sciendo

South East European Journal of Economics and Business
Volume 18 (2) 2023, 162-172
DOI: 10.2478/jeb-2023-0025

CONSUMER SEGMENTS IN BLOCKCHAIN TECHNOLOGY ADOPTION

Ana Čuić Tanković, Marina Perišić Prodan, Dragan Benazić

Abstract

Recent research has highlighted the adoption of blockchain technology (BCT) and the increasing recognition of its multiple capabilities for users. The main objective of this paper is to delineate different consumer segments based on their BCT beliefs and attitudes. Using a survey method, 934 questionnaires were collected and subjected to hierarchical and K-Means cluster analysis and contingency analysis. The results reveal four identifiable user segments with respect to BCT adoption: Innovators (enthusiastic about BCT), Cautious (careful about BCT), Sceptics (doubtful about BCT), and Suspicious (very distrustful about BCT). These results provide valuable insights into understanding behavioral intentions and serve as a basis for future research.

Keywords: *blockchain technology usage, segmentation, customer behavior*

JEL code: *O33, Q55*

1. Introduction

The digital revolution has produced numerous technological innovations, especially in the last century. In recent years, blockchain technology (BCT) has received much attention from industry and academia as one of the most popular technological innovations. As a distributed ledger technology (Zheng and Lu 2021), it is transforming traditional business operations in various industries such as banking and financial services, healthcare, food, transportation, and public services (Shin 2019). For example, to increase supply chain efficiency, Walmart and IBM have integrated blockchain technology into the food production process (Walmart 2021). In addition, this technology was used during the COVID -19 pandemic to purchase and monitor temperature-sensitive vaccines (Grand View Research 2023). Recent studies point to numerous benefits of this new technology, including transparency, improved safety and traceability, speed, efficiency, and cost effectiveness (Shrimali and Patel 2022). According to

Ana Čuić Tanković, PhD (corresponding author)
Assistant Professor
University of Rijeka, Faculty of Tourism and Hospitality Management
Primorska 46, B.O. 97, 51410 Opatija
Country: Croatia
E-mail: anact@fthm.hr
ORCID: 0000-0002-4383-684X

Marina Perišić Prodan, PhD
Associate Professor
University of Rijeka, Faculty of Tourism and Hospitality Management
Country: Croatia
E-mail: marinap@fthm.hr
ORCID: 0000-0003-1954-4481

Dragan Benazić, PhD
Full Professor
Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr Mijo Mirkovic"
Country: Croatia
E-mail: dragan.benazic@unipu.hr
ORCID: 0000-0001-5396-3706

recent research, the blockchain technology market is estimated to reach $1,431.54 billion by 2030, with a growth rate of 87.7% from 2023 to 2030 (Grand View Research 2022). The growth of the blockchain technology market is driven by the increasing adoption of cryptocurrencies by traders and the exponential growth of interest in the financial institutions sector. Moreover, the number of people using cryptocurrencies globally is increasing tremendously. According to recent data, there were more than 300 million people who owned or used cryptocurrencies in 2021 (Grand View Research 2022). As innovative technologies are adopted faster in developed countries, North America (U.S. and Canada) held the largest share of the blockchain technology market in 2022. Being an emerging technology, this market in Europe is estimated to be worth $59,142.33 million by 2028, up from $1,234.08 million in 2021, at a CAGR of 73.8% during the specified period (Business Market Insights 2022). In Europe, Germany has the largest share in the market of emerging technology, followed by the UK, France, Italy, Russia, and the rest of Europe. The Republic of Croatia supports the development of blockchain technology prescribed in the Digital Croatia Strategy 2032 (Official Gazette 2023) and expects this technology to be used in the public and private sectors, especially in the work of public administration, in the next ten years. In Croatia, companies and projects have developed in the financial industry, telecommunications, energy, software solutions, tourism, transport, and public administration, and several initial calls for funds have been issued, reflecting the initiative to support the development of this technology (Fuzul and Juričić 2021).

Parallel to the development and adoption of this technology in various industries, the interest of the academic community is also developing. Recently, studies have investigated the application of blockchain technology in various fields, most commonly in supply chain management (Kamble, Gunasekaran, and Arha 2018; Queiroz and Wamba 2019; Sheel and Nath 2019; Wamba and Queiroz 2019; Alazab et al. 2021) and finance (Yusof et al. 2018; Ali, Ally, and Dwivedi 2020; Kabir and Islam 2021). These studies mainly focused on the organizational perspective and how blockchain technology can add value to businesses and organizations. From the consumer perspective, researchers most often examine the factors that influence the adoption of cryptocurrencies (Albayati, Kim, and Rho 2020; Arli et al. 2020; Almajali, Masa'Deh, and Dahalin 2022; Ter Ji-Xi, Salamzadeh, and Teoh, 2021; Koroma et al. 2022; Mashatan, Sangari, and Dehghani 2022), as well as acceptance drivers and user behavioral intentions for blockchain technology adoption (Hawlitschek 2018; Grover et al. 2019; Shin 2019; Shin and Hwang 2020; Gao and Li 2021; Liu and Ye 2021; Raddatz et al. 2021; Marikyan et al. 2022). According to Zheng and Boh (2021), there is limited empirical evidence on the social perspective of using blockchain technology, and there is little research on how this technology can add value to the customer or user. In addition, Kamble, Gunasekaran, and Arha (2018) and Albayati, Kim, and Rho (2020) emphasize that consumer adoption of blockchain technology is low, largely due to misunderstandings and lack of familiarity with the concept, resulting in hesitant and slow adoption of the technology. Since it is a nascent technology, users have many doubts about its adoption and use (Liu and Ye 2021). In the context of food traceability using blockchain, Wang and Scrimgeour (2022) pointed out that there is a lack of studies on the psychological and motivational factors, segmentation, and consumer perception. This means that it is crucial to determine the characteristics of target segments, their motivations, habits, and intentions for future behavior in order to develop effective marketing strategies. Therefore, the objective of this paper is to identify the key segments of users of BCT, focusing on social influence, trust in BCT, trust in blockchain users, perceived threat of personal data disclosure, and intention to use BCT. This research will help fill the knowledge gaps in profiling user segments regarding their intentions to use blockchain technology. This paper has two main objectives. The first is to explain the fundamental concepts that drive blockchain technology usage intentions, and the second, to identify segments in terms of their attitudes and perceptions toward BCT usage. The study aims to show that there are different segments of BCT users. In addition, the study aims to show the importance BCT, given the increasing development of a disruptive economy.

