University of Sopron
István Széchenyi Economics and Management Doctoral School

**Innovation Management in the Textile Industry:
Potential of Web3 Technologies in the Fashion Industry**

Theses of the Doctoral Theses

Ágnes Paulovics

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Doctoral School: István Széchenyi Economics and Management Doctoral School

Head of the Doctoral School: Prof. Dr. Csilla Obádovics, PhD

Programme:
Business Economics and Management Programme

Supervisors of the dissertation: Dr. habil László Koloszár
Dr. Gábor Keresztes

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Signature(s) of the supervisor(s)

1. Introduction

1.1. Objectives and aims

The aim of the literature review is to explore the theory of innovation management and the textile industry and to uncover innovative solutions in the textile industry. The in-depth research is necessary to discover the research gap, in which niche, no research has been conducted yet. The use of Web3 technologies in textile companies is discovered as a gap, and accordingly, the empirical research focuses on the in-depth study of this area.

The aim of the empirical research is to observe the integration of Web3 technologies in textile companies from various angles and to determine their potential. On the one hand, the goal is to define which projects would be possible and could be implemented. On the other hand, it is to be investigated whether there is a demand for these technologies from the customers and what the attitude of textile companies towards these technologies is. The aim of the research is to create an overview of which projects are possible, what effort is needed for their realisation and how high their potential for success is.

1.2. Research hypotheses, and questions

The author formulated six research areas with corresponding hypotheses examined through research questions. These are based on the review of the national and international literature. The research questions and hypotheses are the followings:

Q1: Which Web3 based projects have already been realised in the textile industry?
H1: In the textile industry, there are existing Web3 projects, which are used in various areas and for different purposes in the companies.
Methodology: Secondary research

Q2.1: How much knowledge on the Web3 area do potential customers possess?
Q2.2: Which project ideas for textile brands might customers find exciting?
H2: Although potential customers might not understand the technical background of Web3-based projects, they have ideas for their implementation.
Methodology: Qualitative research among fashion and blockchain customers

Q3: Which of the defined Web3-based projects do customers find particularly compelling?
H3: There are Web3 projects that the potential customers find exciting.
Q3.1: What is the distribution of cryptocurrency and/or NFT owners between Hungary and DACH?
H3.1: The proportion of DACH-located people with a cryptocurrency or NFT is at least 8% higher than the proportion of Hungarians.
Q3.2: In case of which Web3-based project ideas does owning cryptocurrencies and/or NFTs have an impact on preference?
H3.2: There is a significant correlation between the possession of a cryptocurrency and/or NFT and some of the Web3-based project ideas.

Methodology: Quantitative research among potential customers

Q4: What are the most cost-effective and customer-supported alternatives of Web3-based projects?
H4: A list of potential Web3-based projects can be created and evaluated by customers regarding their interests and by blockchain developers regarding the implementation costs.
Methodology: Merging information from a quantitative customer survey and a qualitative survey of blockchain developers.

Q5: What is the attitude of textile SMEs towards Web3 technologies and solutions?
H5: Although leading apparel brands are currently experimenting with Web3 technologies, small and medium-sized enterprises (SMEs) have not implemented such projects yet.
H5.1: The percentage of companies planning to integrate NFTs into their business is less than 40%.
H5.2: The percentage of the companies planning to integrate blockchain technology into their business is less than 35%.
H5.3: The percentage of the companies planning to integrate metaverse into their business is less than 30%.
Methodology: Quantitative research among textile companies

Q6: What are the most significant deals or partnerships that Lil Miquela has announced or showcased on her Instagram?
H6: The most significant deals or partnerships showcased by Lil Miquela on her Instagram are likely associated with high-profile brands in the fashion, music, and technology sectors, which align with her digital persona's key areas of influence and engagement.
Methodology: Case study

1.3. Research design
The research consists of two main parts. The first part is a literature review focusing on innovative solutions in the textile industry and observing current trends. In this way, potential opportunities for textile companies in the direction of Web3 are identified. After the literature review, the research gap is found, which helps to build the research design for the secondary research and the empirical part of the research. During the secondary research, existing projects with Web3 integration in textile companies are examined. Through this research, a list of ideas containing potential projects that can be realised with Web3 technologies in textile companies is found.

