context, symbolic value, and attitudes to the currency and entangles price with additional firm, brand, or consumer facets.

4.4. Place

4.4.1. Retailing

Most of the discussion on blockchain in retail context has been done with respect to logistics and supply chain management (Caro, Ali, Vecchio, & Giaffreda, 2018). Companies such as retail.global[7] suggest using the integration capabilities and the distributed nature of the blockchain to combine data from different geographic markets and integrate them to help mid-size businesses to become global. Thus, network members can utilize each other's experience, while still keeping their business information secure.

The ability to combine information from distributed sources allows to shed light on classic questions in omnichannel retail, such as what is the typical path of search and purchase in the different channels (e.g., search for a product online, go to try it in the store, and complete the purchase in a third-party outlet). Combining blockchain with IoT, a retailer can optimize the shelf layout by changing the relative position of items with respect to their relative quantities (for instance, does the last item on the shelf sells faster or slower depending on the items located around it?). Data from distributed ledgers can be used to explore questions on franchising and help optimize the information flow and the franchiser-franchisee power balance.

4.4.2. Online commerce

Besides the embedded enhanced security and reliability in transaction logging (Ertemel 2018), blockchain technology offers the potential for true peer-to-peer commerce, with minimal use of intermediary platform such as Amazon.com or AliEspress. In such a market, users' reviews can be tokenized, and designated currencies can facilitate transaction and reduce the processing fees. GAMB[8] is a startup offering such an ecosystem, with its own virtual mall and a virtual coin called GMB. Such a distributed platform opens, among other things, some interesting questions related to trust – does the pseudonymity, where the experience can be verified but the identity is not known, lead to more or less fake reviews? Do buyers' increased security arising from the platform transfer to more trust in the product or in the seller? Such platforms can provide better information of bundles and frequent combinations, on cross buying and on interesting combinations.

4.5. Promotion

4.5.1. Advertising

As described in a research note which accompanies this editorial (Joo et al. 2022), a considerable portion of the suggested implementation of blockchain in marketing relates to advertising (Stallone et al., 2021). Literature so far has expressed the potential of blockchain technology to simplify the advertising media purchase processes (Antoniadis et al., 2019) by allowing direct communication between parties. Platforms such as the Adledger[9] consortium, or the NYIAX (New York Interactive Advertising Exchange) blockchain based market for advertisement and media planning, launched by NASDAQ (O'Leary 2018), are important steps in this direction.

Reducing click fraud and ensuring that advertising dollars reach their intended targets remain major challenges of the advertising industry (Antoniadis et al., 2019), and blockchain technology can be also useful to mitigate this problem. Besides providing enhanced security and efficiency, the tokenization of advertising reach data can help create platforms in which users are compensated for watching an ad (Ghose 2018). This can improve targeting by providing more reliable information as to who actually is exposed to the advertising message (Rejeb et al., 2020) and track their response. Such applications could be used to study questions such as:

[6] https://www.ovato.com/en/.
[7] https://retail.global/.
[8] https://gamb.io/.
[9] https://adledger.org.

1. *Tracking the chain of exposures* – More detailed exposure data can help identify obstacles and blockages in the reach process and add new dimensions to traditional targeting. For example – are there certain people who respond to an ad only after the third exposure while others respond more quickly? Does exposure to an ad of a certain brand influence the response to subsequent ads for other brands? Other product categories? Are there certain pockets of exposure-resistant customers and what are their characteristics? The accurate time stamps offered by the blockchain enable to understand and optimize the time dynamics of exposure and reach.
2. *The return on influencer investment.* Influencer marketing has become a popular tactic for brands to connect with consumers, leveraging the existing social ties between an influencer and their followers. But, how should brands compensate influencers for such collaborations? Compensation per post or subscription? Per number of followers? What are the time delays for influence? Who are the individuals that should be compensated? How should compensation change with respect to the network life cycle and topics of focus? As with digital advertising, blockchain technology can potentially provide accurate measurement as to the reach and frequency of influencers' messages to its audience, supporting an assessment of the value of this increasingly common marketing action.
3. *The hierarchy of effects* – Blockchain technology offers the opportunity to track the response of an individual to advertising messages even in early stages of the hierarchy of effects. Murphy (2018) describes a Basic Attention Token (BAT), which will tokenize user attention. By careful definition of the actions related to each stage of the hierarchy of effect such as engagement, information search, or consideration, the customer journey from exposure to purchase can be deciphered. Studying early stages in the hierarchy of effects can help in understanding message effectiveness for each stage.
4. *Cross platform continuity* – Advertisers often struggle with understanding how exposure on different platforms influence each other (Ghose, 2018). Blockchain advertising applications providing individual level exposure data can shed light on the effect of exposures on different platforms.

