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PAYMENT IMPLANTS AS AN ELEMENT OF HUMAN ENHANCEMENT TECHNOLOGY

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Abstract: *Technology leads to changes that cause the biosphere and the techno-sphere to interpenetrate and co-evolve. This paper is part of a wider research project on the social acceptance of payment implants as an example of Human Enhancement Technology. At this stage, the focus was on identifying the characteristics attributed to users of this form of augmentation in order to assess social attitudes towards them. The study used the method of projection techniques, recognizing that real attitudes towards payment implants may be unconscious or reluctantly verbalized by a person. The research results indicate that the profile of people using payment implants as perceived by society and the set of characteristics attributed to them differs depending on whether the user is a woman or a man. Attention was also drawn to the differences in social and individual attitudes towards this form of augmentation.*

Keywords: *human enhancement technology, microchips implants, payment implants, human, customer.*

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INTRODUCTION

Digital technologies, although common in our everyday life, still raise many questions and cause controversies, especially in the context of how far we are willing to push the limits of their acceptance. An undoubtedly inevitable process is leading to the successive popularization and increase in the number of practical applications of Human Enhancement Technologies (HET). Human enhancement and skills development is a co-evolution of nanotechnology, bioengineering, social engineering, and cognitive science, aimed at developing the solutions that allow humans to overcome existing physical and cognitive limitations (Naam, 2005; Meinzer et al., 2014) and gradually exceed them. They improve the body's anatomical, physiological and information processing (Barfield, 2016). Human Enhancement Technologies have become a promise to improve specific aspects of human functioning and/or the human body (Dijkstra, Schuijff, 2016). The desire to reach the next level of human modification – beyond tattoos and body piercings (Thaddeus-Johns, 2017) – has become real. It is based on both practical reasons (the desire to improve current health due to medical conditions, the level of self-esteem, motivation to change the current way of life and increase perceived comfort), as well as the need to have fun or stand out in the group ("I have a given solution before others, I am a pioneer") (Robertson, 2017; Thaddeus-Johns, 2017). The universality of interaction between human and technology leads to the gradual blurring of a clear boundary between what is typically human and what has resulted from the humanization of technology. Thus, it becomes possible to improve motor skills (e.g., eliminating or minimizing movement limitations, exoskeletons, bionic limbs, etc.), increase cognitive abilities (e.g., sensory perception) and affective abilities (emotions, social interactions), as well as develop abilities that hitherto have not been possessed by human (Greguric, 2014). This applies to both non-invasive (body-worn) and invasive solutions (technological modification of the human body and mind) (Teunisse et al., 2019). This means that technology can coexist with humans in different ways, that is (Warwick, 2016):

- close to the human body, but not integrated with it (e.g., wearables),
- implanted in the body, but not part of the human nervous system,
- implanted into the body and linked to the human nervous system for medical purposes,
- implanted into the body and linked to the human nervous system in order to intensify its capabilities and effectiveness (e.g., the quality and efficiency of the results achieved).

As a result, a person acquires a digital meaning (information collected on how they function, behave, what they feel, etc.), but on the other hand, implanted e.g. nanochips and technological implants replacing some organs and body parts make them partly a cyborg (Greguric, 2014). Body-worn and implantable technology also make it possible to define a person's digital identity and sense of position within a social group (Barfield, Williams, 2017). This leads to the formation of the vision of homo cyber, and even homo augmentus - a human who consciously can use technology to develop and self-improve, and to enter into more and more complex interactions with the environment (Kaczorowska-Spychalska, 2019). "Computationally and technologically advanced" (Trash, 2008) individual that has unlimited possibilities which go beyond the current understanding of the essence of human (Broderick, 2013) and humanism. Smart implants allow chipped users to access smart buildings and rooms without a need for keys or additional authorizations, operate equipment and autonomous

