



INTERNATIONAL
HELLENIC
UNIVERSITY

Data Decentralization in Digital Marketing using Blockchain Technology

Sermpinis Christos

SID: 3305210007

SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of

Master of Science (MSc) in Digital Marketing and e-Business

Thessaloniki, 2023



INTERNATIONAL
HELLENIC
UNIVERSITY

Data Decentralization in Digital Marketing using Blockchain Technology

Sermpinis Christos

SID: 3305210007

Supervisor:

Prof. Ioannis Magnisalis

Supervising Committee Members:

SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of

Master of Science (MSc) in Digital Marketing and e-Business

Thessaloniki, 2023

Copyright © Christos Sermpinis, 2023

All rights reserved.

The approval of the dissertation from the Department of Digital Marketing and e-Business of the International Hellenic University does not necessarily indicate the acceptance of the views of the author.

Abstract

With the rise of internet users and applications with real-time requests, the ability to identify and track data as they are being created through various processes is considered essential, and for many industries it is even required by national or international regulations. Data traceability requires integrity and transparency of data that is being stored and shared. This is a problem for the current technologies, since there are a lot of examples of modified data and vulnerabilities on their databases that resulted in serious consequences and data loss. A solution to that problem might be the decentralization of the data in the used systems, which will remove the center point of failure. For that, a blockchain system or a distributed ledger (DLT), an emergent technology that enables the decentralization of a network and can be used by implementing a trustless model to achieve it. Blockchains are tamperproof and transparent, which means that by exploiting blockchain characteristics, traceability can be improved. A model that describes the decentralization process of data storage has been developed for the purposes of this article and it is being compared with a traditional data storage method. This model was examined in the form of questionnaires which were distributed to the fast paced marketing environment of Hyundai Motorsports GmbH in Alzenau, Germany. The results of these questionnaires are positive as they were completed by the IT team and the Marketing and Digital Marketing teams of company, where both teams agreed that the results of such a change in a company would positively contribute to the security, transparency and validity of the data they receive.

Key-words: blockchain, DLT, data, decentralization

Contents

Abstract	ii
Graph Catalogue	v
Abbreviations	vi
Introduction.....	1
Chapter 1 - Literature Review.....	4
1.1 Digital Marketing.....	4
1.1.1 Definition	4
1.1.2 Digital Marketing Categories.....	5
1.1.3 Data	6
1.2 Decentralization	7
1.2.1 Systems Approach	7
1.2.2 Technological Decentralization	8
1.2.2.1 Information Technology	8
1.2.3 Decentralization and Blockchain Technology	9
1.3 Blockchain	9
1.3.1 Definition	9
1.3.2 Functions and Rules.....	10
1.3.3 The Structure of the Blocks	11
1.3.4 Security and integrity.....	12
1.5 Targets and hypothesis of this project	12
Chapter 2 - Methodology	15
2.1 Research Method	15
2.2 Sample.....	16

2.3 Research Materials - Tools	17
2.4 Research Procedures	18
2.4.1 Research Timeline	19
Chapter 3 - Results.....	20
3.1 General Data	20
3.2 Research results	22
3.2.1. General Questions.....	22
3.2.2 Questions that were addressed to the participants from the marketing sector	27
3.2.2 Questions that were addressed to the participants from the IT sector	31
Chapter 4 - Result Discussion.....	35
4.1 Result Commentary	35
4.2 Result Comparison.....	38
Conclusions.....	39
Bibliography	43

Graph Catalogue

Figure 1: General sample data with percentages	20
Figure 2: Experience in the position	21
Figure 3: Education level	21
Figure 4: Frequency of CRM usage.....	23
Figure 5: Frequency of usage on the marketing processes	24
Figure 6: Satisfaction with the CRM system	25
Figure 7: Integration of Blockchain Technology in CRM system.....	26
Figure 8: Increase of security and integrity with the blockchain technology	27
Figure 9: Implementation of blockchain technology on marketing procedures	28
Figure 10: Positive effects on security from blockchain technologies	28
Figure 11: Positive effects on employees work from blockchain technologies.....	29
Figure 12: Importance of data security	30
Figure 13: Importance of data integrity	30
Figure 14: Importance of open data for the data transactions.....	31
Figure 15: Possibilities of implementing blockchain technologies on current CRM system	32
Figure 16: Upgrade on CRM system with the use of blockchain technologies.....	33
Figure 17: Cost-result worth of the blockchain implementation	34
Figure 18: Timeframe for the blockchain technology implementation	34

Abbreviations

CRM - Customer Relations Management

DLT - Distributed Ledger Technology

IT - Information Technology

Introduction

The global data traffic has increased at an unprecedented rate over the last decades, and has significantly reduced the expenses of various industries like healthcare, retail, transportation and logistics, manufacturing, media, etc. In such an information centric society, data is an asset, and its usage should be under the full control of its owner, although this is not the common case (Kai Wang, 2019). Almost every company and every marketer wants to collect data as much as possible, for their future competitiveness. An increasing amount of personal data, including location information, web-searching behavior, calls, messages and user preferences are being silently collected by the built-in sensors and parts of the user's devices and products from the producing companies, which brings on the risk of privacy leakage of users (Charith Perera, 2015). Moreover, the usage of these data that have been accumulated by the companies that requested them by taking advantage of the ignorance of the users, since currently there is no reliable way to record how the data is used and by whom. Thus, there are only a few methods of tracing the violators who abuse those data. This can be a lack of ability to manage data effectively and it makes it very difficult for an individual to control the potential risks that are associated with the collected data. If there is an efficient and trusted way to collect and store data to form real big data, and improve the work of digital marketers and the services that they provide, this would be through blockchain technologies and its uses, where the key feature is how they make data sharing trusted and secured. Fortunately, blockchain technologies are promising to achieve this goal via consensus mechanisms throughout the network to guarantee data sharing in a tamper-proof way embedded with economic incentives (Jingzhong Wang, 2018).

In this article, we aim at securing data by using blockchain technologies to significantly improve the security and integrity of data storage and sharing. One of the biggest challenges is where and how you store data, because users have to give their data to service providers if they want to use certain services or applications. This is caused because in recent days, people have to consent to providing their data, giving them access to knowing what data is being taken from them and also giving them the option to deny giving these data. All of that has been introduced with privacy and security taken into consideration by authorities who protect customers and consumers by being

used by anyone who might have access to their data, since data is becoming a very valuable asset and people should protect it from anyone who is trying to get it without people's agreement. To protect users from all of that we need data and the procedures that use them, to be transparent and secure. This is where traceability comes in. According to ISO, traceability is the ability to identify the history of the procedures that took place in storing them or publishing them, whilst being verified. (Standardization, 1994). Traceability can be splitted into two categories:

Forward Traceability, which is the ability to find where the data are going to and what is their final destination. Else, we can say that it is the reason for which we acquired the data.

Backwards Traceability, which is the ability to find the history of the acquisition of the data. In this category we can look into the location where we found and gathered our data, so that we can spot all the steps that have happened until now (Vullers, 2003).

According to the above information, we can have a model of traceability of data that can handle the current market needs that have occurred. The problem with the current databases that are commonly used, is that they all have a central point of failure. The storage and use of data on a currently existing database, where anyone can have access to it may lead to data loss, leaks and missinformation of the user.

This project is suggesting a decentralized approach that tries to resolve the main problem that the currently used databases have. For the solution of this matter, this project suggests the use of the blockchain technology, which offers transparency, integrity and openness of the data that are on the database that uses it (Xu Zheng, 2018). This technology came into life from Bitcoin and Satoshi Nakamoto on the scientific paper "Bitcoin: A Peer-to-Peer Electronic Cash System" (Nakamoto, 2008), which explained a new, open and decentralized currency, which is supported by cryptography, machine cooperation for algorithm approvals, which were combined to produce a new technology.

A blockchain can be explained as a network that checks and approves exchanges that happen on a decentralized network. Each user has a public-private key-pair, which we are going to explain later on, which is used as an identification on the user and this is what makes this network pseudo-anonymous (Philip Koshy, 2014). The Bitcoin and Blockchain technologies have been used in many ways in the past to decentralize procedures that were centralized until now. This happened because

of the technology's ability to include metadata in its transactions, and with that all of the data that are contained in the database can be unchanged and anybody can trust that data due to the model of agreement that it uses.

The size of the data that can be included in a Bitcoin transaction can be 80 bytes (Massimo Bartoletti, 2017), but there can be many transactions within a blockchain database for bigger data storage. In many applications that have been created with the use of the blockchain network, not all the data are saved completely, but only the important parts that give the confirmation to the users that the data that they are using are true and there is no infringement.

In this project, we are going to introduce a method for the successful decentralization of data in a database which has as a result, unchanged, transparent and secure data that are important for a digital marketer, and for the customers and users of these data.

Chapter 1 - Literature Review

In this chapter we are going to analyze all the concepts and definitions of the subject under study, and we are going to mention all the targets and results of this project.