The paper is organized as follows. After this introduction, a theoretical framework supporting our study is presented. The third part explain the research methodology and presents the research results. The last section concludes the study, discusses the limitations and offers suggestion for future research.

2. Literature review

2.1. Blockchain technology (BCT)

Blockchain technology (BCT) is defined as a decentralized ledger that maintains transaction records on multiple computers simultaneously (Ali, Ally, and Dwivedi 2020) and represents both an economic and technical transformation (Zhao, Fan, and Yan 2016; Zyskind, Nathan, and Pentland 2015). From an economic

perspective, blockchain provides tools for all areas requiring a reliable record of transactions, especially in scenarios where parties cannot be fully trusted (Lindman, Rossi, and Tuunainen 2017). Technically, blockchain is a novel database system particularly suited for decentralized environments where trust may be lacking. The advent of blockchain technology has introduced various elements and related concepts that may lead to confusion when discussing its implementation. Among these aspects is the concept of organizing and sharing transactions through data structures known as blocks (Asharaf and Adarsh 2017; Antoniadis, Kontsas, and Spinthiropoulos 2019). These blocks are cryptographically linked and distributed across a peer-to-peer network to ensure the prevention of tampering with previously recorded transactions (Beck, Müller-Bloch, and King 2018). Before inclusion in a block, transactions need to be validated by nodes, commonly referred to as miners. Consensus models play a crucial role in determining which node is granted the privilege of publishing the subsequent block. It is important to note that the ledger of all transactions performed in the blockchain is not stored centrally but rather distributed across all participating nodes (Antoniadis, Kontsas, and Spinthiropoulos 2019). Furthermore, blocks offer the potential to integrate advanced smart contract capabilities by facilitating the provision of code and data on the blockchain network through cryptographically signed transactions (Ali, Ally, and Dwivedi 2020). Although blockchains have often been associated with cryptocurrencies, researchers have recently shifted their focus towards exploring other potential applications of blockchain technology (Ali, Ally, and Dwivedi 2020). Beyond its use in Bitcoin, blockchain is considered to have breakthrough potential (Zhao, Fan, and Yan 2016). The security and integrity of all transactions within a blockchain are safeguarded by the fact that every node in the peer-to-peer network maintains a complete record of the blockchain. Thus, any fraudulent manipulation attempt would necessitate attacking all copies of the blockchain distributed across the network, rendering it infeasible (Seebacher and Schüritz 2017). To maintain the integrity of the blockchain, new blocks with fresh transactions are only added after successfully passing agreed verification protocols.

2.2. Customer segmentation in the context of BCT

According to the theory of innovation diffusion, the spread of new technologies within a given social system represents a flow or movement from the source to the users, usually through different communication channels or social influence (Bohlmann, Calantone, and Zhao 2010). In the context of the above theory, users are classified into 5 groups of adopters depending on their willingness to adopt new products, especially technologies (Rogers 1983): 1) Innovators, who are enthusiastic about the technology, conduct tests, and report weaknesses to obtain lower prices; 2) Early Adopters, who represent opinion leaders in the social community and are less price sensitive; 3) the Early Majority are conscious pragmatists who accept a new technology when its benefits are proven and many have already adopted it, and they represent the majority of the market; 4) the Late Majority represents skeptics who reject risks and are afraid of the technology; 5) Laggards are traditionalists who resist innovation. Ramírez-Correa, Grandón, and Rondán-Cataluña (2020) studied technology-related behavioral intentions in a less technologically mature country, Chile, and compared them with users from the United States, a more technologically mature country. They identified five groups of users: pioneers, hesitants, avoiders, explorers, and skeptics, similar in composition to the U.S. research but differing in order of importance. Namely, the vast majority of Chilean users belong to the Pioneers and Hesitants group, while Skeptics represent the majority in the U.S. study. In the context of blockchain technology, Wang and Scrimgeour (2022) studied consumer acceptance of blockchain food traceability (BFT) and identified two consumer segments: pioneers and conservatives. Pioneers have much more positive attitudes and purchase intentions toward BFT, have more experience with food traceability, and consider BFT easy to use, compared with members of the Conservative segment.

In the field of information technology (IT), the concept of behavioral intention encompasses the user's perceived likelihood of engaging in a particular behavior, such as adopting a new technological innovation (Albayati, Kim, and Rho 2020). However, willingness to adopt a technology varies from user to user (Kabra et al. 2017) and occurs when a user is inclined to actively integrate a particular technology into his or her routine (Tran and Nguyen 2021). In the context of mitigating the risks associated with suboptimal technologies, behavioral intentions help define various metrics for technology adoption in the early stages of their development (Albayati, Kim, and Rho 2020).