vehicles without access codes and passwords. They also make purchases from a list of perfectly profiled offers, easily and quickly deal with many matters in offices, have an ability to move using urban means of transport, as well as biometric boarding. Technology allows you to see what is invisible. hear what seemingly cannot be heard and feel what ordinary people do not feel. And although there is a debate about the ethics of such solutions and the possibility of using them to manipulate our decisions, leading to the polarization of attitudes towards it, it seems that HET may become something natural in the future. Especially when the user of e.g. nanochips will be able to easily program, update, improve existing functionalities and introduce new ones, individualizing them according to their own needs, and the solutions they use will be comprehensive and understandable. It is not surprising, therefore, that more and more industries and sectors look to Human Enhancement Technologies, in particular nanochips, as controversial, but at the same time promising solutions to intensify the consumer experience. This is due to the fact that human has changed the way he communicates, buys, makes payments, spends his free time and performs daily tasks (Wong, Kim, 2016). What counts more and more for him is the speed, convenience of the solutions used and the accompanying emotions.

The aim of the article is to preliminary diagnose the social attitude towards payment implant, as an example of Human Enhancement Technologies, with particular emphasis on the characteristics attributed to their users.

To achieve the research goals, the following structure of the work was adopted: literature review on the issues of Human Enhancement Technology and microchips/nanochips implants, including payment microchips, with particular emphasis on factors affecting their acceptance, research methodology along with their context based on bibliometric analysis and analysis of published content on the Internet, presentation of the obtained results and discussion. The study also takes into account research and practical implications and indicates the limitations of the conducted research. The article is part of the ongoing discourse on the possible directions of development of digital technologies and their social significance, assuming that people's behavior changes along with the development of technologies and their popularization.

LITERATURE REVIEW

Human Enhancement Technology

The development of technologies and their increasing implication in various spheres of human life have created the opportunity to achieve the desired perfection. This not only fits into the history of its evolution, but at the same time, shapes it for the future in a different way than before, taking into account its cultural, philosophical or religious aspect (Almeida, Rui, 2019). According to Kurzweil, without technology we will not be able to understand and keep up with the changes taking place around us in the long run (Kurzweil, 2005).

Human Enhancement Technology (HET) is defined as any implantable, wearable, invasive or non-invasive technology that can temporarily or permanently change or augment human functioning (Giger J, Rui, 2019, Rui G, Rohde P, Giger, 2019). However, it is emphasized that any improvements should not be mere short-term mechanical or pharmacological alternatives leading to false human expectations. They should enable a deep and complete blurring of the

boundary between the biosphere and the techno-sphere (Anderson and Tollefsen, 2008). Therefore, perceiving technology only as a kind of "prosthesis of human existence" (Giesler and Venkatesh, 2005) seems to be a gross simplification. HET entails the improvement, intensification of human characteristics and abilities to levels that far exceed what is possible as a result of the course of natural - biological processes of human development, including the development of atypical and even supernatural abilities (Agar, 2010; Wood, 2008). As Warwick points out, the dynamics of changes occurring as a result of biological evolution and those resulting from HET take place in different time perspectives (Warwick, 2003). As a result, we can not only look different, but also experience the reality around us in a different way than before. Such improvements should positively affect people as individuals and societies, developing them in a way that recognizes the legitimacy of human existence (Branford, 2017). If we assume that the society of the future will consist of representatives with varying degrees of implemented improvements, including people who, for various reasons, have remained unimproved, then the spectrum of abilities, experiences and capabilities of the entire society/different societies will be diverse. This will allow for shaping new forms and ways of human interaction with increasingly multidimensional and advanced technology, further strengthening the synergy between them and deepening their interdependence (Buchanan-Oliver, Cruz and Schroeder, 2010).

So far, technological solutions used by human were rather external tools that allowed him to better understand the surrounding reality and the processes taking place in it, to understand, modify or create them (Wood, 2008). Currently, they are becoming its "natural" part (Coeckelbergh, 2011) as a result of three potential levels of possible augmentation (Cebo, 2021):

- replication, which recreates typically human features, including organs and body parts (e.g. prosthetic limbs, hearing aids, etc.). Its goal is to reach the level typical for a healthy person;
- supplements (enrichments), especially the intensification of human senses with additional possibilities. This is a specific form of their supplementation, which boils down to increasing their ability to a level exceeding what we are used to considering as typical (e.g. hearing and vision become more acute, we perceive a wider spectrum of colors, we feel additional senses, etc.). As a result, our ability to experience and learn about the world around us, to discover and understand it, increases;
- extraordinary (supernatural), as a result of which we can acquire skills unusual for a typical person, e.g. infrared vision, making payments with the hand, controlling the drone only through thought, etc.