Afterward, the design of the primary research is determined. First, through qualitative interviews, the customers' potential needs and level of knowledge on Web3 and related technologies are explored. In addition, ideas that would be of interest to potential customers are generated. These ideas are added to the results from the secondary research into the list presented in *Table 1* and are examined during the

quantitative research by potential customers. In addition, three blockchain development companies analyse the ideas and provide feedback and advice on their implementation. As a following pillar of current research, quantitative research involving textile companies is carried out to gain deeper understanding of their willingness to implement Web3 technologies in their business. The last part of the empirical research is the case study about the virtual influencer, Lil Miquela. *Figure 1* demonstrates the research design of the dissertation.
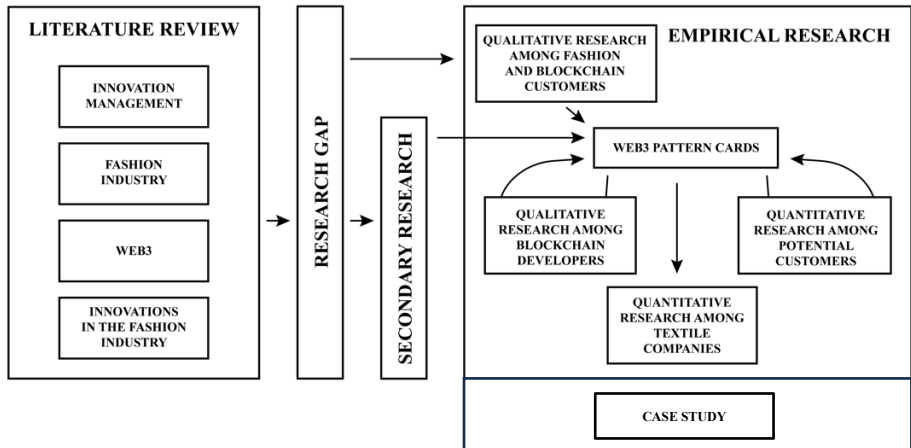

Figure 1 The visualisation of the research design
Source: own visualisation

2. Theoretical background
2.1. Innovation
Innovations are important factors that contribute to the development of the economy. Based on my research and the definitions of innovation by Schumpeter (1911) cited by Scholtissek (2009, p. 163), Sombart (1913) cited by Reinert and Reinert (2006, p. 19), Schumpeter (1934) cited by Taylor (2017, p. 131), Drucker (1985) cited by Tidd and Pavitt (2011, p. 19), Freeman (1982) cited by Tidd and Pavitt (2011, p. 19), Freeman (1992) cited by Rennings (2000, p. 327), ABS Innovation Survey questionnaire, Section B cited by Rogers (1998, p. 8), Mulgan and Albury (2003, p. 3), OECD (2005, p. 46), Damanpour and Schneider (2008, pp. 496-497), Innovation Nation. Department for Innovation, Universities and Skills (2008, p. 13) and Amabile and Pratt (2016, p. 158), I define innovations with the following attributes:

- new or significantly improved solution,
- commercialised or used for the commercial production and has an economic impact,
- new (at least) to an organizational population,
- can occur in different subject areas.

2.2. Textile industry

The fashion industry is a very important industry. Before the outbreak of the Covid-19 pandemic, its global revenues were estimated at between $1.7 trillion and $2.5 trillion dollars (*Global Fashion Industry Statistics - International Apparel*, n.d.). Thus, the value of the global apparel industry is approx. 2% of the world's Gross Domestic Product (GDP). In 2019 only in the US were nearly $380 billion dollars on apparel and footwear spent by customers (Vilaca, 2022).Therefore, the apparel industry is not insignificant and plays an important role in economy.