The influence of the social dimension on user behavior is particularly pronounced when a new technology is introduced (Albayati, Kim, and Rho 2020; Queiroz and Wamba 2019). The social environment, especially reference groups, has a direct influence on

consumer behavior (Vitezić and Perić, 2021) and can affect the acceptance or rejection of BCT, which indicates the extent to which an individual perceives the approval of important personalities to adopt the new system or technology (Alazab et al. 2021; Venkatesh et al. 2008). Social influence emerges as the most important predictor of auditors' willingness to adopt BCT (Ferri et al. 2020).

Trust is one of the most important factors influencing the adoption and expansion of BCT, because it is built within a decentralized network structure that promotes secure frameworks for storing and validating transactions (Kabir and Islam 2021; Shin 2019). The field of blockchain-enabled sharing economies highlights the essential importance of trust within BCT as a driving force for trust in blockchain-based platforms (Hawlitschek 2018). Within the interactions and dynamics inherent in blockchain systems, trust within the user community emerges as a linchpin, with users relying on and trusting the experiences of their peers (Liu and Ye 2021, Koroma et al. 2022).

The impact of privacy concerns on users' behavioral inclinations in various technological contexts has been proven (Zhou 2011; Kumar, Kumar, and Bhasker 2018; Libaque-Sáenz et al. 2021). For BCT, there is a significant and positive correlation between perceived privacy and intention to use services enabled by BCT (Marikyan et al. 2022). Consumers' perceptions of privacy affect their trust in and attitude toward blockchain, which affects their intention to use the technology (Shin 2019) and their approval of blockchain media (Shin and Bianco 2020).

Therefore, in understanding consumer segments within the domain of BCT, the critical factors involve intention to use (Albayati, Kim, and Rho 2020; Alazab et al. 2021), social influence (Queiroz and Wamba 2019; Nuryyev et al. 2020), trust in BCT (Hawlitschek 2018; Almajali, Masa'Deh, and Dahalin 2022), trust in the BCT user community (Liu and Ye 2021; Koroma et al. 2022), and the perceived risk linked to sharing personal information (Marikyan et al. 2022; Shin and Bianco 2020).

3. Methodology and sample

An empirical study, which utilized the survey method as a means of data collection, was conducted. A self-administered questionnaire, based on the current literature and adapted from previous studies, was used as the measurement instrument. The survey was conducted in Croatia from September to December 2022, using an online questionnaire.

A diverse sample comprising 1018 participants was selected using a stratified sampling technique, in order to represent a larger population and to ensure replicability and validity of the collected data. After accounting for errors and missing values, 934 completed questionnaires were included in the analysis. The sample consisted of 61.77% female and 38.23% male participants. Most respondents (42.3%) hold undergraduate degrees, followed by respondents with secondary school qualifications (39%) and graduate degrees (17.8%). About 38% of the respondents were employed, while 59% were students. The majority of respondents (32%) had a personal monthly income between 400€ and 800€.

The measurement instrument was designed based on the relevant literature and was adapted to the needs of this study. The questionnaire followed the funnel principle, consisting of four groups of structured questions. Based on the findings of the literature review, which identified factors affecting attitudes and beliefs about BCT, the questionnaire includes questions about familiarity of the term BCT, social influence, trust in BCT, trust in the community of BCT users, perceived threat of sharing personal information, and intention to use. The questionnaire started with questions about the social influence on blockchain technology (BCT), which were adapted from Vitezić and Perić (2021). The second part contained statements about trust in BCT and the community of BCT users, which were adopted from Hawlitschek (2018). In the third part, the participants rated their level of agreement with statements about the perceived threat of sharing personal information (Brinson, Eastin, and Cicchirillo 2018), and six items for intention to use were adapted from Van Pinxteren et al. (2019) and Hu et al. (2019). The questionnaire ended with questions to collect socio-demographic data. Seven-point Likert scales were used to rate levels of agreement with items, anchored at 1= strongly disagree and 7= strongly agree. The collected data were analyzed using hierarchical cluster analysis with STATA software.

4. Research results

The study aimed to determine whether there are different segments of consumers with regard to attitudes towards BCT usage. To this end, hierarchical cluster analysis was performed, using Ward's method, an agglomerative respondent clustering procedure. The objective of Ward's method is to minimize the total variance within clusters by joining individuals into clusters and forming new clusters. The aim is to achieve the greatest possible homogeneity of members of the individual clusters while maximizing

heterogeneity among the clusters created. The Euclidean distance was the distance measure used to join respondents into clusters. To determine the final number of clusters, a graphic presentation of respondent grouping in a cluster dendrogram was used, and the Calinski/Harabasz-F index, the Duda/Hart Je(2)/Je(1) index and the pseudo T-squared values were calculated. Based on a visual examination of the dendrogram and on the calculated values of the selected indicators, it was determined that the optimal solution consists of 4 clusters. The Calinski/Harabasz pseudo-F measure had the highest value for the solution with 2 segments, amounting to 934.75. It dropped to 606.54 for the 3-segment solution and grew to 640.99 for the 4-segment solution, but then dropped again for individual solutions, down to a value of 244.06 for the 15-segment solution. On the other hand, the value of the Duda/Hart Je(2)/Je(1) index was higher for the 4-segment solution than for the 2-segment and 3-segment solutions, and amounted to 0.813. The value of the pseudo T-squared measure for the 4-segment solution was 86.52, lower than the values for the solutions with 2 and 3 segments. Based on the above indicators, it was concluded that the optimal solution is the 4-segment solution and, accordingly, the means were calculated for the individual statements used in the study for the identified 4 segments of respondents. The results are presented in Table 1.