The current types of improvements are most often considered, depending on the specificity of the modified feature, the purpose and method of its modification, as: physical (improvement of motor skills, speed, external appearance - ears, nose, etc.), cognitive (memory, superintelligence, understanding many languages without the need for many years of science (Branford, 2017), etc.), emotional (empathy, happiness, etc.). Some studies also refer to moral improvements (becoming a more moral person) (Coeckelbergh, 2017). The extent to which this modification will progress, both from the point of view of human as an individual, society, and the expected effect of this process, is also significant (Lin, Allhoff, 2008). However, it is pointed out that cognitive and emotional improvements may lead to personality changes, which

raises doubts regarding the future autonomy and moral agency of human (the level of synergy between technology and human) in the light of his further evolution.

The image of an ideal human with a set of features and capabilities at an ideal level, although it would allow for the assessment of the effectiveness and legitimacy of HET (Roduit et al., 2013), is still subjective - it can be interpreted differently by each person, giving him a different level of reference and individual expectations. Pursuing one's own ideal is currently socially accepted (e.g. cosmetic procedures or plastic surgery), allowing me to develop in a direction that reflects who I am and who I want to be. This is a manifestation of the authenticity I declare. Perhaps, therefore, also Human Enhancement Technologies will be morally accepted if they do not lead to damage to third parties (their sense of justice, threat to social position and resulting rights and obligations, level of autonomy, etc.). And even if the ideal we desire is not fully developed (it develops along with the development and change of society and its norms), we can create a set of qualities that we consider perfect, and which are necessary for us to lead an ideal life (Heilinger & Baumann, 2015) embedded in the context of "here and now" - technologies as a tool to achieve excellence (Clark, 2003). And although currently what is reinforced seems to be socially different from the standard, in the long run it may become normal - a new standard, and the lack of improvements which are something unusual, deviating from the accepted social norms at a given moment. The scope and form of HET will therefore change over time, depending on the context in which we consider it.

However, this raises concerns that the features currently unique to a person will become a kind of good that I can buy at any time in order to become physically fitter, more intelligent, closer to certain canons of beauty, or more effective at work. Then, they will become objectified, reduced to the role of an indicator of social status and wealth - they will lose their uniqueness. In addition, Fukuyama suggested that HET may become a relatively simple remedy for eliminating what we as humans are ashamed of, what we consider embarrassing or compromising (Fukuyama, 2002). Moreover, the effort currently put into self-development (study, practice) will lose its importance (Sandel & Michael, 2002), because the opportunity to enhance any desired trait will have a commercial dimension. Thus, by awakening certain abilities or deepening them, we simultaneously impoverish ourselves by others that we currently feel (e.g. satisfaction with our subsequent progress resulting from the perceived relationship between the effort made and the effect achieved) (Kass, 2003), or we will have to redefine their current way of understanding and interpreting them (Bostrom & Roache, 2008). This may lead to the disruption of the current system of social approval and rewards, determined by the individual effort made by human for his self-development (Brey, 2008). In the literature, attention is also drawn to the aspect of the so-called the "fragility" of human combined with the machine (his addiction to technology) (Woodward, 1994), the pain of introducing a foreign body into the human body, and the risk that non-enhanced people may come to see themselves as incomplete and inferior to new standards (Brey, 2008).

By creating new abilities and pushing the boundaries of existing ones, we are creating new realities of life and perceived well-being (Hogle, 2005), which in turn can lead to widening differences in quality of life, social status, education and income. It seems, however, that the existence of huge databases that collect information about us in real time and the resulting knowledge, to which we have more and more unlimited access, makes a person today someone with capabilities and features that go far beyond their typical conditions (Kim, 2017).