2.3. Web3

Web3 is a term used to describe the decentralization of the web and means a set of protocols and technologies allowing the creation of decentralized applications. With Web3, there is no single point of control or failure. Instead, the web is powered by a network of decentralized computers, a.k.a. the peer-to-peer web. This new model of the web has the potential to transform the Internet to a form never seen before. There are several technologies under development to make the use of Web3 possible including the followings:

1. Blockchain: Blockchain is a distributed database allowing secure and transparent transactions. This technology could be used to create more secure and private applications (Dubey, 2022).
2. NFT: The NFT technology allows the creation of digital assets that are unique and cannot be duplicated. This technology might be used to create more secure and private applications (Sharma, 2022).
3. Metaverse: Metaverse is a virtual world developed to allow the creation of virtual assets and experiences. Metaverse is a collective, virtual, shared space created by the convergence of virtually enhanced physical reality and physically persistent virtual space including the sum of all virtual worlds, augmented reality, and the Internet. Metaverse is the next generation of the Internet, where digital assets are linked to physical assets, and the identity is persistent. Additionally, metaverse enables a new generation of applications and services that provide more immersive and user-centric experience than what is possible today (Sinha, 2022).

2.4. Innovations in the textile industry

Non-Web3 based innovations in the textile industry are sustainability as a driver of innovation, laboratory grown materials, catalytic clothing, zero waste, waste management, and recycling, bionics, highly functional textiles, emotive technology and laser cutting.

Web3 based innovations in the textile industry are Internet of Things (IoT); 3D printing; virtual reality, augmented reality, mixed reality; e-textiles, smart textiles, wearable technology; artificial intelligence (AI); blockchain; non-fungible tokens (NFTs) and digital property.

2.5. Secondary research: With Web3 realised projects in the textile industry
There is a wide range of existing projects in the Web3 space including metaverse, NFTs, digital fashion, traceability, authenticity, and crypto payments. These projects consist of short-, medium-, and long-term actions and offer a mix of solutions for textile companies. In addition, a trend towards a more collaborative way of working through partnerships is recognized.

3. Empirical study
3.1. Primary research 1: Qualitative interviews on the context of Web3 with potential customers
3.1.1. Aim of the research
The aim of this primary research is to detect the customers' potential needs and desires as well as their level of knowledge on Web3 and related technologies. In addition, for textile companies, ideas that would be of interest to potential customers are generated. Altogether, interviews with five people are conducted. The interviewees are all between 25 and 30 years old. Their place of residence is either Hungary or Germany.

3.1.2. The methodology of data collection and processing
For the evaluation, the method of Meuser and Nagel is used, and the explanations of (Ullrich, 2006) are followed. For each interview, a two-column table is created. In one column, the text sequences are copied, in the other, the topic labels of the individual text sequences are transferred.

For each topic area, a long list of quotations is created. This list serves as a basic framework for the analysis. Afterwards, all the materials are reviewed again; however, this time, they are no longer organized by interview but by topic. This allows the theoretical generalization to take place; thus, connections between the categories are examined, and interpretations are formulated.

3.1.3. Findings
During the discussions, a variety of ideas and wishes are generated. Additionally, the customers' expectations for fashion brands and Web3 projects become clearer, and they might express which projects they find interesting. In this part, the generated ideas and insights are explained, and they are listed in the form of points in *Table 1*.

3.2. Primary research 2: Quantitative research among potential fashion customers
3.2.1. Aim of the research
The aim of this part of the research is to evaluate the ideas collected during the secondary research and first primary research, listed in *Table 1* to determine which projects would be the most exciting for the customers therefore the most successful to be introduced for textile companies. On the other hand, it is aimed to detect which factors are those that keep customers from investing in Web3-based products and services.

3.2.2. The methodology of data collection and processing

All together 723 people participate in the survey. After applying the filters with the three attention questions, there are 283 answers. Afterwards, a comparison is made between different statements of the participants. After this check, unfortunately, it had to be concluded that merely for 138 participants, it is sure that they state the truth. The hypotheses of the research are tested on this sample.