The first segment, labelled "Innovators-enthusiastic about BCT", comprises 17.5% of the respondents. The average scores of the investigated statements range from 5.22 to 5.91. This segment is well-informed of BCT (FAM1=5.22), and is willing to use BCT more often in the future (INT3=5.81) and to recommend it to others (INT5=5.85). The average scores of statements referring to the influence and encouragement of others in the BCT usage of members of this segment (SOCINF5=5.37) and to BCT usage being a status symbol (SOCINF4=5.36) are slightly lower. Generally, the members of this segment tend to associate with people who have similar attitudes towards BCT as they do (SOCINF3=5.36) and they trust the technology (TRUSTB2=5.45).

The second segment, comprising 21.7% of the respondents, was labelled "Cautious-careful about BCT", considering that average scores ranged from 2.70 to 4.67. The members of this segment are less informed about BCT (FAM1=3.95), and are somewhat less willing to use BCT in the future, make recommendations to others on how to use BCT (INT1=4.34, INT2=4.18, INT3=4.38) or recommend BCT usage to others (INT6=4.33). Generally, however, they have a positive opinion regarding BCT usage (INT6=4.67). On the other hand, the members of this segment have slightly more-negative opinions (average score less than 3.5) regarding statements referring to people, in particular people who are important to them, encouraging them to use BCT (SOCINF5=2.70). Furthermore, the respondents belonging to this segment also expressed a slight uncertainty regarding the safety of BCT usage (TRUSTB2=3.45).

Labelled "Sceptics-doubtful about BCT", the third segment accounts for 20.2% of the sample. The respondents in this segment gave low average scores, ranging from 1.02 to 1.30, to all the statements. This segment is poorly informed about BCT (FAM1=1.17) and, accordingly, expressed low intentions of using BCT in the future. Nevertheless, in this segment, the statement that BCT usage is a good idea has a slightly higher average score (INT6=1.30).

Finally, the fourth segment, which is also the largest segment, comprises 40.6% of the respondents. Considering the range of average scores, from 2.14 to 2.86, given to the statements, this segment is labelled "Suspicious-very distrustful about BCT". Although the respondents belonging to this segment are poorly informed about the new BCT (FAM1=2.86), they are still slightly better informed than the respondents in the third segment. Similarly, although the respondents in the fourth segment expressed their somewhat negative opinions to all the statements with average scores lower than 3.5 for all statements, these scores are higher than the scores in the third segment. For example, this segment's willingness to use BCT in the future is low, but in comparison with the third segment, they are in greater agreement with the statement that BCT usage is a good idea (INT6=2.70). Among the lower averages scores given to statements referring to the influence of other, important people on the BCT usage of members of Suspicious' segment, a relatively low average score was given to the statement referring to the safety of using BCT (TRUSTB2=2.25).

In addition to hierarchical cluster analysis, K-means cluster analysis was also performed using the centroids determined by Ward's method. The obtained structure of the segments was relatively equal to the previously obtained results of hierarchical cluster analysis, indicating the relative stability of the obtained solution. To expand the results of cluster analysis, contingency analysis was also performed, taking into consideration the individual segment to which a respondent belongs as well as the respondents' demographic characteristics (gender, age, education, and income), and the chi-square indicator was calculated. The results of contingency analysis are presented in Table 2.

The results of contingency analysis indicate that there is a statistically significant associative

Table 1. Results of cluster analysis

Code	Items	Mean	ST. DEV	Mean-S1	Mean-S2	Mean-S3	Mean-S4
	Segment size (%)			17.5	21.7	20.2	40.6
FAM1	I am familiar with the term Blockchain technology	3.16	0.07	5.22	3.95	1.17	2.86
INT1	I am ready to use BCT in the future.	3.19	0.06	5.72	4.34	1.28	2.44
INT2	I will definitely use BCT again in the future.	3.04	0.06	5.60	4.18	1.15	2.28
INT3	I am willing to use BCT more often in the future.	3.20	0.06	5.81	4.38	1.20	2.45
INT4	I will definitely use BCT more frequently in the future.	3.16	0.06	5.75	4.38	1.17	2.38
INT5	I will recommend the positive use of BCT to others.	3.16	0.06	5.85	4.33	1.14	2.39
INT6	The use of BCT seems to be a good idea	3.41	0.06	5.91	4.67	1.30	2.70
SOCINF1	People who influence my behavior would want me to utilize BCT	2.77	0.06	5.46	3.25	1.06	2.21
SOCINF2	People in my social networks (e.g., friends, family, and co-workers) who utilize BCT have more prestige than those who don't	2.79	0.06	5.52	3.20	1.05	2.27
SOCINF3	People whose opinions I value would prefer that I utilize BCT	2.79	0.06	5.63	3.12	1.05	2.42
SOCINF4	Utilizing BCT is a status symbol in my social networks (e.g., friends, family, and co-workers)	2.65	0.06	5.36	2.89	1.05	2.16
SOCINF5	People who are important to me would encourage me to utilize BCT	2.60	0.06	5.37	2.70	1.03	2.15
SOCINF6	People in my social networks (e.g., friends, family, and co-workers) who would utilize BCT have high profiles	2.69	0.06	5.41	3.07	1.02	2.15
TRUSTB1	I feel good about how things go when doing activities on the Blockchain	2.72	0.06	5.44	3.17	1.05	2.14
TRUSTB2	I feel assured that legal and technological structures adequately protect me from problems on the Blockchain	2.84	0.06	5.45	3.45	1.09	2.25
TRUSTC1	Information provided by other users of the Blockchain is valuable	3.06	0.06	5.59	3.92	1.13	2.46
TRUSTC2	Other users of the Blockchain offer e help when I have questions	3.01	0.06	5.55	3.77	1.10	2.46
TRUSTC3	In general, I can count on the information provided by other Blockchain users.	3.05	0.06	5.70	3.79	1.11	2.48