1.1 Digital Marketing

1.1.1 Definition

Marketing is a restless, changing, and dynamic business activity. The role of marketing itself has changed dramatically due to various crises - material and energy shortages, inflation, economic recessions, high unemployment, dying industries, dying companies, terrorism and war, and effects due to rapid technological changes in certain industries. Such changes, including the internet, have forced today's marketing executives to become more market driven in their strategic decision making, requiring a formalized means of acquiring accurate and timely information about customers, products and the marketplace and the overall environment. Digital marketing involves the usage of the Internet to market and sell goods or services. Digital marketing utilizes the power of electronic commerce to sell and market products (M. Bala, 2018). Electronic commerce refers to any market on the internet. The electronic commerce supports selling, buying, trading of products or services over the internet. Internet marketing forms a subset of electronic commerce. With the outburst of internet growth, internet marketing has started becoming very popular. It is said that Internet marketing first began in the beginning of 1990 with just text based websites which offered product information. With growth in the internet, it is not just selling products alone, but in addition to this, information about products, advertising space, software programs, auctions, stock trading and matchmaking. Digital Marketing can be divided by its categories, where specialists can be formed and any user of digital marketing can separate their needs. These categories can log their data and their results in databases and Customer Relationship Management (CRM) systems, in which users can check the data of any case of digital marketing that they have.

1.1.2 Digital Marketing Categories

1.1.2.1 Search Engine Optimization (SEO)

The search engine optimization is used to improve a business' website visibility to its potential customers when a customer is searching for specific products on a search engine (Patel, 2017).

The importance of the SEO is that it increases the brand awareness with an influence of search results that feature content of a common industry related queries and all of this comes also from customer behavior knowledge that comes by associating the website to specific products and services.

1.1.2.2 Search Engine Marketing (Paid Search Marketing)

Search Engine Marketing is a method of advertising a specific product or service in a search engine that is getting paid to advertise this business' website. This is also known as Pay Per Click advertising and it is promoting the business that is paying on the top of the results so that it can be found easily as an alternative to what the searcher is looking for. These ads have a positive impact on the recognition of the brand and its awareness (Patel, 2017).

1.1.2.3 Social Media Marketing

Social Media seems to have a great impact on people's lives these last years. Many needs are created to people who are scrolling through social media and the brand awareness of most businesses increases through them. Most firms are using social media to begin or increase their brand awareness for their business and in that way they become more popular. As their business is being more recognizable, they start to optimize their SCM according to the users they want to attract as potential customers (Alves, 2016).

On the other side, the customers start to increase their consumption on data for the products that they are looking for, and the social media marketing keeps increasing because many more advertisements and suggestions start being introduced to them.

1.1.2.4 Email Marketing

More than 80% of businesses use Email Marketing as a way to attract customers to do business with them again. Email Marketing is a marketing method which is mostly used by businesses when they want to attract people with whom they have done business with again in the past, or have some kind of interaction with them and have provided their email (Xi Zhang, 2017). With Email Marketing, customers get to be reminded of the purchases they have already made and they might need to make again, new offers that the business is providing, products that the customer might be interested at and many more. Email marketing can be used in various ways, like simple emails sent to the customers, or more complicated ways like inventing a small game that they can play within the email. Also, many marketing ideas can be implemented in the email which can attract customers to make purchases, like individual discount codes and offers, or specific offers that can only apply to the people that have the connecting email.

1.1.3 Data

With vast amounts of data being available for free by living in the era of information, all companies are focused on exploiting data for competitive advantage. The volume of data and the variety of them have surpassed the capacity of the manual analysis that we can process and in some cases they have exceeded the capacity of conventional databases. At the same time, current technology is so advanced and so powerful, networking is in its current peak and the data processing algorithms have developed so much that can connect databases and datasets to enable a better analysis of the data that are available without issues (Provost, 2013).

Data in digital marketing is playing an important role, since digital marketing is gathering data so that it can improve over time (Grishikashvili, 2014). By gathering data by each person, digital marketing can get more personal with each user and can provide better ads, information and suggestions to the users.

Taking all that into consideration, we should start to beg the question of the security and the integrity of the data that digital marketers store and the users give and consume at the same time. Since data is so important, it means that it is also a very valuable asset for each one that holds it,

and with data being a valuable asset, many people would be tempted to bias any set of data of their opponent or even steal and take advantage of these sets of data. This is why, in this paper, we suggest a solution that could be implemented as a ledger in a database that is held in any system, like a CRM system which is used by digital marketers to provide a better service to their customers, that has the solution of a blockchain system integrated.

1.2 Decentralization

Decentralization is the process by which the activities of an organization, particularly those regarding planning and decision making, are distributed or delegated away from a central, authoritative location or group. A large number of developing countries are getting into some sort of decentralization programme. This interest has started to grow when public and private sectors have started to partner with the governments to provide new ways of delivering their services (Dubois, 2009).

1.2.1 Systems Approach

Those studying the goals and processes of implementing decentralization, often use a systems theory approach as the entry point at which holistic definitions of development goals are starting and it is most practical to support and maintain them. The below cases can be named as goals while implementing a decentralized system in order to achieve a good result.

Decentralization is often linked to concepts of participation in decision making, democracy, equality and liberty from higher authorities (Vipond, 1991). Decentralization enhances people to state their opinions and take place with their beliefs and their mindsets. Decentralization is connected to the restructuring or reorganizing of an authority so that there is a system of co-responsibility between two or more parties in many levels, which increases the quality and effectiveness of the system that uses it. (Dubois, 2009). Decentralization has been described as a counterpoint to globalization, which removes decisions from local or single parties, to global or multiple-partied interests (Johnson, 1999). As a result of all that, people are not skeptical about participating and joining parties that are using decentralized systems.

Diversity plays an important role in decentralized systems. It is defined to be a unique property of entities or individuals that are not shared by the larger groups or structures (Johnson, 1999). Both

decentralization and diversity are necessary attributes to achieve the self-organizing properties of interest. It is important to note that diversity is key to getting various opinions and options which could not be possible without the decentralization of systems.

Efficiency is our final goal that is set to be achieved by the decentralized systems and decentralization is set to increase efficiency and effectiveness due to reduction of congestion in communications, quicker reactions to various problems, improved ability to deliver services, improved information about local conditions and more support from beneficiaries of programs (Silverman, 1992). The main principles on which decentralization is preferred are that it can help on long term strategies and reduce the day to day decision making, which this means that it frees up time from various tasks.

1.2.2 Technological Decentralization

Technological decentralization can be defined as a shift from concentrated to distributed modes of production and consumption of goods and services. Shifts like these are accompanied by transformations in technology and different technologies are applicable for either system. This technology includes tools, materials, skills, techniques and processes by which goals are accomplished in the public and private spheres. Concepts of decentralization of technology are used throughout all types of technology, including especially information technology and appropriate technology (Eggiman, 2016).

1.2.2.1 Information Technology

Information technology concerns computers, networks, information distribution technologies, from software, hardware, electronics, the internet and telecommunications equipment, and computer services (Chandler, 2011).

There is a constant tension between centralizing and decentralizing information technology which means that the right balance between the lower costs of centralizing and the benefits of decentralizing should be met by any organization or company that uses decentralization so that it can manage their data storage and distribution in comparison with the costs. Decentralization is particularly applicable to businesses or service providers that have a high level of independence,

complicated products and customers, like marketing firms which is the topic of this project (Baschab, 2007). Taking into consideration the below mentioned facts, we can clearly assume that the internet is a good example of a decentralized infrastructure. It is a network that has no owners at all, where nobody is in charge of it and at the same time everybody is in charge of it. Many people can establish protocols but this is not stopping anyone from developing their own and make the internet suit them more. We can clearly then connect this information to our subject of implementing decentralized networks on digital marketing databases. This will help with getting and storing information safer than before, with easier access and more accurate information for the customers and users.

1.2.3 Decentralization and Blockchain Technology

In blockchain, decentralization refers to the transfer of control and decision-making from a centralized entity to a distributed network. Decentralized networks strive to reduce the level of trust that participants must place in one another, and determine their ability to have an authority or control over one another in ways that degrade the functionality of the network (Anderson, 2019). As it has been previously mentioned, bitcoin is the original implementation of blockchain, where proof of work is used as a mean of establishing decentralization. This enables the uniqueness as a digital asset and its utility as a cryptocurrency.

1.3 Blockchain

1.3.1 Definition

Blockchain is a new technology which is presented as a public, non editable chain in its historical data, which is splitted in timed and arithmetically counted parts, or else “blocks”. The first actual, real world, application of the blockchain technology was in the field of digital currencies, and it was the case of the “Bitcoin” cryptocurrency. Bitcoin is a decentralized digital currency, which does not require a bank or a central administrator that handles the transactions from one user to another in the bitcoin network, without the need of an intermediary. This technology can be applied in various human activities, like for example voting counts, education, health sector, product and service verification, social media, financial and insurance services, construction sector, news

transparency sector, historic, political and fiscal databases that keep data safe and transparent for all users (Nakamoto, 2008).