The following analytical procedures are used:

- Descriptive statistics to present the empirical data clearly through tables and graphs,
- Chi-square test to check if there is a relationship between cryptocurrency or NFT holdings and preferred Web3-based offers,
- Cramer coefficient, which indicates the strength of the relationship, when a significant relationship is found during the Chi-square test (a 5% significance level is assumed).

3.2.3. Findings

The reason for not owning any blockchain-based products is indicated with totally agree by 51.38% of the respondents as they do not have sufficient knowledge in the field. 46.79% of the participants state that they need somebody who can explain to them how to start. The reason of not knowing how to buy crypto assets is indicated by 40.37% of the survey participants. Moreover, there are some clear reasons that tend not to influence the buying behaviour. 55.96% of the respondents do not fear potential governmental regulations, and not hearing about the technologies is not a main reason either. Additionally, the environmental impact seems to be less important for the participants, as well.

The next part of the research focuses on capturing the respondents' preferences for different products and services that could be realised through Web3 technologies. It can be concluded that based on the respondents' "Yes!" answers, the participants are most interested in receiving lifelong warranty on their physically purchased items, followed by earning money with doing sports, and receiving early access to discounts and new collections. Furthermore, the survey participants show high interest in verifying the entire life-cycle of the purchased products, earning money by playing games, receiving right to decide which products should be produced by the brands, and receiving access to limited edition products that nobody else can buy.

If the answers by summarizing the "Maybe..." and "Yes!" options are analysed, it can be concluded that receiving lifetime warranty is still the most appreciated offer as 91.30% of the participants vote for this service. Three offers land head-to-head on the second place, which are the followings: verifying the entire life cycle of the product, earning money by doing sports, and getting early access to discounts and new collections. On the third place are the followings: voting for the products of the collection you like thus deciding which products should be produced and verifying the authenticity of the purchased fashion items.

3.3. Web3 pattern cards
3.3.1. Aim of the research
As it has already been announced in the previous chapters, the main aim of current research is to create a list of possible Web3-based projects and to evaluate them. The evaluation by the customers is provided in *Chapter 3.2*. **Primary research 2: Quantitative research among potential fashion customers**, thus, the comprehensive results can be presented.

3.3.2. The methodology of data collection and processing
The heart of the project includes 38 ideas that are collected and generated through the secondary research, through the in-depth qualitative interviews, and through brainstorming.

In the left column of *Table 1*, there is the name of the Web3 project. This is followed by the category; thus, the related projects can be recognized.

Additionally, the budget friendliness is listed per project. To determine this feature, three blockchain developer companies are asked to rank the projects by budget between 1 and 5, where 5 means the lowest budget, and 1 means the highest budget. After receiving all three ratings, the average of the awarded points is calculated and entered under budget friendliness.

The points for customer demand result from the research conducted in *Chapter 3.2*. Based on the given points for customer demand and budget friendliness, the average per project is calculated. Thus, the textile brands can estimate at the beginning how high the budget for their desired project could be. Some projects cannot be rated by the developers because the costs may depend strongly on the scope of the project. In case a developer does not provide any information, no average is calculated, and the status not rated is entered instead.

3.3.3. Findings
Table 1 Web3 pattern cards with rating for budget friendliness, customer demand and average

Name	Category	Budget friendliness	Customer demand	Average
Lifetime discount	Utility	4.67	4.25	4.46
Unlimited physical replacement of products	Utility	4.67	4.63	4.65
Early access to new collections	Utility	4.67	4.25	4.46
Early access to discounts	Utility	4.67	4.25	4.46
The visibility of the life cycle of the product	Verification	4.00	4.25	4.13
Exclusive drops and products exclusively for token holders	Utility	4.00	4.13	4.06
Right to have a say	Utility	3.67	4.13	3.90
Access to exclusive content (passive)	Utility	3.67	4.00	3.83