Source: authors' own calculation, n=934

relationship between the specific segment to which a respondent belongs and the respondent's gender (χ^2=22.26, p<0.05) and income (χ^2=37.81, p<0.05), but no statistically significant associative relationship with regard to age and educational level. While there is a relatively equal number of females and males in the Innovators segment, the share of female respondents is relatively larger in the other three segments, in particular in the Sceptics segment. Furthermore, the table also suggests that respondents with higher incomes (more than 1334 Euros) account for a larger share in the structure of the first segment (7.98% and 6.13%) in comparison with the other segments, which is to be expected as a higher income allows for greater investment in alternative technologies. On the other hand, respondents with incomes below 215 Euros prevailed in the structure of segments Cautious, Sceptics and Suspicious.

Table 2. Contingency analysis of selected demographic variables and cluster analysis results (%)

	Innovators	Cautious	Sceptics	Suspicious	Total
Gender					
M	47.85	38.42	25.93	31.13	34.58
F	52.15	61.58	74.07	68.87	65.42
Total	100	100	100	100	100
Chi square					22.26*
Year of birth					
<1965	1.23	1.48	4.23	2.65	2.47
1965-1979	3.70	7.39	4.23	7.41	6.12
1980-1994	15.43	16.75	14.29	14.81	15.24
1995-2012	79.63	74.38	77.25	75.13	76.18
Total	100	100	100	100	
Chi square					9.33
Educational level					
Secondary school	38.04	37.62	46.56	41.27	40.99
Undergraduate study	47.24	41.09	40.21	40.21	41.63
Graduate study	13.50	20.79	12.70	17.20	16.42
Post-graduate study	1.23	0.50	0.53	1.32	0.97
Total	100	100	100	100	
Chi square					10.25
Income					
<215 €	9.82	15.27	28.57	21.11	19.38
216-467 €	22.70	24.14	21.16	21.37	22.16
468-800 €	35.58	29.06	26.98	29.82	30.09
801-1334 €	17.79	23.15	16.40	21.90	20.34
1335-2000 €	7.98	4.93	5.82	3.69	5.14
2001-2600 €	6.13	3.45	1.06	2.11	2.89
Total	100	100	100	100	
Chi square					37.81*

Source: authors' own calculation, n=934, *p<0.05

5. Discussion and conclusion

The aim of the research conducted was to identify different consumer segments in terms of the underlying factors for the intention to use blockchain technology. Based on the data and using hierarchical cluster analysis, four segments were identified: Innovators (enthusiastic about BCT), Cautious (careful about BCT), Sceptics (doubtful about BCT) and Suspicious (very distrustful about BCT). The differences between the segments were examined.

The research found that the fourth segment, Suspicious, is the largest. It accounts for 40.6% of the sample. In contrast, the first segment, Innovators, the second segment, Cautious and the third segment, Sceptics, are roughly equal in size. The most positive attitude toward blockchain technology was recorded in the first segment, in terms of information about BCT, future use of BCT, and recommendations to others. Members of this segment are influenced by their reference groups and have confidence in the community and the technology. The findings on the characteristics of this segment are consistent with the research findings of Wang and Scrimgeour (2022), whose segment, referred to as "Pioneers", also has positive attitudes toward blockchain technology and strong intentions to use it, in the context of purchasing food via blockchain technology. Social influence is extremely important to them, which was also demonstrated in this research. The characteristics of

the segment identified in this study are also partially consistent with the study of Ramírez-Correa, Grandón, and Rondán-Cataluña (2020), who emphasized that their segment, referred to as "Explorers", is characterized by a high level of optimism and innovation and a very low level of uncertainty and discomfort with new technologies. Members of the second segment are less well informed about blockchain technology and express lower intentions to use and recommend this technology in the future, compared with members of the first segment, but have a positive attitude toward using this technology. They are also not influenced by reference groups and express uncertainty about the security of this technology. The members of the third segment have a negative attitude toward blockchain technology, are not aware of this technology and are not inclined to use it in the future. This segment can be compared to the research findings of Ramírez-Correa, Grandón, and Rondán-Cataluña (2020), who describe the "Sceptics" segment as individuals who are the least optimistic about the adoption of new technologies and have a high level of discomfort and uncertainty about new technologies. Members of the last and largest segment are poorly informed about the technology but have more information compared with the third segment. The intention to use the technology is low in this segment, as is the perception of the security of blockchain technology. However, compared with the third segment, they are more likely to think that using the technology is a good idea. The results are consistent with Wang and Scrimgeour's (2022) research findings that members of the segment labeled as "Conservatives" have negative attitudes toward blockchain technology and low intention to use it, do not believe that the technology will benefit them and their community, and view the technology as complicated.