1.3.2 Functions and Rules

Blockchain Technology comes from a network of people that create and share something in common. The network is decentralized and separated in equal parts. This means that there is no person on the network that has a higher level over another one, in any way, which means that there is a lack of priority, on whichever field, for one person or another. These people that participate in the network are not the same, but they are all equals with each other in regards to every action that can take place in the network which uses the blockchain technology. Statistically speaking, if a case of election for a person comes up, each member of the network has the same chances of being elected by the network, and the person will be elected only by chance and without any bias. All the people of a blockchain network can create and share files and documents that are shared with each other. The procedure of the creation and saving of a created file is being defined and checked by a constitution of rules that is named “consent protocol”. These rules are being composed with a basic opinion of necessary trust being applied to everyone within the network. This phrase means that there is an absolute need of trust between every action taken from all the people that are involved in the same process. The drafting of a solid consensus protocol removes the creation of conditions that lead to the need for the persons of the network to prove their honesty regarding their participation in the network, and thus subsequently, their right to co-exist in it.

All the people that are members in the creation of a sharing chain, have a unique and at the same time exact copy of a shared file. This file though is not a static document, but a document that continuously gets filled with information and new data. The basic difference of a blockchain file versus an ordinary type of file comes from the ability to not be able to delete data in it. It consists of a chain of newly posted data within this file, with logs of each action from any user, the so called “datablocks”, which are the blocks that are created and connected like the circles of a chain in real life. Like the circles of the chain, these datablocks with their individual data, or the “blocks”, connect to one another in a chronological row that creates a chain that is built from the people who have access in the blockchain network for the audience that needs to check this blockchain network. The connecting process is achieved by running a hash function on groups of them, called blocks, and creating cryptographic fingerprints of them (Nakamoto, 2008).

1.3.3 The Structure of the Blocks

The basic structure of each block contains the below data information (Nakamoto, 2008).

- a) The cryptographic footprint of the previous block in the chain (previous block hash). These data belong in the category of the important data of each block. It is an indicator that defines the unique identity of the previous block.
- b) The cryptographic footprint that comes from the action of a hash function in the total of entered data and unique transactions in the specific block. In the case of bitcoin, each transaction is being mentioned and has all the details of the coin transaction. The transactions belong to the category of useful data, while their cryptographic footprint belongs to the category of the important data. These data within the block are being stored in a specific structure, which, in the computing world, is named “Merkle tree”, and it has the structure of a reversed tree. The top of the reversed tree is named “Merkle root” and it consists of the information of the involved people within the block and all the transactions. We should note at this point that each node that takes place in the procedure of creating a new block and the induction of it in the blockchain, does not consist of the same useful data. The necessary condition to include a specific transaction in a new block that is being nominated to get inserted into the blockchain, is the attachment of this data to the administrator-node since it is connected to the transaction-fee that this block requires. The transaction-fee is a clash of the digital transaction that can be used in all blockchains. The higher the value of the attached data from the user, the higher it will be in the list of transactions, and this will increase its chances of being published faster.
- c) The timestamp is also an important part of the structure of the blockchain. The timestamp is the number of seconds that have passed from the 1st of January of 1970 since the production of this specific timestamp.
- d) The receipt of the cryptographic nonce, which is a uniquely created distributed ledger technology (DLT). This is a series of important data that have been created in random procedures from the administrator-node. The arithmetic data of a block that follows the rules of induction in the blockchain and has the following property. The action of this hash

in the total amount of data of the last three blocks, is to create the data of the last block that was created.

- e) The cryptographic footprint of the specific block. Likewise from the case of the example a) this footprint defines the unique identity of the specific block. It should be noted that when a new block is nominated to get in the blockchain, this block should get this cryptographic footprint which will be the last one of the previous block, like we mentioned on the paragraph a).

1.3.4 Security and integrity

In the arithmetic hash of a block there is a key of stability and security features of a blockchain. The finding of the appropriate arithmetic hash is based in total on random factors and for that reason it has an immediate need for the computing power of each administrator-node. The design of the bitcoin protocol allows in addition the creation of processors that are created specifically towards the direction of improvement of their actions. The creation of an arithmetic hash that can take action on its own gives us the absolute proof of action in the procedure of adding new blocks in a blockchain since it needs very high numbers of production of these hashes and security checks of random hashes until it can find one that can do all the work that is needed in the specific condition of each protocol. This procedure, of the action to find the ideal hash, is in essence what we call mining, and it is necessary to understand this process to be able to understand how balance is achieved in the chain at the same time as there is no need for guarantees of mutual trust between network participants (Nakamoto, 2008).

1.5 Targets and hypothesis of this project

In order to show the decentralized model of data traceability, we will introduce it by giving an example of application of how it can be used. Our application allows organizations, companies and users to track their data of various procedures with a decentralized and open way, with the use of a system that has a database that is built with the blockchain technology. Various data can be inserted into a blockchain system. From simple information like user counting, all the way to specific click numbers on an email campaign. The company that uses these systems will decide which data is more important to them and they can use so that they can provide accurate and safe

information to their customers and themselves. This information will be typical for this product and will be used for the information of the way a specific project of the company or organization works.

The needed characteristics of the platform are:

1. The company or organization has to create an identity using the decentralized identity platform “uPort4”. This identity is unique and will be used for the signing of the information later.
2. The creation of a first transaction of data so that there is a starting hash of a document that can then be completed by the customer and the provider of the service, as well. This document must include the list of information of a specific type of data that needs to be included when the blockchain gets updated.
3. From now on, companies will create documents of data that include information which connect to a specific project or case of the company or service provider, and will be signed by the “uPort” signature of the provider. The hash of the document will be included in the blockchain.
4. In order to inform the consumer about the state of the service that has been requested, companies and providers should create a new document with the current state of the service and save it within the blockchain like before.
5. The recall of a wrong state of the blockchain is not possible since the company or service provider can just create a new document and insert it in a new block on the blockchain which states that a previous document on a specific block has wrong information and also the correct information can be included in the new block.
6. The new documents that are created will be saved in the decentralized space which is called “Swarm5”, with nodes that are created by the company of the service provider. In that way, users and customers can navigate in a web page where all the needed information is available for them and they can see all the important states of all the procedures that took place for their service in a blockchain. In that way, users can trust the systems with this data and not only the company, and the companies can be transparent about the state of their service in a decentralized and safe way.

7. Users and customers will use an application from their side that can automatically search the documents that exist within the hashes which are saved within the blockchain system, and they will be able to download the documents. With that, the users will use the applications more easily and this will not require any technical knowledge.

Chapter 2 - Methodology

The methodology is considered a decisive chapter for our research because it analyzes the procedure followed for the completion of this work. The methods that will be followed will judge to a large extent the success or otherwise of the research and through them the results and conclusions on the subject being analyzed will be presented.

2.1 Research Method

In the present research, mainly due to the lack of practical knowledge in the field of IT, quantitative research was applied, through the help of questionnaires, which were answered by workers in the marketing field and the IT field. These questionnaires contained closed-ended questions, since we were interested in having specific answer options, and only the optional question concerning the name of the employees was open-ended. In this way, the participants who would like to choose a different answer from the ones given, are unable to do so, but it was easier and faster for us to analyze the resulting statistical data. Continuing, closed-ended questions have a pre-decided set of answer choices. The type of closed questions can vary depending on how the answers are given or chosen by the participant. The types of questions, some of which were also used in this research, are as follows:

- **Bipolar Questions:** these are the questions that have as possible answers only two options of the type Yes / No, or True / False.
- **Multiple choice type questions** Option to select ONLY one answer from a multiple choice set. Ability to select multiple answers from a multiple choice series.
- **Likert-scale questions:** This type of question or proposition tries to elicit what the participant's attitude is on an issue or how much they “Agree” or “Disagree” with a proposition and only one answer is allowed.

- Ranked Questions: These are the questions that ask the participant to place sentences or words in order of priority.

Continuing, in this research, the reasons that led us to use quantitative research are the following:

- The possibility of a holistic (global) approach to the subject.
- More direct contact with respondents
- There is potential for better explanation of weaknesses as well as more correct interpretation of results.

Finally, it is logical that there are also some disadvantages, or weaknesses, in the choice of quantitative research. These are:

- It usually involves small samples.
- It is characterized by relatively limited possibilities of generalization and comparison.
- It depends a lot on the personal perceptions of the researcher and on his communication skills.

2.2 Sample

The participants of this project are the employees of the company “Hyundai Motorsports GmbH”. Hyundai Motorsports is a German company which is a subsidiary of the Korean company “Hyundai Motors”, which specializes in Motorsports with cars, such as world class rallying, touring car racing and others. The year that the company was created was 2012, with the intention to compete in the World Rally Championship and it is competing in races all over the world. The company is using digital marketing as a main way to improve awareness of what the business does and engagement with the fans of the team and the sport. This company was selected due to the fact that the composer of this project is an employee of this company at the time it was conducted.

The questionnaires have responses from employees in the fields of marketing and IT, and as an add-on they were also sent to employees that have some knowledge on CRM systems and Blockchain technologies.

2.3 Research Materials - Tools

This research is a quantitative research and has been completed with the use of a questionnaire. The questionnaire that was used was a closed type, with specific answers and there was no interview made for the responses of the questionnaires. The decision to avoid the interview section was made to avoid open type answers on the questionnaires for the ease of the collection and analysis of the results and the creation of the statistical analysis, but also for the difficulty level of the questionnaire to our respondents and for the time that they would need to give for this task.