Name	Category	Budget friendliness	Customer demand	Average
Blending physical, digital, and experiential products	Utility	3.67	4.00	3.83
Physical product with NFT	Product	3.67	4.00	3.83
Dress-to-earn	Play-to-earn	3.33	3.88	3.60
Access to exclusive content (active)	Utility	3.33	3.75	3.54
Product co-creation	Product	3.33	3.63	3.48
Authenticity verification	Verification	2.67	4.13	3.40
Community membership	Community building	2.33	4.00	3.17
Brand-inspired avatars, PFPs	PFPs	3.67	2.63	3.15
Avatars dressed in the customers' own clothes	Metaverse	3.00	3.00	3.00
Gaming skins and NFTs	Gaming	2.33	2.75	2.54
Digital dressing room	Digital fashion	1.67	3.13	2.40
Train-to-earn	Play-to-earn	not rated	4.38	not rated
Have a say, profit from your vote	Utility	4.33	not rated	not rated
Fashion week VIP access	Utility/Event access	4.00	not rated	not rated
Play-to-earn	Play-to-earn	not rated	3.88	not rated
NFT with physical product	Product	3.67	not rated	not rated
Arts collection	Arts	3.67	not rated	not rated
Sustainable choices	Sustainability	3.33	not rated	not rated
Private program with the team	Utility	not rated	3.25	not rated
Payment in cryptocurrency in web shops	Payment	not rated	3.25	not rated
Payment in cryptocurrency at local shops	Payment	not rated	3.13	not rated
Evolving NFT	Customer loyalty	2.67	not rated	not rated
External metaverse events	Metaverse	1.67	not rated	not rated
Building an own game	Gaming	1.67	not rated	not rated
Metaverse store	Metaverse	1.33	not rated	not rated
AR fashion collection	Digital fashion	1.33	not rated	not rated
Collaboration with another brand	Partnerships	not rated	not rated	not rated
Unexpected partnerships	Partnerships	not rated	not rated	not rated
Collaboration with an NFT project	Partnerships	not rated	not rated	not rated
Event in metaverse	Utility/Event access	not rated	not rated	not rated

Source: own compilation, 2022

3.4. Primary research 3: Quantitative research among apparel companies
3.4.1. Aim of the research

In this part of the research, the aim was to find out what the attitude of textile companies towards the Web3 technologies is. Thus, it is investigated how high their willingness to

implement the technologies is and which factors hold the companies back from the implementation.

3.4.2. The methodology of data collection and processing
The survey is distributed through direct e-mails to potential survey participants. For this purpose, 376 companies are contacted by direct e-mails and invited to participate. The list of the companies is partly obtained from the address list of Swiss Textiles, partly from the website Not just a Label, as well as from the list of the companies of Blickfang. Out of the 376 contacted companies, 33 participate in the research, which corresponds to a response rate of 8.78%.

The following analytical procedures are used for data analysis:
- Descriptive statistics to present the empirical data clearly through tables and graphs,
- One sample Z-test for proportion to determine whether an assumed difference in means between the sample and the population can be rejected by drawing inferences from the sample data (Kumar, 2022).

3.4.3. Findings
Some of the respondents, namely between 3.03% and 18.18% (i.e., depending on the technology), do not know the terms. The term NFT is the least known, and Artificial Intelligence is known by most of the respondents.

Many technologies - between 57.58% and 75.76% depending on the project - have not been planned for implementation by the companies. Metaverse projects are the least planned by companies with 75.76% refusing them, which is followed by virtual reality and artificial intelligence with 72.73% for each. The respondents are most interested in NFT projects with merely 57.58% clearly stating that they have not realised any projects in the area of NFTs yet, nor they are planning to do so.

Some participants (3.03% for each) have realised a project in the areas of drones, robotics, IoT, 3D printing, and blockchain, and several projects in the areas of augmented reality and virtual reality. However, they indicate that they do not plan any more projects internally in these areas. For the area of artificial intelligence, projects have been realised by 6.06% of the respondents, and they intend to realise more projects in this area, too.

Interesting insights can be gained from the indication of which projects have not been realised by companies but are planned to be integrated. Here it is visible that 24.24% of the respondents have not implemented NFT projects yet but intend to integrate this technology soon. Additionally, this statement is valid for 18.18% of the companies for each of the following technologies: drones, robotics, IoT, 3D printing, blockchain, artificial intelligence, and virtual reality. Projects for metaverse and augmented reality are planned to be realised by 15.15%.