Payment implants

Payment implants are a form of microchips implants and as such, are part of the Human Enhancement Technology philosophy. These are electronic devices in a bio housing (biopolymer) that can be implanted into the human body, which leads to the extension of its existing capabilities (Pelegrín-Borondo et al., 2017). Based on NFC (Near Field Communication) technology, they allow you to make a payment when you put your hand with an implanted payment chip to an authorized payment terminal. They do not need batteries, charging, and do not emit their own radio waves (passive device). They also do not track the location of their users and cannot be lost. They are also small in size, and their miniaturization increases the possibilities of their integration with the human body.

An important role in the popularization of payment implants can be played by the level of their functionality and adaptation to the actual expectations of consumers. Contactless payments increase both the speed of transaction execution and the convenience of consumers who use them, especially in comparison to cash. They are perceived as a more competitive alternative to traditional forms of payment (Polasik et al., 2013; Trütsch, 2020). The speed of the transaction and its convenience are therefore crucial in the process of selecting specific payment tools and accepting new ones (Jonker, 2007). The promotion of various innovative forms of payment, in general, over time may lead to a decrease in the popularity of solutions perceived as conventional.

Technology opens up potentially infinite possibilities for human. However, the pace of acceptance of new solutions may depend on the demographic and behavioral characteristics of consumers (Trütsch, 2020; Dias et al., 2023), as well as ethics and individual perception of what is right and wrong in the light of the accepted norms in a given society, as well as in direct reference groups (family friends, acquaintances, colleagues, etc.) (Adams, 2010; Javo & Sørlie, 2010). This will be related to cultural aspects, including e.g. religion, social morality, which may be important when assessing the value of implants, benefits and their ratio compared to costs, as confirmed by research (Žnidaršič et al., 2021; Borut et al. 2022). The more society begins to accept a given innovation, the more the importance of social norms as limitations and barriers in the human decision-making process decreases (Risselada et al., 2014). Social approval then becomes a kind of consent (Pelegrín-Borondo et al., 2016).

More and more often it is also said that the level of acceptance of payment implants may in the future be related to the spectrum of benefits and potential applications they offer (not only a payment tool, but also a tool for identifying and unlocking access to specific rooms, a carrier of information contained in our documents such as ID or passport, a tool facilitating the process of managing smart home and smart devices). It should be assumed that when these benefits outweigh other solutions available on the market, their popularity will increase (Park, 2014).

The attitude towards payment implants may also be affected by the scope and nature of the interests of their potential users. This is confirmed, for example, by research showing that reading science fiction publications has a strong impact on the acceptance of possible human improvements (Laakasuo et al., 2018). This also applies to movies and games. The more often we meet and familiarize ourselves with such controversial solutions in the world of fiction, the more they stop shocking us in the real world. The lifestyle of payment implant users also turns out to be of some importance. Research conducted among people who have opted for this type

of augmentation (Michael et al., 2017) shows that their buyers are mainly men who are active in social media, have experience in contactless payments with smartphones, wearables (smartwatch) and often use online payment services. They are also people who quite often lose various types of identifiers, wallets or payment cards. Moreover, based on the habits of a potential consumer who has a payment chip implanted, it can be assumed that his lifestyle is quite stressful (Borut Werber, 2022). Potential users of this type of Human Enhancement Technology are therefore looking for simple solutions that do not require additional involvement from them, naturally fitting into their everyday habits, while providing them with unusual, as for the moment, skills for a typical person.

The acceptance of payment implants will also be influenced by emotions (Reinares-Lara, 2016), both positive (e.g., they facilitate a payment process, provide new experiences, improve our perceived social status) and negative (e.g. social disapproval, fear of unknown, threats resulting from the presence of a foreign body in the human body (Reinares-Lara, 2018). The personality traits of payment implant users, which determine their consumer behavior, will be important here (Borut Werber, 2022). It is increasingly difficult to understand the behavior decisions and human attitudes without taking into account their technological perspective.