In this project we used a questionnaire that had general questions for our case, but also more specific ones, as well, for each of the groups that completed it. More to the point, it was given to two groups of people, where in the first one the people who completed it were workers of the marketing sector of the company in question and the second group is working in the information technology sector of the company. The questionnaire that was used was specifically made for the needs of this project and it is created in a way that it satisfies our needs completely on giving us results that will make a complete view of the current situation.

The type of the questionnaire is simple and clear, without asking difficult questions to the target groups. Based on the good will of the groups in question and the will to cooperate with us, we can assume that the answers of the questionnaire are correct and accurate. The questionnaire is separated into five different parts, which cover different parts of this research.

To begin with, the first part of the questionnaire is a written introduction that is referred to the respondents and includes a brief analysis of what we are trying to achieve and which technologies are used to get to our goal. With that, the respondents are able to understand the case that we are having and then they can make the comparison to the existing systems that they currently use in their everyday tasks.

The second part of the questionnaire includes some questions that refer to personal information of the respondent, and these are optional to respond to since the questionnaires can be anonymously completed. The questions in this part are the following:

- Name
- Position in the company
- Working experience in the company

- Level of education
- Subject of education

The third part of the questionnaire has questions about the field of work in the company, either it is in the marketing department or in the IT department. The questions that make the third part are the same for all respondents, in whichever field they are working on and are the following:

- Specific field of work within the company
- Frequency of usage of the CRM systems
- Frequency of working with the marketing procedures of the company
- Satisfaction with the current CRM system
- Personal opinion on the integration of the blockchain technology in the current CRM system
- Personal opinion on the increase of security with the application of blockchain technology

The next part of the questionnaire has to do with the personal opinion of the respondents about the idea of changing the current system with one that has a base with blockchain technologies and if they find it possible. This part is different from the ones before since it is splitted into the two main categories of working teams that we have asked within the company and it also requires experience and maybe academic knowledge, as well, on the marketing field.

Finally, the last part consists of questions made to the IT department of the company and they are more specialized about the applications of the blockchain technologies in the current CRM system, or if it is needed to create a new system from scratch in order to implement the blockchain technology, if it is worth the investment for such a change and if it is possible to happen and how much time it would require to be completed.

2.4 Research Procedures

The collection of the data that we needed has been done by providing the aforementioned questionnaires in various workers of the Marketing, IT and Purchasing departments of the company Hyundai Motorsports GmbH, as mentioned before.

The questionnaires were created and given to the respondents via the platform Google Forms (a platform created by the company “Google” for creating questionnaires), which were filled in electronically via the same platform, in which we also collected our responses immediately in our personal email account. Also, the questionnaires were given to the respondents via the company’s email for faster communication and due to problems to provide the questionnaires in person to all of the participants.

In the email we included information about the way that the respondents should fill in the questionnaires, and a thankful note for their contribution in this project, as well as some contact details to be used in case there were any questions. Within the timeframe of accepting the responses, we were in contact with some of the participants via phone, since there were some issues while giving their responses.

2.4.1 Research Timeline

The timeline of the research is presented as follows with the specific dates:

- 5/12/2022 The questionnaires were given to the participants via the company’s email. 31 emails were sent to the employees of the company, from which the first 15 of the responses came from 5/12/2022 to 7/12/2022.
- 9/12/2022 A reminder email was sent to the participants in case they have not submitted any responses so that they can proceed with a submission of their opinions.
- 15/12/2022 The acceptance of new responses has been closed and the analysis has begun with a total of 23 responses received.

While the research was being completed, there were some face to face meetings with the participants , in order to provide detailed information about the application of the new technologies that we are referring to in our project.

As mentioned above, we received a total of 23 responses from the initial 31 emails that were sent to the employees of Hyundai Motorsport via Google Forms.

Chapter 3 - Results

In this chapter we will present the results of the questionnaires of this research, as well as the results of the analysis that happened from these results from the total amount of the responses that were finally received from our side.

3.1 General Data

In the following table we can see some general data from our participants like their field of work, their work experience in this position and their education.

Category	N	Percentage (%)
What is your field of work?		
Marketing	16	68.8
IT	7	31.2
What is your work experience in this position?		
Less than a year	8	34.8
More than a year	15	65.2
What is your education level?		
Secondary Education	6	26.1
Higher Education	17	73.9

Figure 1: General sample data with percentages

As we can see from Table 1 above, the percentage of the people that have contributed in this project that work in the marketing and digital marketing field comes to 68,8%, while the rest 31,2% comes from the IT sector of the company. In the second question, which concerns the experience in their position, we see that most of the people that took part are working in their position for more than a year, and their percentage comes to 65,2%. The 34,8% is working in their current position for less than a year, at the time that this questionnaire was given to the respondents, which does not necessarily mean that they are less than a year in the company since the current position might mean that they have been promoted or they have changed their field of work. Finishing up this first part, we have asked the question of the respondents education level, which turned out to be

really satisfying since the 73,9% of our answers said that they have completed a higher education degree which means that these people have the knowledge and the academic experience that is needed for this project. The 26,1% that is left has completed secondary education which does not mean that they lack knowledge or experience. On the contrary, people with secondary education might show a bigger number of working experience since their careers had a head start compared to people with academic background. Below you can see a more detailed analysis of the questions we mentioned before with pie charts for a visual representation of the results.

How many years are you on this position?
23 responses

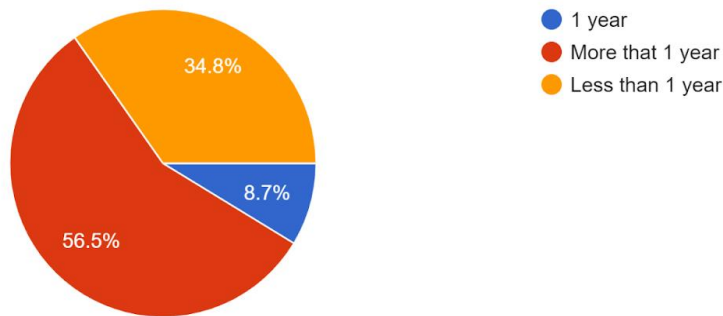


Figure 2: Experience in the position

What is your education level?
23 responses

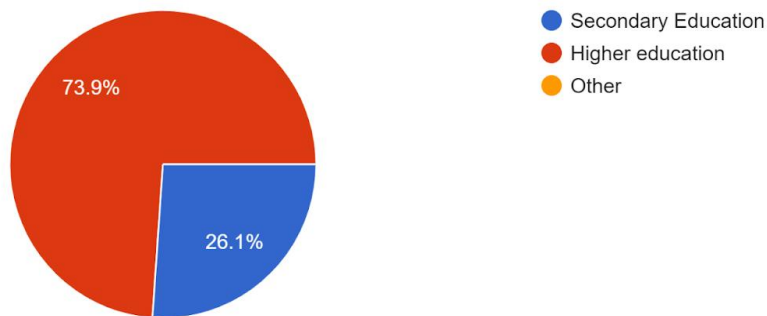


Figure 3: Education level

3.2 Research results

This subchapter analyzes the responses that were given in the aforementioned questionnaire, in each question that appeared in the main sector of the research that we are completing, which means that we will analyze the questions that were made for the work sector of each respondent. The sectors that are found within this project keep the form of the questionnaires that were shared, and we will split it in 3 parts. The first one for the general questions, the second for the questions that were addressed to the marketing employees and the third one for the employees of the IT department.

3.2.1. General Questions

This part of the questionnaires is composed of questions that are generally asked to both fields that have a connection to the marketing processes and uses of the systems that are used by the marketing department. These fields are the marketing department and the IT department since the first one is using it for their everyday tasks, and the second one is using it for development, various troubleshooting that might be needed and other problems that might occur. These questions are general ones so that we can gather information about the respondents knowledge and opinion about the blockchain technologies and the CRM systems. These questions were the ones to receive the biggest amount of answers since they were answered by all fields that were taking part in this project, in comparison to the next parts of the questionnaire. The next two parts of the questionnaire were splitted and the most responses were in the marketing sector questions since the department is bigger than the one that was responding to the questions of the third part, which was the IT department.

The first questions has to do with the frequency of use of the company's CRM system, either as a user, which should be an employee of the marketing department, or as a development team, which means that it should be a user of the IT department, who should make improvements on the system. As it is shown also from the below graph, the majority of the respondents are using the CRM system at least 3 times per week with only 2 people not having something to do with the CRM system, which comes from people from the IT department which are handling other situations from the CRM systems (mostly hardware cases and not software). This result shows that the respondents

are giving accurate data for this project since they are using the systems often and now its weak and strong points, and which are the things that can be improved the most, as listed by this project

What is your frequency with the company's CRM system either as a user or as a development team?