Not solely the readiness for Web3 project integration is examined in this research section, but the reasons holding companies back from implementing the technologies, as well.

The reason for not offering any Web3-based product or service is that they lack resources for the implementation as indicated by 57.58% of the respondents with the expression "to a large extent". It is followed by 54.55% voting for the lack of supervisors to answer questions if they need help during the implementation process. 51.52% state both lack of ideas for such projects and lack of knowledge in this field.

The participants indicate that it is not a reason for the non-implementation that they do not know the technologies (66.67%) or that they are afraid of cybersecurity or theft risks (42.43%). The respondents could not accurately assess the following points as a reason: the price volatility of cryptocurrencies, the fear of possible government regulation, and the negative impact on the environment.

3.5. Case Study
3.5.1. Aim of the research
The aim of the case study is to assimilate and critically examine AI-generated virtual celebrities and to construct a comprehensive analysis of Lil Miquela by undertaking a year-by-year dissection from 2016 to 2023 of her while emphasising pivotal events, brand affiliations, musical ventures, and other notable endeavours. Analysing Lil Miquela's trajectory offers insights into the real-world implications, challenges, and opportunities of synthetic media entities in the evolving digital milieu.

3.5.2. The methodology of data collection and processing
The primary platform for data extraction was the Instagram page of Lil Miquela given its centrality in her digital life, and Instagram is the medium through which her persona primarily engages with the audience. Further secondary sources encompassed industry reports, articles, press releases, case studies, and information available on the websites of associated brands. Each year of Lil Miquela's Instagram presence was treated as a distinct unit of analysis. This meticulous approach ensured that evolving trends, significant events, and shifts in engagement patterns were captured. While traversing the digital timeline, pivotal moments, such as magazine interviews, cover shots, song releases, and personal events, that could influence her digital persona's relatability were documented.

3.5.3. Findings
2016-2017: Lil Miquela's initial emergence on Instagram was marked by immediate intrigue due to her realistic CGI representation. This period saw a significant uptick in her popularity, catalyzed by audience speculation and engagement. Her venture into music with "Not Mine" indicated a strategic diversification into other creative domains. The sentiment analysis of audience reactions revealed a predominance of positive responses, highlighting the acceptance and appeal of virtual entities in traditionally human-centric fields.

2018: This year was pivotal for Lil Miquela, with advancements in both her music career and fashion endorsements. The revelation of her origins added a new dimension to her narrative, intensifying audience engagement and discussion.

2019: Miquela's participation in the Calvin Klein campaign alongside Bella Hadid brought forth a multi-faceted response, stirring conversations on the nuances of digital representation. The year also marked a consolidation of her presence in the music industry, with several successful releases.

2020: The partnership with Creative Artists Agency signified a breakthrough in the representation of virtual influencers, positioning Lil Miquela for broader collaborative opportunities. Her entry into the NFT market with "Rebirth of Venus" demonstrated the expanding role of virtual influencers in digital art and blockchain technology.

2021: The year underscored Lil Miquela's narrative development, characterized by deeper personal storylines and continued brand collaborations. This phase reflected a strategic shift towards more immersive and relatable content creation.

2022: This year marked a significant transition for Lil Miquela with Brud's acquisition by Dapper Labs. The acquisition aligned Lil Miquela's path with the broader vision of incorporating virtual personas into decentralized ecosystems, suggesting new potentials for her narrative and audience engagement within digital spaces.

2023: Despite a decrease in the frequency of activities, Lil Miquela maintained her relevance through selective brand associations and engagement with emerging technologies, aligning with the evolving paradigms of influencer marketing.

4. Conclusion
4.1. New and novel scientific results of the research

The novel results of current dissertation is the interpretation and presentation of Web3 projects in the textile industry based on existing literature and conducting empirical research. The research allows companies in the textile industry to get acquainted with existing projects and to find inspiration.

At the beginning of the secondary research, I defined the following hypotheses.