Looking at the characteristics of the third and fourth segments, it is clear that the aforementioned segments either do not intend to use this technology or the intention to use it is very low. The reason for this could be the fact that the Republic of Croatia is ranked 21st among the 27 member states of Europe, according to the Digital Economy and Society Index (DESI) for the year 2022 (European Commission 2022), which indicates that Croatia is a technologically less developed country. In this sense, and in line with the recommendation of Ramírez-Correa, Grandón, and Rondán-Cataluña (2020), it is extremely important to explore behavioral intentions related to technology because if the population of a country is not open to new technologies, the future development of the country is questionable. The latter is especially true for countries with a less pronounced tendency to accept new technologies.

Contingency analysis was used to demonstrate that there is a statistically significant relationship between segment membership, gender, and income. Compared with the first segment, the percentage of female respondents is significantly higher in the second, third, and fourth segments, and especially in the Sceptics segment. This indicates that it is more difficult for women to adopt new technologies, which was also confirmed by the study of Wang and Scrimgeour (2022), which proved that the Pioneers in adopting new technologies are likely to be male. Moreover, members of the first segment are individuals with higher incomes than members of the other segments. Indeed, Ali, Ally, and Dwivedi (2020) pointed out that people with higher incomes set aside funds for innovative technologies more easily, especially in the field of cryptocurrencies.

The empirical study conducted fills an important gap in the research and understanding of user behavior in the context of blockchain technology. The scientific contribution of this work manifests itself in its theoretical and applied value. From a theoretical perspective, the study represents a contribution to the research field of blockchain technology, particularly from the perspective of consumer behavior in the context of using innovative technologies. Moreover, as far as we know, this study is the first to examine consumer segments in terms of their intentions to use blockchain technology in a Croatian context. The practical contribution of this study can be seen in the possibility of applying the knowledge gained from the research in the development of various marketing strategies. Knowing the characteristics of each segment, it is possible to develop different marketing activities depending on the target market segment. Since Innovators are the most promising user segment, it is necessary to stimulate this segment in such a way that targeted advertising promotes special benefits and additional services when using this technology (e.g., discounts, points, call center support, etc.). Assuming that this segment is an early adopter of new technologies and uses them more frequently compared with other segments, its members can become opinion leaders and a kind of nano-influencer to other segments, whose activities companies can leverage through video marketing, podcast recordings, and testimonials. In marketing activities targeting the Cautious, it is especially important to emphasize the security aspect, as members of this segment express insecurities about using this technology. Companies can also set up various online communities of users to provide this segment with the necessary information about security, as much as possible. Since the

"new-technology skeptics" and the "suspicious of new technology" share similar characteristics, marketing activities should generally focus on educating and spreading awareness of the benefits and advantages of this technology, with the goal of accelerating adoption. For Skeptics, marketers should pay particular attention to understanding the interests of female consumers, as the majority of this segment are women. The use of different appeals in targeted advertising is particularly important here.

This study has some limitations that provide clues for future research. Although the study was conducted on a relatively large sample, the number of male and female respondents was uneven, so the results of this study can be considered indicative. For future studies, it is necessary to distribute the structure of the sample more evenly in terms of the gender of the respondents. The study sample consists primarily of young consumers with an income range predominantly between EUR 400 and EUR 800, it is important to emphasize that this income level represents a snapshot of a specific demographic subgroup and does not generalize the entire study population. Further exploration will analyze the potential impact of demographic factors on interest in or engagement with BCT. This will provide a more nuanced understanding of how demographic characteristics may influence interest in and engagement with BCT.

In order to obtain a more complete picture of the target segments for the use of blockchain technology, it would be necessary to include respondents from other European countries in future studies, as Croatia is a country with a lower level of readiness to accept new technologies. According to the European Commission's Blockchain Strategy, the European Union aims to be a leader in BCT, with the fundamental goal of enabling people and organizations who do not know or trust each other to build trust and securely exchange information and conduct transactions in a digital environment (European Commission 2023). Therefore, it would also be possible to compare the results of such studies with the results of studies from European countries with similar characteristics using defined criteria. The findings of this study can formulate policies that support the regulation of the blockchain industry, ultimately contributing to the growth and success of the blockchain technology sector in the region.

The present research focuses on the intention to use blockchain technology. Since actual behavior and behavioral intentions differ significantly, in future studies it is necessary to include respondents who actually use blockchain technology. Considering that the differences between the segments cannot be fully explained by demographic variables, it would be necessary for future studies to include certain psychological variables such as perceived risk, propensity to invest in new technologies, and personality characteristics.

Funding: This paper has been financially supported by the University of Rijeka, Faculty of Tourism and Hospitality Management for the project ZIP-FMTU-012-09-2022.

References

Alazab, M., Alhyari, S., Awajan, A., and Abdallah, A. B. 2021. Blockchain technology in supply chain management: an empirical study of the factors affecting user adoption/acceptance. Cluster Computing 24 (1): 83-101.

Albayati, H., Kim, S. K., and Rho, J. J. 2020. Accepting financial transactions using blockchain technology and cryptocurrency: A customer perspective approach. Technology in Society 62: 101320.

Ali, O., Ally, M., and Dwivedi, Y. 2020. The state of play of blockchain technology in the financial services sector: A systematic literature review. International Journal of Information Management 54: 102199.

Almajali, D. A., Masa'Deh, R. E., and Dahalin, Z. M. 2022. Factors influencing the adoption of Cryptocurrency in Jordan: An application of the extended TRA model. Cogent Social Sciences 8 (1): 2103901.