22 responses

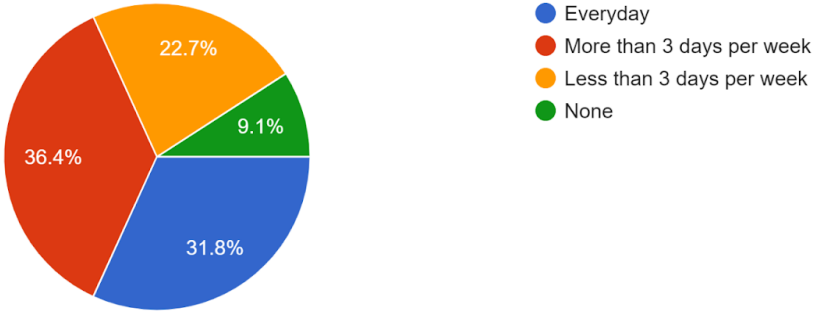


Figure 4: Frequency of CRM usage

As numbers are concerned, the percentages on the responses for the question above come to a 31,8% for the people that use the system daily, the 36,4% for the people that use it more than 3 days per week, the 22,7% are the people that use it for less than 3 days each week and finally, the last 9,1% comes from people that do not use the CRM systems at all, which as mentioned comes from the people in the IT department that handle different cases in their everyday tasks, but this does not necessarily mean that they do not have the knowledge to complete this questionnaire.

In the second question, we asked the respondents about the frequency of their use on the marketing processes of the company. The results of which are represented visually in the form of a pie chart, below.

How often do you deal with our company's marketing processes?

23 responses

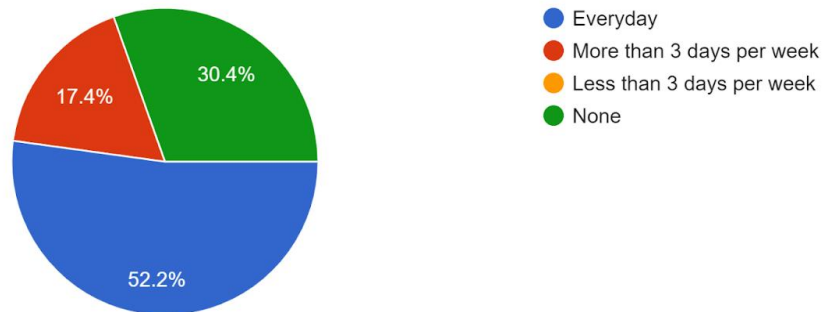


Figure 5: Frequency of usage on the marketing processes

In this chart we can see that more than half of the respondents are using the marketing processes daily. This is a particularly good result since this shows that we have the expertise of the respondents to get accurate results in our project. On the other hand, the 30,4% of the respondents in this question have told us that they do not use any marketing processes, at all, which can also be considered a big number for what we are looking for. But, at least the rest 17,4% is using the marketing processes at least 3 days per week which can have a positive result for the opinions that we want.

As far as the opinion of the employees concerning their satisfaction on the current CRM systems, the majority of them responded that it is currently neither good, nor bad. For that, we can see the bar chart below that gives us a representation of the responses on their opinion.

How satisfied are you with the company's existing CRM system?

23 responses

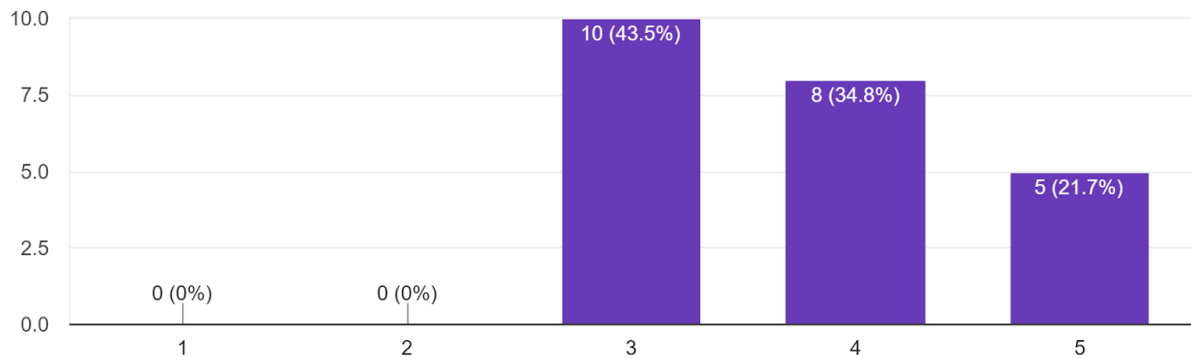


Figure 6: Satisfaction with the CRM system

As we mentioned, the 43,5% of the respondents have said that the current system is ok but it is not getting ahead on something from its competition. The immediate chosen response after that was that the current CRM system is good, by covering the 34,8% of the responses. The remaining amount from the last 5 responses came to a 21,7% from the people that think that the current CRM system is excellent. It interesting to see that none of the people that took place in our project are disappointed by the current system they use.

Next, we see the question for the opinion about the integration on the blockchain technologies. After a brief introduction to the blockchain technologies in our questionnaire summary, that took place in the beginning of the questionnaire, and some small introduction to the people that requested it by face to face communication, we can safely assume that all the respondents of this question knew what we were asking and had a clear image on what is the blockchain technology and what is the reason of its implementation on the current CRM system that the company is using.

What do you think about the integration of Blockchain technology in the company's CRM system?

23 responses

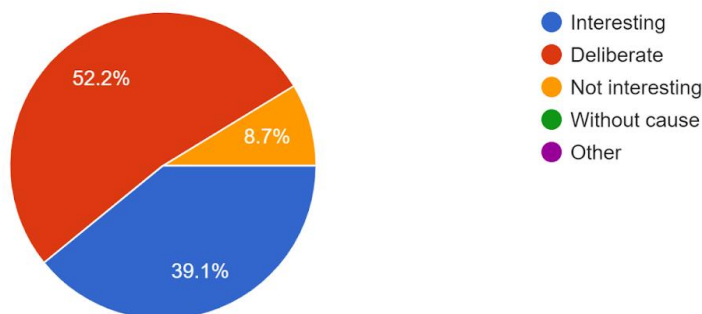


Figure 7: Integration of Blockchain Technology in CRM system

As we can see from the pie chart above, the 52,2% of the people that filled the questionnaire found this application deliberate. This means that this is a change that should happen in the future but according to their opinion, it is not an urgent case or a case that should be implemented as soon as possible. 39,1% of the participants found this application interesting, which is still a big number compared to the final 8,7% of the participants that found this application of the blockchain technology not interesting.

Since we have examined the opinion of the workers for the integration of a blockchain technology in the current CRM system, and we saw the pretty positive results of this question, we have to take a look on their opinion about the increase of the security and integrity of the data in we use the blockchain technology to store them and below is the visual representation of the responses that we gathered. As shown, we can easily see that all of the respondents of the questionnaire are positive that the data stored in such a system will be more secure and more accurate with 100% of the results being positive. This is a very reassuring response since it confirmed that this action give positive results to the people using systems like this which can benefit many companies around the world.

Do you think that the current integration of the aforementioned technologies could increase the security and integrity of the data?

23 responses

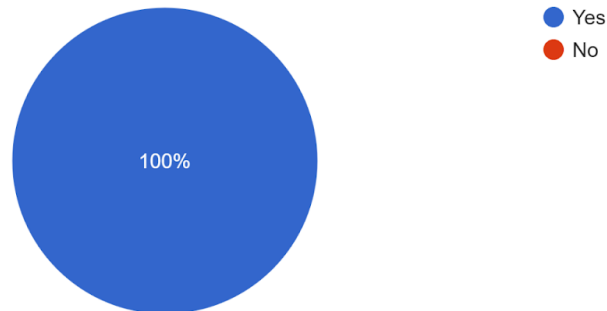


Figure 8: Increase of security and integrity with the blockchain technology

3.2.2 Questions that were addressed to the participants from the marketing sector

The second part of the questionnaires are asked to the workers of the marketing sector with specially made questions for them. In the first question, the respondents were asked if they want the previously mentioned application of the blockchain technology to be implemented in their workplace, or in the company that they work for. It is clearly stated that all of the respondents want this implementation, which makes the result of the question positive. This happened because all of the workers know the value of the security, integrity and the transparency of the data and they want to see these improvements in their work environment. This means also, that they are interested in the type and the accuracy of the data that they can provide to their customers and their services, so that no one is dissatisfied with the provided services. The above mentioned details are shown also in the graph below.

Would you like the above application to be implemented in your workplace (or in the company you work for)?

16 responses

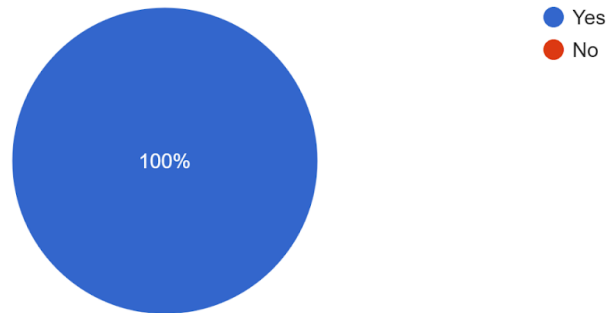


Figure 9: Implementation of blockchain technology on marketing procedures

In the next question the attendants were asked if they believe that the application of the blockchain technology could have a positive impact in the security of work related matters that concern data storage. Once again, the results turned out to be 100% positive for the outcome of this research with all the responses being positive on the question. This gives us the information that the workers are conscious for security concerns for the data of the company and for its potential customers and viewers. This also means that the employees are appreciating the data security and that it can offer good results for the company.