4.5.2. Consumer interactions and social networks

1. A natural application of the blockchain structure that utilizes its peer-to-peer network would be to implement a blockchain-based social network. Such a social network will not require a central platform, such as Twitter of Facebook; its users can be compensated through tokens for their interactions and contribution, generating trackable and reliable (Sahpour, 2018) user content, which enables to identify influencers and detect information flow and influence processes (Murphy, 2018; O'Leary, 2018; Antoniadis et al., 2019). Steem[10] and Peepeth[11] are examples for a social blockchain in which users maintain control over their data, and earn cryptocurrency rewards for each contribution they make. In one of the research notes accompanying this editorial, Colicev (2022) describes how the usage and trading of NFTs facilitates in creating social networks and communities that enhance the value of brands and platforms.
   This new social network model raises some interesting research questions:

2. *Network structure* – Does the peer-to-peer nature of the network flatten the network structure? Will blockchain-based networks, where there are fewer barriers for direct interactions, have, instead of a power-law distribution of ties, (i.e., a small number of highly connected users and a large number of users with a small number of ties) looks more like a random graph, where the tie distribution is bell-shaped around a certain mean? (Stephen & Toubia, 2009; Muller & Peres, 2019). The resulting network structure has implications for the concentration of influence and the speed with which information may propagate.
3. *Transient Information puffs* – Rumors, trends, hypes, and buzz spikes are of great interest to social network researchers (Kamins, Folkes and Perner 1997; Gelper, Peres, & Eliashberg, 2018). Detectable social networks can generate insights on these transient information streams, understand their source, and track their evolution.
4. *The authenticity of content* – The ability to better track content authenticity raises a set of research questions relating to "what is truth"? By combining blockchain platforms to traditional platforms, researchers can track real vs. fake information (reviews, news) and address questions relating to the motivation for manipulation (Mayzlin, Dover, & Chevalier, 2014), or the amount of false information a network can tolerate.

4.6. Marketing intangible assets

For many firms, a considerable portion of their equity stems from brand equity and customer equity (Leone et al., 2006; Aaker, 2009; Libai, Muller, & Peres, 2009). Monitoring and managing these assets is far from being trivial, especially due to the difficulty to track brand perceptions and customers, and to monetize their related activities. We list below the potential contribution of blockchain technology and describe some relevant research questions.

[10] https://steem.com/.
[11] https://peepeth.com/about.

4.6.1. Brand equity

Colicev (2022) focuses on blockchain technology from a branding perspective. Brand assets and liabilities (Aaker, 2009), as well as brand elements can be stored and traded using NFTs. Alternatively, NFTs can be used as independent entities which are stored, used and traded in the Metaverse (Colicev, 2022). Brand usage royalties and permissions can be facilitated through NFTs and priced more easily. Colicev (2022) further describes how online brand communities can be created on their blockchain, and the contribution of their members from their social media activities – posts, audio and video, can be monetized. Boukis (2019) mentions that brand specific currencies can be created used to compare the value of different brands. With such a straightforward monetization, the linkage between branding actions and brand value can be more easily studied.