In H1, I claim that in the textile industry, there are existing Web3 projects, which are used in various areas and for different purposes in the companies. With in-depth secondary research it is found that there are several existing Web3-based projects in the textile industry. These projects can be categorized into the following groups: metaverse, NFTs, digital fashion, traceability, authenticity, and crypto payments. Based on these facts, I can conclude that H1 can be accepted, and I formulate the following thesis:

> **T1: In the textile industry, there are existing Web3 projects, which are used in various areas and for different purposes in the companies.**

The next hypothesis is formulated and tested based on qualitative research. In H2, it is claimed that although potential customers might not understand the technical background of Web3-based projects, they have ideas for their implementation. With qualitative interviews, more information is learnt of the potential fashion customers' attitude and could generate a list of ideas that got added to *Table 1*. Based on this outcome, I can conclude that H2 can be accepted, and I formulate the following thesis:

T2: Although potential customers might not understand the technical background of Web3-based projects, they have ideas for their implementation.

After this result, the research focuses on three hypotheses examined by quantitative research. In H3, it is stated that there are Web3 projects that the potential customers find exciting. With quantitative research, the customers' interests in different Web3-based services and products in the fashion industry are defined, which information is presented in *Table 1.* Based on the results, I can conclude that H3 can be accepted, and I formulate the following thesis:

T3: There are Web3 projects that the potential customers find exciting.

In H3.1, it is claimed that the proportion of DACH-located people with a cryptocurrency or NFT is at least 8% points higher than the proportion of Hungarians.

Based on the conducted two-sample ratio test, I can conclude that H3.1 can be accepted, and I formulate the following thesis:

T3.1: The proportion of DACH-located people with a cryptocurrency or NFT is at least 8% higher than the proportion of Hungarians.

H3.2 claims that there is a significant correlation between the possession of a cryptocurrency and/or NFT and some of the Web3-based project ideas. Based on the applied Chi-square test, it could be detected if there is a relationship between cryptocurrency or NFT holdings and preferred Web3-based offers. I can conclude that there is a significant correlation between the possession of a cryptocurrency and/or NFT and the following factors:

- you can try on apparel items digitally and post the pictures on social media,
- you can use skins and NFTs for gaming,
- you can use NFTs from your favourite brands as profile pictures,
- you can pay in cryptocurrency in web shops,
- you can pay in cryptocurrency at local shops.

Based on this result, I can conclude that H3.2 can be accepted, and I formulate the following thesis:

T3.2: There is significant correlation between the possession of a cryptocurrency and/or NFT and some of the Web3-based project ideas.

The most important result of the research is the generation of Web3 pattern cards, which provides textile companies with a list of Web3 ideas with a comprehensive analysis of the customer demand and the implementation costs of these projects. The integration of Web3 projects in the textile industry has not been investigated in this way in the national or international literature yet, and the results are valuable for theoretical and especially practical experts as they can provide a starting point for the implementation of such projects.

In H4, it is stated that a list of potential Web3-based projects can be created and evaluated by customers regarding their interests and by blockchain developers regarding the implementation costs. With merging information from the quantitative customer

survey and the blockchain developers' qualitative survey I am able to rank potential projects and present these findings in *Table 1*. Based on the outcome, I can conclude that the H4 can be accepted, and I formulate the following thesis:

T4: A list of potential Web3-based projects can be created and evaluated by customers regarding their interest and by blockchain developers regarding the implementation costs.

As the next part of my research, a survey involving fashion companies based in Hungary, Switzerland, Germany, and Austria is conducted. The analysis of the attitude of textile companies towards Web3-based projects should be mentioned as a novel finding. Up to now, no such research has been conducted to investigate the perception of textile companies towards Web3-based solutions in this region. Therefore, these findings can be seen as novel results. In H5, it is claimed that although leading apparel brands are currently experimenting with Web3 technologies, small and medium-sized enterprises (SMEs) have not implemented such projects yet. This hypothesis can be answered based on the research results from the three following hypotheses. As it is visible, there are implemented projects – although they are not common for the research participants yet. Thus, I cannot accept this hypothesis and I formulated the following thesis:

T5: Not only are leading apparel brands experimenting with Web3 technologies, but small and medium-sized enterprises (SMEs) have also implemented such projects.