Do you think that the implementation of Blockchain could have a positive effect on the security of all the work related matters of data storage?

16 responses

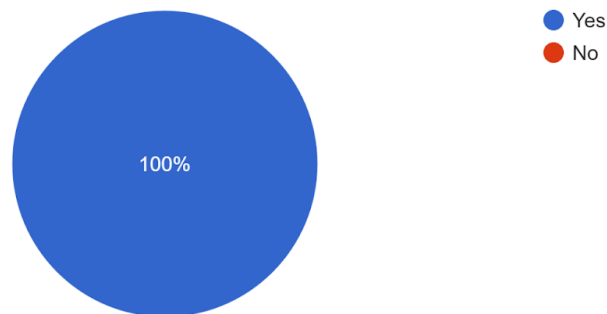


Figure 10: Positive effects on security from blockchain technologies

After that, the employees were asked if they believe that the increased security and integrity of the data can offer better results on their personal work in their position (or in the work that they are responsible for) and the results were similar to the previous questions. With 100% positive results, we see that every employee that answered this question believes that they can improve and have positive effects on their day to day tasks. This means that the workers can work better and more effectively when they know that they can provide better, more secure and accurate information to their customers, with better integrity and they can also be quicker on their tasks since they do not have to double check or correct any possible mistakes that can be made by having false or insecure data and they can avoid the corrective actions that they should do otherwise.

Do you think that more information security makes sense and can have positive effects on your work (or the work of those responsible for it)?

16 responses

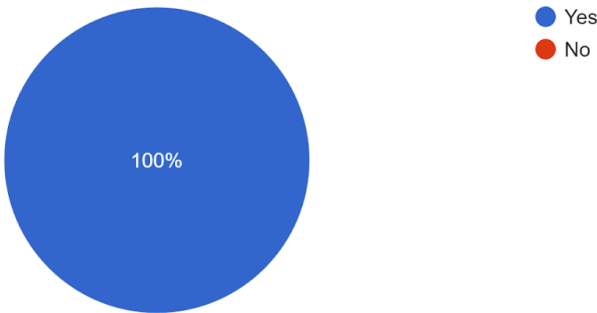


Figure 11: Positive effects on employees work from blockchain technologies

Later on, the question for the importance of the need for security was raised in the questionnaire. The responses, which are graphically shown on the below bar chart, show that the 75% of the respondents think that it is very important to have security on the data storage. The 18,8% of the respondents have the opinion that it is quite important but it is not currently the most important thing to take care of. Finally, we see that the rest 6,2% has answered that the need for security is neither important nor unimportant. These results turn out to be reassuring for our research since we can see that some of the most noteworthy values are important for the workers of the company and they also value the information and the data that they handle.

How important do you consider the need for more data security?

16 responses

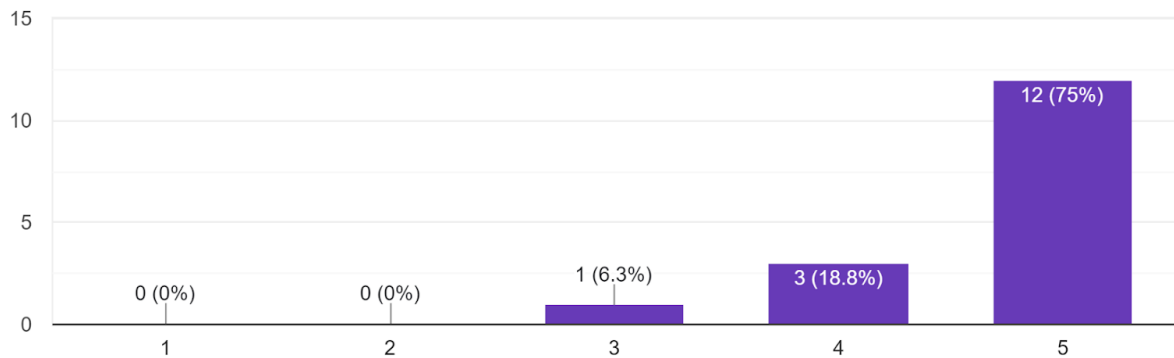


Figure 12: Importance of data security

Once again, we see in the below chart that the largest number of respondents, that comes to 81,3%, has told us that the need for greater data integrity is really important, while the rest 18,7% still thinks that it is fairly important to have a great data integrity but maybe there are also other important stuff to focus on. Even so, this proves the same point as the previous question, that the employees have an accurate image of the important aspects when dealing with data and that the need for more security and integrity is really important and should be considered for every data transaction.

How important do you consider the need for greater data integrity?

16 responses

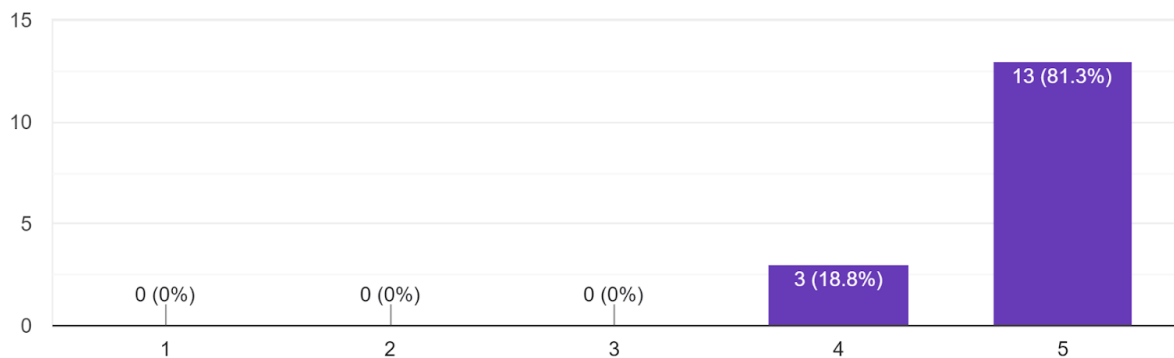


Figure 13: Importance of data integrity

Getting to the last question of the second part of the questionnaire, we asked the employees about the importance of open and secure access to the commodities of data for those who are responsible for each data transaction. The results that we got were pretty encouraging, like the previous responses that we got, since the 87,5% of the respondents have told us that it is really important to have secure and open data for every transaction that is being made. The rest 12,5% still think that is fairly important, which means that all of the respondents are on the same side when it comes to security, integrity and openness of the data and the transactions that are being made for them. Open data is really important for companies of this size since they can have and provide the information about their services to everybody without worrying about security and accuracy of the data. The fact that these companies can offer open data with this level of security is the thing that everyone should value highly since it is the most accurate form of data that people can get and with that, mistakes can be tracked and traced more easily since the openness of the data can allow to more people checking of the procedures taken for the actions that are needed.

How important do you consider the need for open and secure access to commodity data by those responsible for each data transaction?

16 responses

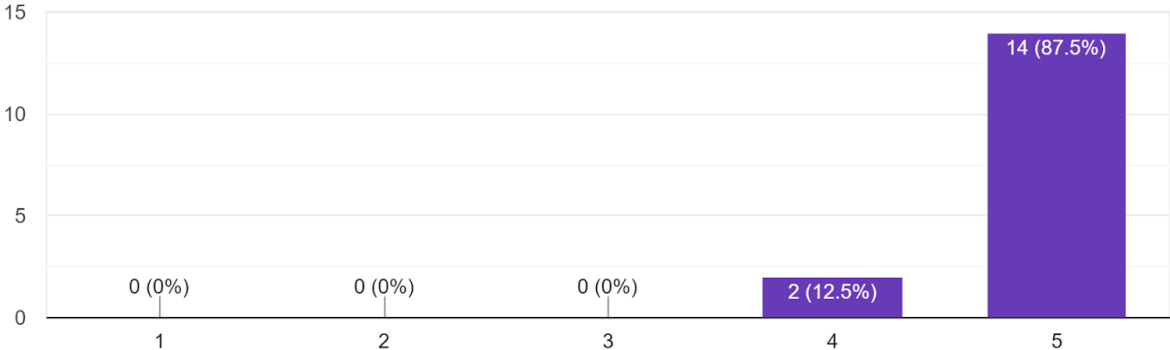


Figure 14: Importance of open data for the data transactions

3.2.2 Questions that were addressed to the participants from the IT sector

The last section of the questionnaires is purely for IT workers, with specialized knowledge of software development, who work to develop the company's CRM system software and to fix the

occasional daily errors that occur on the job. For this reason the sample is reduced to 7 people as a company does not need more people for this sector.

The first question to the IT sector has to do with the opinion of the employees about the implementation of blockchain technologies into the current CRM system that the company is using. As you can see below, most of the respondents have told us that they think it is possible to implement it and they occupy the 55,6% of the respondents. The rest of the respondents, which are the 44,4% of them, are stating that it cannot be possible to make such a big change on a CRM system.