Relevant research topics in this domain include:

1. *The relative contribution of brand elements* - The relative contribution of each brand element (e.g., logo, name, symbol, slogan) to the overall brand equity is hard to assess. With NFTs, each of them can be logged separately and be individually tokenized and evaluated. Thus, we can better understand both the contribution, as well as the synergetic effects, of the various brand elements.
2. *NFT as a value enhancer* – An interesting question, discussed in Colicev (2022), would be whether the mere existence of NFTs for a brand contributes to the overall brand equity. How does owning a brand-related NFT contributes to one's brand loyalty and perception? What should such NFTs be (e.g., visuals, photos of rare packages, memorabilia, documents and usage royalties)? Should they be time limited and attached to a specific device? Which will contribute more value? Would "fans only" or "deserved" brand NFTs be perceived as having more value?
3. *Co-branding* – With brands being more easily valued and monetized, classic co-branding research questions can be revisited (Geylani, Inman, & Ter Hofstede, 2008). What brand combinations are best for impactful co-branding? What is the optimal time frame? Which of the brand elements should be combined? What are the synergetic effects?

4.6.2. Customer equity

Blockchain technology has the potential to offer better measurement and management of customer equity, while addressing some critical concerns relating to customer privacy. One of the research notes that accompany this editorial delves deep into privacy-related issues (Marthews & Tucker, 2022). As with brands, customer-specific currencies can be produced and traded, so customer value can be computed based on the entire set of user transactions, and customers could be compensated according to their value (Stallone et al., 2021). The start-up Lum,[12] for example, suggests a preliminary version of such a system, which provides transaction and content stamping of firms' customers and tokenizes it using its own native digital token.

Relevant research topics include:

1. *Customer value* – Though customer lifetime value is traditionally calculated based on a customer's monetary transactions, customer value can be also expressed by one's word-of-mouth, willingness to try early versions of the product, writing product reviews and influencing others. A customer-centric blockchain platform could facilitate capturing these components in the value calculation. Also, the connection between these components and marketing mix elements can be tested – how do price changes influence WOM? Are the heavy shoppers also highly influential or heavy WOM distributors? While some of these questions have already been asked, data from blockchain based platform can generate new and potentially more nuanced insights.
2. *Loyalty programs* – Many of the proposed applications for blockchain in marketing relate to loyalty programs (Kowalewski et al., 2017). For example, Appsolutely[13] is a firm aiming to create a universal rewards platform. It uses LoyalCoin, a cryptocurrency that can be earned from using one brand and can exchange its rewards for other digital assets, or redeemed and spent outside the platform. With all transactions being logged into the ledger, and the information being shared across firms, Starbucks can have a joint program with United Airlines, and WholeFoods, for example. Crypto loyalty rewards can be offered (Rejeb et al., 2020), and participants can trade their loyalty points. The fundamental research question regarding these broad, multi-brand programs is how effective they are in engaging consumers with the brand and create actual loyalty. Other research questions relate to optimal combinations or loyalty partners, dynamic and customer-dependent partnerships, and the time dynamics of collecting and trading the loyalty rewards.

5. Conclusion

While blockchain was initially introduced as a proposal to create a virtual currency system (Bitcoin), it has evolved in a general technology used to record, distribute, and leverage data with added ease, security, and privacy. Its potential for marketing applications is significant, ranging from better recording transactions and customer data, to better connecting market participants, to quantifying intangible assets and entities, to more efficient segmentation and marketing. We hope that the

[12] https://lum.network/.
[13] https://appsolutely.ph/?fbclid=IwAR2mUlTMN6eUudAy-FK11WcW8m-IckWKye3fpEMY4l-roDXiD17dh6v-LY4.

editorial and research notes included in this issue open the door to more research in these exciting areas of inquiry and eventually help practitioners and consumers benefit from the applications of blockchain technology. The next step in this journey will be an IJRM Special Issue on the topic coming soon.[14] Stay tuned.

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[14] The call for papers is available here: https://www.journals.elsevier.com/international-journal-of-research-in-marketing/call-for-papers/blockchain-meets-marketing.

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