The conducted research on the factors influencing the acceptance of microchip implants does not provide clear conclusions. On the one hand, they show that perceived ease of use, usability and trust are identified as the most important predictors of the intention to use microchip implants (Žnidaršič et al., 2021). On the other hand, the research by Reinares-Lara et al. from 2016, does not confirm that there is a statistically significant relationship between the ease of use of this type of implants and the decision to use them. Perhaps, this is a result of the adopted methodological assumptions, as well as the purpose for which the chip was introduced into the human body.

METHODOLOGY

Study Context

Issues related to human enhancement technology, including the issue of microchip implants and payment microchips implants, are definitely still a new area of interest for researchers. This can be seen in a relatively small number of publications on these issues. In order to identify the current state of knowledge and the main directions of research in the analyzed area, a systematic literature review was carried out. First, it concerned issues related to human enhancement technology (HET), then microchip implants (MI) and payment microchips. In the process of analysis, a standardized procedure was adopted, taking into account three main areas: 1) identification of key databases and a collection of publications, 2) their selection and development of a full database of publications, and 3) their bibliometric and content analysis. In the first stage, international databases were selected, taking as a criterion their full-text nature. Their analysis allowed for the identification of only 33 publications directly related to HET and 26 related to microchip implants (full-text and peer-reviewed publications). Unfortunately, it was not possible to find publications that would directly address the issue of payment chips. At this stage, the conducted analyzes were not limited to social sciences only,

but also included publications in the field of engineering and technical sciences, medical sciences, humanities, as well as exact and natural sciences.

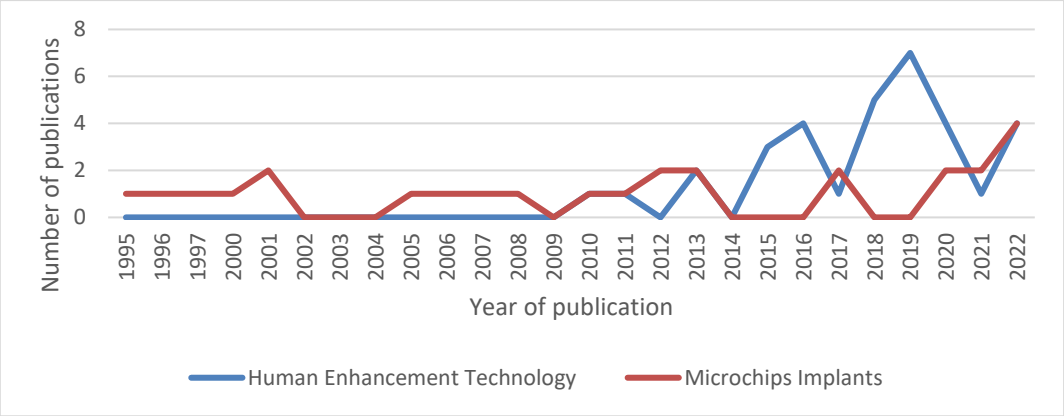

Figure 1. Analysis of the number of publications.
[Source: own study]

Taking into account the dynamics and the scope of observed social and business changes resulting from the development of technology, the period 2010-2022 was adopted for further analyses.

Among the publications in the field of HET, those that were the result of single authorship (42.4%) prevailed. Almost every fourth publication in this field was the result of only institutional collaboration, and slightly more than 18% was created as a result of only national collaboration. Only 15.1% of publications in this field were the result of international collaboration. Interestingly, there were no publications that would have been created as a result of academic - corporate cooperation. In the case of microchips implants, single authorship publications accounted for 15.5%. Almost 1/3 of the publications were those that were created as a result of only national collaboration. Publications resulting from international collaboration and only institutional collaboration accounted for 26.9%, respectively. Only one publication resulted from academic-corporate cooperation.