Do you think it is possible to integrate Blockchain technology into the company's CRM system?
9 responses

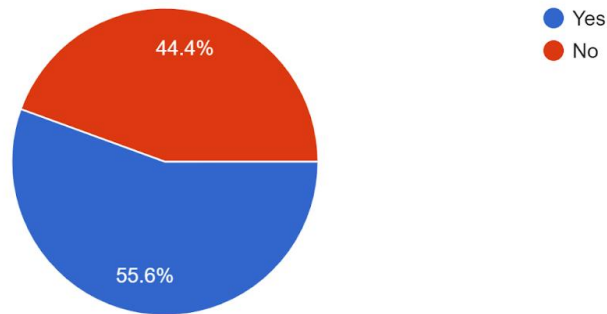


Figure 15: Possibilities of implementing blockchain technologies on current CRM system

For the next question, we are asking the IT department to tell us if they think that an upgrade like this could have good benefits to the current CRM system. This one was an easy response, as it turns out, since all 100% of the respondents have told us that it will provide benefits to the current CRM system. This comes from the numerous security, transparency and integrity updates it will bring after this big implementation. Although not all of them think that it is possible to make this integration, they all think that if it would be possible, it would be a great benefit for the company and the employees that use the CRM system.

Do you think that the company's CRM system will be upgraded through the use of Blockchain technologies?

9 responses

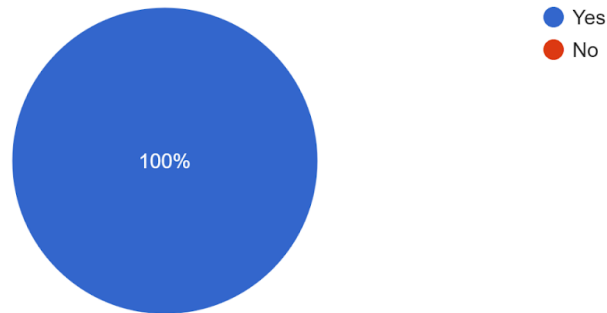


Figure 16: Upgrade on CRM system with the use of blockchain technologies

Next up, we take a look at a question that has to do with the actual worth of implementing such a big change on the system, in terms of the development costs to the results that it will have. The answers here are not that optimistic if we take into consideration that the 55,6% of the respondents told us that it is not worthwhile to develop such a change, since it would be very costly and will not give us back such great results. Other than that, the rest 44,4% has told us that it is worthwhile, due to the fact that the increased security and transparency of the data transactions could benefit the company in other ways.

Do you think that the development of such a system is worthwhile, in terms of development costs - results?

9 responses

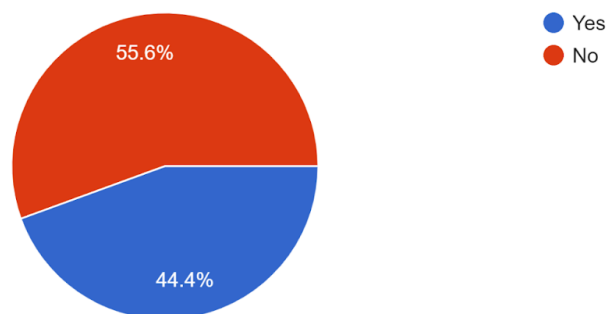


Figure 17: Cost-result worth of the blockchain implementation

Finally, in the last question of the questionnaire, we have asked the opinion of the employees of the IT sector, how much time it would take to implement such a development on the current CRM system.

Since it is such a big change to make, there were no responses that stated less than 6 months of work. Most of the responses are stating more than 1 year and these people cover 55,6% of the respondents. The rest 44,4% of the respondents are splitted in half and the first 22,2% of the respondents said that it can take from 6 months to 1 year, while the final 22,2% of the respondents said that it is not possible to develop such a system, which seems to be correct according to one of the previous questions about the actual possibility of developing such a system.

How long do you think it will take to integrate Blockchain technology into the company's existing CRM system?

9 responses

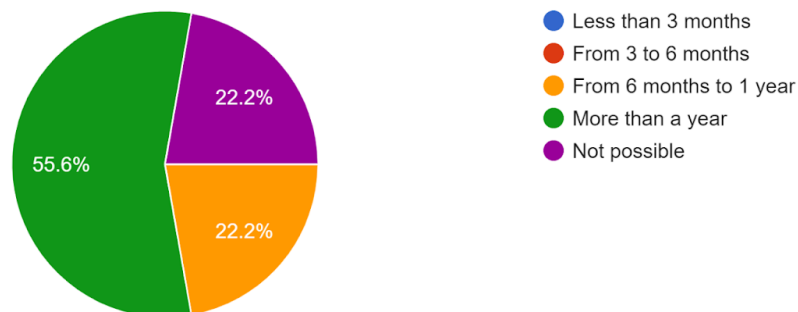


Figure 18: Timeframe for the blockchain technology implementation

Chapter 4 - Result Discussion

The commentary on the results as well as their interpretation compared to the relevant literature are presented in the following chapter.

4.1 Result Commentary

In the present research, we can characterize our sample as qualitative, since most of the respondents held some responsible/competent position, and had been working in it for more than a year. This directly shows us that the people who answered the questionnaires have enough experience to have a proper understanding of CRM systems, to have realized any flaws they face, and to be able to judge whether the idea we present to them could help them or not. improve the way they work. As for IT workers, we are interested in their experience in CRM systems, since they can combine it with their IT knowledge, and as it turned out, help us with whether this venture is possible, and how much time is needed.

Of course, to the above is added the level and subject of education of the employees, since it is important for the validity of the answers. The majority of the respondents have completed some part of higher education, and are working on the subject of their studies, which shows us that their answers are based on encyclopedic knowledge and experience, corresponding to what we ask for.

Continuing, from the results we notice that the majority of respondents use the company's CRM system every day. This result is not surprising, since one of the objectives when looking for employees to participate in the research was to find employees who use the CRM system. This was done for reasons mentioned above, such as software experience and recognition defects, to judge whether the system we proposed can correct these defects and improve their daily work.

Moving on with this pattern of questions, we found out that the majority of the employees are handling the marketing procedures. These employees are 15 in total and cover the 69,6% of the respondents that took part in this research. From the total of the respondents though, the 43,5% of them have informed us that are not satisfied with the current CRM system while only 5 people,

which cover 21,7% of the respondents, are actually satisfied with the system as it is now, which means that many suggestions and solutions could be proposed in order to improve it and satisfy the employees, like we have done with this project.

Finishing up the first sector of the questionnaire, we placed some questions that have to do with the blockchain technology that we propose to implement. The first question is about the employees opinion about this implementation, which gave us very positive results with more than 90% telling us that it is at least a deliberate update for the current system, while the rest 8,7% has told us that it is not interesting. Finally, we have to mention that all of the employees are agreeing that the blockchain technology implementation is a good upgrade for the current CRM system for increasing security, integrity and transparency of the data and their transactions.

The survey continues with the questions addressed to the employees of the marketing sector, in order to get informed opinions, in-depth from people who have a lot of experience, especially in this field. This section started with the question of whether they would like to see blockchain technology implemented in their workplace, with all participants stating that they would like it to be implemented, which shows that the employees believe it can help their work, and would like to see it in daily use. Also, the same employees answered that the current implementation of blockchain technology in the company's CRM system can bring positive results to all tasks related to data security and integrity of each data transaction in whichever point they are within the transaction. The next question was answered in the same direction as the previous question, as it concerned the opinion of the respondents in relation to whether data security could really bring about positive results in their work or in the work of those who need the specific data and the results were once again 100% positive according to the outcome that we were looking for, since everybody agreed that it can have positive results in their work. Later on, we asked the employees if it makes any sense to have more information security, and if it can have a positive effect on the workers day to day tasks. As the pattern continued, all of the respondents have agreed that their day to day tasks can benefit from such an implementation, covering again the 100% of the responses. As for the importance of the data security in general, which happens to be our next question, the responses started to take a different shape since the 6,2% of the respondents said that it is not that important, 18,8% said that it is important and the majority, covering the 75% of the

respondents, said that it is very important. Following along, we made the question about the importance of data integrity, where we see some similar responses with the 18,8% responding that it is important to have data integrity while the rest 81,2% have told us that it is very important.

Finally, before we finish up with the questions for the marketing department, we made one final question that concerned the importance of the openness of the data for each data transaction. The 12,5% of the marketers have told us that it is important to be open and transparent on the transactions that happen on the data they handle and the rest 87,5% of the marketers has told us that it is really important to be open and transparent to all of the people that the same transaction is referred to.

Reaching out to the last part of our questionnaire, we are looking for answers from the IT department of the company in question where the employees of this department have the experience and the knowledge to give us the right responses on our questions that concern the implementation, the time needed and other information about blockchain technologies in the current CRM system.

The first question that was made to the IT department was about the possibility of the integration of the blockchain technology in the CRM system that the company is using. Interestingly enough, we saw that a large number of respondents, covering 44,4% of the people from the IT department, said that it is not possible to implement it, while the rest 55,6% said that it is possible. This response came from the fact that this company is not developing its own CRM system, but it is bought from an external software company. This means that the questioned company cannot make such big developments, but they can set the question for the company that creates the software.

The next question to the IT department was if the employees believed that an implementation of the blockchain technology to the CRM system would be an upgrade if it is possible to happen. The responses here were pretty positive since all of the respondents said that it would be an upgrade to increase security for the data that is being transitioned.