Antoniadis, I., Kontsas, S., and Spinthiropoulos, K. 2019. Blockchain applications in marketing. In the Proceedings of 7th International Conference on Contemporary Marketing Issues (ICCMI 2019), 10-12 July, 2019, Crete; Greece.

Arli, D., van Esch, P., Bakpayev, M., and Laurence, A. 2020. Do consumers really trust cryptocurrencies?. Marketing Intelligence & Planning, 39 (1): 74-90.

Asharaf, S. and Adarsh, S. (Eds.). 2017. Decentralized Computing Using Blockchain Technologies and Smart Contracts: Emerging Research and Opportunities: Emerging Research and Opportunities. IGI Global.

Beck, R., Müller-Bloch, C., and King, J. L. 2018. Governance in the blockchain economy: A framework and research agenda. Journal of the Association for Information Systems 19 (10): 1020–1034.

Bohlmann, J. D., Calantone, R. J., and Zhao, M. 2010. The effects of market network heterogeneity on innovation diffusion: An agent-based modeling approach. Journal of Product Innovation Management 27 (5): 741-760.

Brinson, N. H., Eastin, M. S., and Cicchirillo, V. J. 2018. Reactance to personalization: Understanding the drivers

behind the growth of ad blocking. Journal of Interactive Advertising 18 (2): 136-147.

Business Market Insights 2022. https://www.business-marketinsights.com/reports/europe-blockchain-market (accessed June 1, 2023).

European Commission 2022. Digital Economy and Society Index (DESI) 2022 – Croatia. https://digital-strategy.ec.europa.eu/en/policies/desi-croatia (accessed June 1, 2023).

European Commission 2023. Blockchain Strategy. https://digital-strategy.ec.europa.eu/en/policies/blockchain-strategy (accessed September 1, 2023).

Ferri, L., Spanò, R., Ginesti, G., and Theodosopoulos, G. 2020. Ascertaining auditors' intentions to use blockchain technology: evidence from the Big 4 accountancy firms in Italy. Meditari Accountancy Research 29 (5): 1063-1087.

Fuzul, E. and Juričić, V. 2021. Trend tehnologije ulančanih blokova u Hrvatskoj: kvalitativna analiza realnog sektora. Polytechnica 5 (2): 15-27.

Gao, S. and Li, Y. 2021. An empirical study on the adoption of blockchain-based games from users' perspectives. The Electronic Library 39 (4): 596-614.

Grand View Research 2022. Blockchain Technology Market Growth & Trends. https://www.grandviewresearch.com/press-release/global-blockchain-technology-market (accessed June 1, 2023).

Grand View Research 2023. Blockchain Technology Market Size & Share Report, 2030. https://www.grandviewresearch.com/industry-analysis/blockchain-technology-market (accessed June 1, 2023).

Grover, P., Kar, A. K., Janssen, M. and Ilavarasan, P. V. 2019. Perceived usefulness, ease of use and user acceptance of blockchain technology for digital transactions–insights from user-generated content on Twitter. Enterprise Information Systems 13 (6): 771-800.

Hawlitschek, F. 2018. In blockchain we trust: Consumer trust relationships in the sharing economy 2.0. In Perspectives on the sharing economy, edited by D. Wruk, A. Oberg, and I. Maurer, 148–155. Newcastle upon Tyne: Cambridge Scholars Publishing.

Hu, J., Liu, Y. L., Yuen, T. W. W., Lim, M. K., and Hu, J. 2019. Do green practices really attract customers? The sharing economy from the sustainable supply chain management perspective. Resources, Conservation and Recycling 149: 177-187.

Kabir, M. R. and Islam, M. A. 2021. Application of blockchain for supply chain financing: explaining the drivers using SEM. Journal of Open Innovation: Technology, Market, and Complexity 7 (3): 167.

Kabra, G., Ramesh, A., Akhtar, P., and Dash, M. K. 2017. Understanding behavioural intention to use information technology: Insights from humanitarian practitioners. Telematics and Informatics 34 (7): 1250-1261.

Kamble, S., Gunasekaran, A., and Arha, H. 2018. Understanding the Blockchain technology adoption in supply chains-Indian context. International Journal of Production Research 57 (7): 2009-2033.

Koroma, J., Rongting, Z., Muhideen, S., Akintunde, T. Y., Amosun, T. S., Dauda, S. J., and Sawaneh, I. A. 2022. Assessing citizens' behavior towards blockchain cryptocurrency adoption in the Mano River Union States: Mediation, moderation role of trust and ethical issues. Technology in society 68: 1-9.

Kumar, S., Kumar, P., and Bhasker, B. 2018. Interplay between trust, information privacy concerns and behavioural intention of users on online social networks. Behaviour & Information Technology 37 (6): 622-633.

Libaque-Sáenz, C. F., Wong, S. F., Chang, Y., and Bravo, E. R. 2021. The effect of Fair information practices and data collection methods on privacy-related behaviors: A study of Mobile apps. Information & Management 58 (1): 103284.

Lindman, J., Rossi, M., and Tuunainen, V. K. 2017. Opportunities and risks of blockchain technologies in payments: A research agenda. . In: Proceedings of the 50th Hawaii International Conference on System Sciences, Manoa 1533–1542.

Liu, N. and Ye, Z. 2021. Empirical research on the blockchain adoption–based on TAM. Applied Economics 53 (37): 4263-4275.

Marikyan, D., Papagiannidis, S., Rana, O. F., and Ranjan, R. 2022. Blockchain adoption: a study of cognitive factors underpinning decision making. Computers in Human Behavior 131: 107207.