The list of disciplines that most often refer to HET issues shows a significant share of publications in the field of Arts and Humanities (41.7%), Business, Management and Accounting (33.3%) and Social Sciences (33.3%). However, a parallel analysis of the Field-Weighted Citation Impact indicates that the highest value of this indicator was in the case of publications in the field of Business, Management and Accounting and was at the level of 1.39. In other cases, the value of the FWCI index was lower than 1, which means that publications in this field are cited much less often than would be expected considering the global average for similar publications. In the case of microchips implants, publications in the field of Engineering (31.1%), Biochemistry, Genetics and Molecular Biology (26.7%) and Computer Sciences (11.1%) dominated. However, a parallel analysis of the Field-Weighted Citation Impact indicates that the highest value of this indicator was in the case of publications in the field of Neuroscience (1.32), Computer Sciences (1.16) and Physics and Astronomy (1.11). In the remaining cases, the FWCI was less than 1.

Next, an analysis of the frequency of keywords and research problems for human enhancement technology and microchips implants was performed, and the keywords selected

in this way were subjected to quantitative analysis. The visualization of their frequency was presented in the form of a "word cloud", where the frequency of occurrence was reflected in the size and thickness of the font (Figure 2, Figure 3).

Figure 2. Keyword frequency analysis for human enhancement technology (2010 – 2022)
[Source: own study]

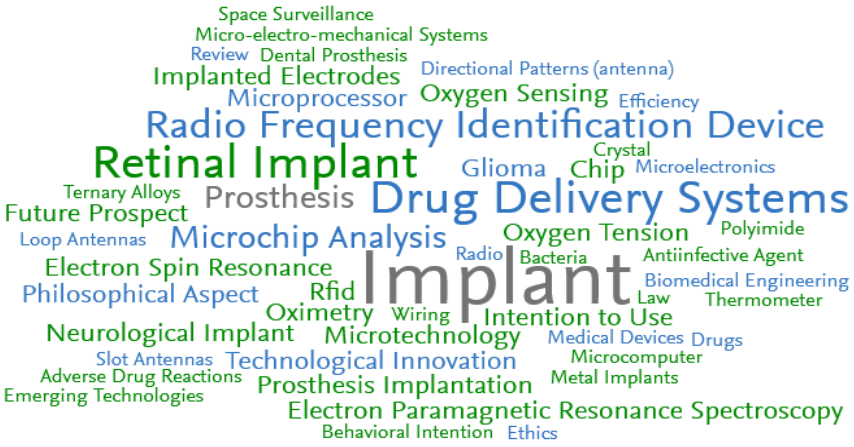

Figure 3. Keyword frequency analysis for: microchips implants (2010 – 2022).
[Source: own study]

Publications in the field of HET were in line with the issues of human-robot interaction (the highest level of prominence measured by the RCSI index), microelectrodes, extended mind, posthuman, methamphetamines. Publications in the field of microchip implants were related to strain and flexible sensors/electronics (the highest level of prominence), transdermal drug, implants and surge capacity. Issues related to management and business practices, which are the main area of interest of the authors, were prominent at the level of 54.822.

The Topics & Topic Clusters analysis showed that publications in the field of Human Enhancement Technology has contributed to 10 topics (Figure 4), of which the dominant was: Science Fiction; Human Enhancement; Posthuman. In the case of microchips implants, publications were more interdisciplinary in nature and they have contributed to 29 Topics & Topic Clusters (Figure 5).

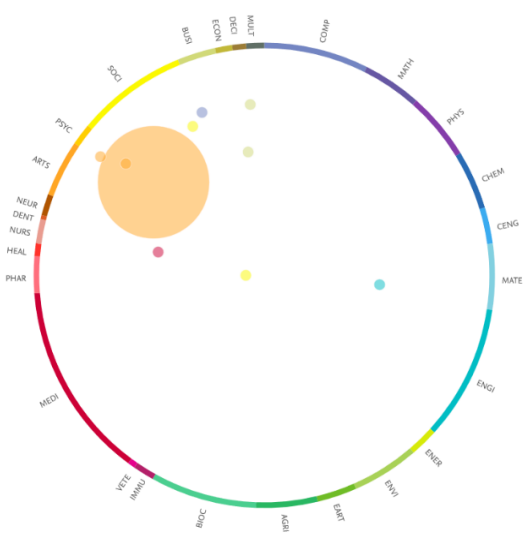

Figure 4. Topics and Topic Clusters for HET. [Source: own study]