Next, we wanted to know if such a big development would be worth it in terms of cost-result comparison. Once again a bit more than half of the respondents told us that they think it is worth it to develop such a system since the customers and the collaborators will highly value the security and the integrity of their data that the company can offer. The percentage of the employees that had this opinion came to the 55,6% of the respondents, while the rest 44,4% responded that it is not worth it to have this expense to develop such a system.

As we come to an end of the questions that were placed in the questionnaire that we provided to the employees of Hyundai Motorsport, the last question was about the time that was estimated to be needed to develop such a safe system. Most of the respondents told us that more than one year is needed for such a big development, covering the 55,6% of the respondents. The next 22,2% of them think that it can be done within 6 months to 1 year, while the last 22,2% thinks that this implementation is not possible.

4.2 Result Comparison

In conclusion to this work we should mention the comparison in terms of its results with respect to other works of the same kind. Our specific work showed positive results as the majority of our respondents said they would like to see this particular application in their work environment and that they believe it would offer more security, integrity and transparency to the information provided in intra-company data uses and transactions data between company and customers.

The same results can be found in many researches and works that have been done on similar topics, as for example in the work entitled “Blockchain technology transforms digital marketing by growing consumer trust” (Rabby, 2022), whose work showed positive results in use of blockchain technology in an data logging system as the data recorded and used by this system was more secure and transparent for sharing among employees using the same system.

On the other hand, the article entitled “Applications of blockchain technology for digital marketing: A systematic review” (Rahman, 2021) states that although the theoretical results

indicate that this change could be positive , this does not mean that its practical application would improve the use and exploitation of the information received by a system. So in comparison with the present work, the difference is that as the idea and the result are presented with the same logic, the conclusion of the research we report is different with the reference to the chances of failure of the practical application that could exist.

Moving on further to our research about more studies on our topic, we came across the article “Digital marketing and the role of blockchain in the digital marketing industry” (Kumar, 2018) where we see a detailed analysis of the digital marketing industry, as well as a detailed analysis of the blockchain technology with various uses and applications in the digital marketing industry. According to this detailed analysis we can safely say that the uses of the blockchain technology can expand to many more than the ones we mentioned on our project. Also, we can see that there are also numerous benefits of implementing such a technology either from the security and safety point of view, or from the cost point of view.

Conclusions

In this chapter, as we come to an end, we will take a look at the conclusions of our research which came from the analysis of the responses we saw in the previous chapter, and we will close up with some suggestions for further research that can be made in the future. As we said before, in this research we took a look at an innovative application that replaces the ledgers of a CRM system with the distributed ledger technology of blockchain for enhanced security, transparency of information and integrity. This starts from the CRM systems, on which, in order to make the necessary actions in a company, the actions taken are recorded. For example, in a company like the one that we reference this project to, many marketing and digital marketing processes take place that need to be registered in the CRM systems. These registrations on the CRM system could be safer if the ledger used in the development of the system had been created with the blockchain technology as a basis. This system saves the data that we give to it in a unique cell, which, after we close it, cannot be opened again, which means that it cannot be modified in any way. For the

addition, or modification of the data, we should create a new cell in the chain where we can note the change of the data that we need to make, either if this change is an add-on to the information that we already have, or if it is a change on the data that we have put on the previous cell that is inside the blockchain. All of this means that for each action taken within the company, we create a new blockchain in which we store all the actions taken in an analytical way, and if there are any changes that are needed to be made, a new cell is created with the appropriate data to undo the data that was saved on the previous cell. This also makes it easier to make a search for information that has been stored in the blockchain. This comes from the fact that everything is in a row of information and there are no changes in the chain to confuse the system or the users and the solutions to any problems that might occur can come faster and easier by finding the actual root of each problem. At this point, it is worth mentioning that the benefits of such a system do not limit themselves to being only for the company using a system like this one. Benefits can also exist for the side of the customers, since they can also reach out and find every detail they want or need within the ledger that uses the blockchain technology. All this is done by starting a new chain of blocks (blockchain) every time a new shipment is made for the company. As you create this chain, workers extract the access keys for this chain. These keys have some specific properties, that is, every person who will have access to such a key will also have a position in this chain. This project has been completed through the use of questionnaires that were shared to the employees of the company Hyundai Motorsports GmbH, that are working in the marketing and IT sector of the company, and to people that have some general knowledge of the marketing procedures that the company uses. This means that the people that answered the questionnaires have knowledge and experience on the marketing or the IT sector and have knowledge on the procedures and can understand where these benefits can help them on a day to day basis. The thing that they understood as a main benefit from an implementation like this one is first of all the security of the data transactions, the transparency of the data for all parties using the data and the improvement of their performance since many mistakes can be eliminated by the use of a system with the blockchain technology implemented. On the other side, the employees of the IT department had the opportunity to examine this case only in a theoretical level with the cases that we presented to them, but they can fortunately get to understand clearly enough what we are talking about and how to develop and build such a system from their experience and their knowledge, and most of all,

they know how to reach out and give the necessary information to the company that creates the software in order to help them develop such a software for their needs.

The results that we obtained confirmed our hypotheses, and from these results there were some interesting conclusions which could be summarized below:

- The application of blockchain technology presented resonated, and most respondents are interested in its practical use.
- The application of blockchain technology can provide an increase in the security, integrity and transparency of the company's data.
- The development of the system is completely feasible.
- There is great interest in developing the idea from both sectors surveyed.
- Security and integrity implications play an important role for the company's employees.

In addition to the positive results, however, there were also some limitations, which limited the research to its comprehensive and complete conduct. These are the following:

- Lack of government financial support, for practical development of the system
- Small number of respondents, due to the use of a sample by the company.
- The sample did not have the opportunity to see the application in action, but only to read about it, which may have varied the results.
- The largest percentage of the sample has dealt with only one ERP system, which means that they do not have experience of various systems, for the holistic approach of the presented idea.

In conclusion, we could say that the present research offers a good ground for future research that can be conducted, based on the present one. Some suggestions for future research are:

- Practical implementation of Blockchain technology in CRM systems
- Comparison of security, transparency and data integrity between the upgraded and legacy CRM system

- Examining the possibility of renewing an existing CRM system with Blockchain technology.
- Conducting the same survey on a larger sample, from more companies and from CRM software development companies.

In summary, we conclude that the application we have presented has appeal, and we would suggest that CRM software development companies consider developing such a system. This proposal, however, comes with valid results as the company that has been examined is a company that is actively using marketing services and a very popular CRM system from the motorsport environment which is an important aspect for customers, suppliers and general recognition. So we conclude that such an application is feasible and would have significant improvement results both for the producer of the system and for the user of the system as well as for the consumer of the company that will use it.

Bibliography

- Alves, H. (2016). Social Media Marketing: A Literature Review and Implications.
- Anderson, M. (2019). Exploring Decentralization: Blockchain Technology and Complex Coordination.
- Baschab, J. (2007). *The Executive's Guide to Information Technology*.
- Chandler, D. (2011). *A dictionary of media and communication*. Oxford University Press.
- Charith Perera, R. R. (2015). End-to-End Privacy for Open Big Data Markets.
- Dubois, F. (2009). Definitions and typologies in public administration research: the case of decentralization.
- Eggiman, S. (2016). The optimal degree of centralisation for wastewater infrastructures. A model-based geospatial economic analysis.
- Grishikashvili, K. (2014). Investigation into Big Data Impact on Digital Marketing.
- Jingzhong Wang, M. L. (2018). A Blockchain Based Privacy-Preserving Incentive Mechanism in Crowdsensing Applications.
- Johnson, N. (1999). Diversity in Decentralized Systems: Enabling Self-Organizing Solutions.
- Kai Wang, J. D. (2019). Securing Data with Blockchain and AI.
- Kumar, A. (2018). Digital Marketing and the Role of Blockchain in the Digital Marketing Industry.
- M. Bala, D. V. (2018). A Critical Review of Digital Marketing.
- Massimo Bartoletti, L. P. (2017). An Analysis of Bitcoin OP_RETURN Metadata.
- Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System.
- Patel, N. (2017). How to use SEO to build your brand.
- Philip Koshy, D. K. (2014). An Analysis of Anonymity in Bitcoin Using P2P Network Traffic.

- Provost, F. (2013). Data Science and its Relationship to Big Data and Data-Driven Decision Making.
- Rabby, F. (2022). Blockchain Technology Transforms Digital Marketing by Growing Consumer Trust.
- Rahman, K. T. (2021). Applications of Blockchain Technology for Digital Marketing: A Systematic Review.
- Silverman, J. (1992). Public Sector Decentralization: Economic Policy and Sector Investment Programs.
- Standardization, I. (1994). *ISO 27001 - Information Security*. Retrieved from International Standardization: <https://www.iso.org/isoiec-27001-information-security.html>
- Vipond, R. C. (1991). Liberty & Community: Canadian Federalism and the Failure of the Constitution.
- Vullers, M. H. (2003). Managing Traceability Information in Manufacture.
- Xi Zhang, V. K. (2017). Dynamically Managing a Profitable Email Marketing Program .
- Xu Zheng, Z. C. (2018). Data Linkage in Smart Internet of Things Systems: A Consideration from a Privacy Perspective.