Mashatan, A., Sangari, M. S., and Dehghani, M. 2022. How perceptions of information privacy and security impact consumer trust in crypto-payment: an empirical study. IEEE Access 10: 69441-69454.

Nuryyev, G., Wang, Y. P., Achyldurdyyeva, J., Jaw, B. S., Yeh, Y. S., Lin, H. T., and Wu, L. F. (2020). Blockchain technology adoption behavior and sustainability of the business in tourism and hospitality SMEs: An empirical study. Sustainability 12 (3): 1256.

Official Gazette 2023. Digital Strategy of Croatia for the Period until 2032. 2/2023 https://narodne-novine.nn.hr/clanci/sluzbeni/2023_01_2_17.html (accessed June 1, 2023).

Queiroz, M. M. and Wamba, S. F. 2019. Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA. International Journal of Information Management 46: 70-82.

Raddatz, N., Coyne, J., Menard, P., and Crossler, R. E. 2021. Becoming a blockchain user: understanding consumers' benefits realisation to use blockchain-based applications. European Journal of Information Systems 32 (2): 287-314.

Ramírez-Correa, P., Grandón, E. E., and Rondán-Cataluña, F. J. 2020. Users segmentation based on the Technological Readiness Adoption Index in emerging countries: The case of Chile. Technological Forecasting and Social Change 155: 120035.

Rogers, E. M. 1983. Diffusion of innovations. Third Edition, London: The Free Press A Division of Macmillan Publishing Co., Inc.

Seebacher, S. and Schüritz, R. 2017. Blockchain technology as an enabler of service systems: A structured literature review. In Exploring Services Science: 8th International Conference, (IESS 2017), Rome, Italy, May 24-26, 2017, Springer International Publishing. Proceedings 8: 12-23.

Sheel, A. and Nath, V. 2019. Effect of blockchain technology adoption on supply chain adaptability, agility, alignment and performance. Management Research Review 42(12): 1353-1374.

Shin, D. D. 2019. Blockchain: The emerging technology of digital trust. Telematics and informatics 45: 1-11.

Shin, D. and Bianco, W. T. 2020. In blockchain we trust: does blockchain itself generate trust?. Social Science Quarterly 101 (7): 2522-2538.

Shin, D. and Hwang, Y. 2020. The effects of security and traceability of blockchain on digital affordance. Online information review 44 (4): 913-932.

Shrimali, B. and Patel, H. B. 2022. Blockchain state-of-the-art: architecture, use cases, consensus, challenges and opportunities. Journal of King Saud University-Computer and Information Sciences 34 (9): 6793-6807.

Ter Ji-Xi, J., Salamzadeh, Y., and Teoh, A. P. 2021. Behavioral intention to use cryptocurrency in Malaysia: an empirical study. The Bottom Line 34 (2): 170-197.

Tran, T. M. L. and Nguyen, T. T. H. 2021. The impacts of technology-based communication on EFL students' writing. AsiaCALL Online Journal 12 (5): 54-76.

Van Pinxteren, M. M., Wetzels, R. W., Rüger, J., Pluymaekers, M., and Wetzels, M. 2019. Trust in humanoid robots: implications for services marketing. Journal of Services Marketing 33 (4): 507-518.

Venkatesh, V., Brown, S. A., Maruping, L. M., and Bala, H. 2008. Predicting different conceptualizations of system use: The competing roles of behavioral intention, facilitating conditions, and behavioral expectation. MIS quarterly 32 (3): 483-502.

Vitezić, V. and Perić, M. 2021. Artificial intelligence acceptance in services: connecting with Generation Z. The Service Industries Journal 41 (13-14): 926-946.

Walmart 2021. https://tech.walmart.com/content/walmart-global-tech/en_us/news/articles/blockchain-in-the-food-supply-chain.html (accessed June 1, 2023).

Wamba, S. F. and Queiroz, M. M. 2019. The role of social influence in blockchain adoption: The Brazilian supply chain case. IFAC-PapersOnLine 52 (13): 1715-1720.

Wang, O. and Scrimgeour, F. 2022. Consumer adoption of blockchain food traceability: effects of innovation-adoption characteristics, expertise in food traceability and blockchain technology, and segmentation. British Food Journal 125 (7): 2493-2513.

Yusof, H., Munir, M. F. M. B., Zolkaply, Z., Jing, C. L., Hao, C. Y., Ying, D. S., Zheng, L. S., Seng, L. Y., and Leong, T. K. 2018. Behavioral intention to adopt blockchain technology: Viewpoint of the banking institutions in Malaysia. International Journal of Advanced Scientific Research and Management 3 (10): 274-279.

Zhao, J. L., Fan, S., and Yan, J. 2016. Overview of business innovations and research 0pportunities in blockchain and introduction to the special issue. Financial Innovation 2 (28): 1–7.

Zheng, X. R. and Lu, Y. 2021. Blockchain technology–recent research and future trend. Enterprise Information Systems 16 (12): 1-23.

Zheng, Y., and Boh, W. F. 2021. Value drivers of blockchain technology: A case study of blockchain-enabled online community. Telematics and Informatics 58: 101563.

Zhou, T. 2011. The impact of privacy concern on user adoption of location-based services. Industrial Management & Data Systems 111 (2): 212-226.

Zyskind, G., Nathan, O., and Pentland, A. 2015. Decentralizing privacy: Using blockchain to protect personal data. In the Proceedings of the IEEE Symposium on Security and Privacy Workshops (IEEE 2015), 21-25 May, San Jose, CA, USA: 180–184.