In H5.1, it is claimed that the percentage of the companies planning to integrate NFTs into their business is less than 40%. Based on the conducted one-sample z-test, I can conclude that H5.1 can be accepted, and I formulate the following thesis:

T5.1: The percentage of the companies planning to integrate NFTs into their business is less than 40%.

H5.2 states that the percentage of the companies planning to integrate blockchain technology into their business is less than 35%. Based on the conducted one-sample z-test, I can conclude that H5.1 can be accepted, and I formulate the following thesis:

T5.2: The percentage of the companies planning to integrate blockchain technology into their business is less than 35%.

In H5.3, it is claimed that the percentage of the companies planning to integrate metaverse into their business is less than 30%. Based on the conducted one-sample z-test, I can conclude that H5.1 can be accepted, and I formulate the following thesis:

T5.3: The percentage of the companies planning to integrate metaverse into their business is less than 30%.

At the beginning of the research, the H6 hypothesis got defined that claimed that the most notable partnerships and deals presented by Lil Miquela on her Instagram are predominantly associated with renowned brands in the fashion, music, and technology

sectors. During in-depth analysis of her Instagram content, it was found that the collaborations indeed revolved prominently around these sectors. It could be concluded that H6 can be accepted, and thus the following thesis could be formulated:

> **T6: The most significant deals or partnerships showcased by Lil Miquela on her Instagram are likely associated with high-profile brands in the fashion, music, and technology sectors, which align with her digital persona's key areas of influence and engagement.**

4.2. Recommendations for further research

The research provides comprehensive knowledge in the field of Web3 projects, as customer needs and costs of realisation were also analysed. This information is helpful for textile companies, as it supports them in finding ideas and creating concepts. However, they do not provide guidance on how exactly to realise these projects. The PhD thesis does not offer practical advice on which technologies and developers are needed to realise each project. That's why the author is working on a solution with a blockchain developer, where they analyse the best rated projects from *Table 1*, create the project plans for them and describe the technologies. In addition, they are working out alternatives that can be implemented without programming skills. This should help with the textile companies to be able to implement more cost-effective alternatives themselves and also to gain more overview of the whole development process.

A limitation of the research is that the research has analysed the customer needs based on theoretical information from the survey participants. No realised project has taken place and therefore it has not been analysed by practical examples how well such projects are accepted by customers. After preparing the project plans and technology stack with the blockchain developer, the next part of the research will focus on implementing some of these projects in practice and analysing them afterwards. Thus, it will be possible to determine exactly how well each project is accepted by customers and whether there really is a demand for them.

5. List of own publications
Conference Proceedings

Paulovics, A. (2021) *Promoting responsible thinking and behaviour at Swiss Universities.* In: Innovative Solutions for Sustainability - Day of Hungarian Science 2021 Conference Proceeding. Budapesti Gazdasági Egyetem, Budapest, Magyarország, 125-137. ISBN 978-615-6342-20-1. https://doi.org/10.29180/9786156342201_9

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Paulovics, A. (2022) *Fashion Industry Projects Realized with the Use of Web 3.0.* In: XVI. SOPRONI PÉNZÜGYI NAPOK: A kriprovaluták szerepe a fenntartható gazdaságban pénzügyi, adózási és számviteli szakmai és tudományos konferencia 29 October 2022, Sopron – Conference Proceedings, Sopron, Magyarország: Soproni Egyetem Kiadó (2022)

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Paulovics, A (2021). Promoting responsible thinking and behaviour at Swiss universities. *PROSPERITAS*. 8(1), 118-134. http://dx.doi.org/10.31570/Prosp_2021_1_7

Paulovics, A (2023). Assessing User Privacy Concerns in the Wearable Tech Industry. GAZDASÁG ÉS TÁRSADALOM 16(1), 56-72. https://doi.org/10.21637/GT.2023.1.04

Recension
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