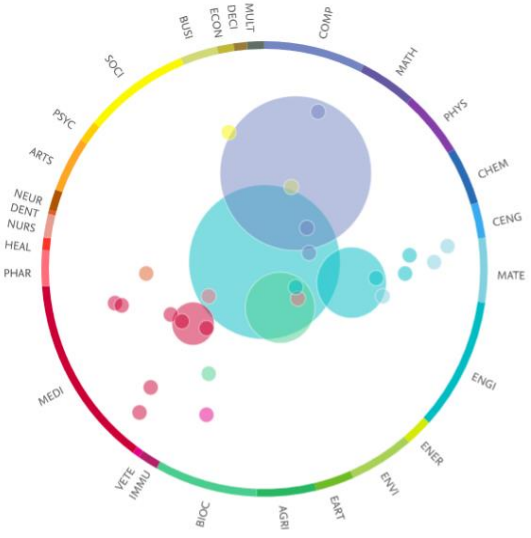

Figure 5. Topics & Topic Clusters for MI. [Source: own study]

Differences in the number of publications from the point of view of the most active countries and research institutions are small. Therefore, it is difficult to conclude that this is a criterion clearly determining further directions of research on HET and MI. The conducted analysis showed that the largest number of publications on Human Enhancement Technology was created in the United Kingdom. However, the FWCI index was higher than 1 only in the case of publications by German and American research centers. In the case of microchips implants, the most publications came from the United States, Australia and Slovenia, while the highest FWCI was recorded for publications from Belgium, Australia, Italy and Switzerland.

In accordance with the methodology of a systematic literature review, an analysis of citations was also carried out, taking into account the following phrases: human enhancement technology and microchip implants. However, the conducted analysis was limited to substantive areas related to the authors' interests. This made it possible to identify valuable cognitive publications and publications requiring further exploration of research areas, in accordance with the interests of the authors (Table 1).

Table 1. The most frequently cited authors dealing with the issues of human enhancement technology and microchips implants (2010 – 2022).

Author	Article	Publication	Year	Citation Count
HUMAN ENHANCEMENT TECHNOLOGY				
Coeckelbergh, M.	***Human development or human enhancement? A methodological reflection on capabilities and the evaluation of information technologies***	Ethics and Information Technology vol. 13(2), pp.81-92	2011	40

Grewal, D., Kroschke, M., Mende, M., Roggeveen, A.L., Scott, M.L.	*Frontline Cyborgs at Your Service: How Human Enhancement Technologies Affect Customer Experiences in Retail, Sales, and Service Settings*	Journal of Interactive Marketing vol.51, pp. 9-25	2020	38
Bloomfield, B., Dale, K.	*Fit for work? Redefining 'Normal' and 'Extreme' through human enhancement technologies*	Organization vol. 22(4), pp. 552-569	2015	18
Saritas, O.	*Human enhancement technologies: Future outlook and challenges*	Foresight Russia vol. 7(1), pp. 6-13	2013	7
Caon, M., Menuz, V., Roduit, J.A.R.	*We are super-humans: Towards a democratisation of the socio-ethical debate on augmented humanity*	ACM International Conference Proceeding Series 25-27-February-2016,a26	2016	3
Woodrow, B.	*The Process of Evolution, Human Enhancement Technology, and Cyborgs*	Philosophies vol. 4(1), pp.	2019	3
Leung, KH.	*The Technologisation of Grace and Theology: Meta-theological Insights from Transhumanism*	Studies in Christian Ethics vol.33(4), pp. 479-495	2020	3
Pronin, M., Yudin, B., Sineokaya, J.	*Philosophy as expert examination*	Filozofskill Zhurnal vo. 10(2), pp. 79-96	2017	3
Lima, V., Belk, R.	*Human enhancement technologies and the future of consumer well-being*	Journal of Services Marketing vol.36(7), pp. 885-894	2022	1
	MICROCHIPS IMPLANTS			
Michael, K.; Michael, M.G.	*The future prospects of embedded microchips in humans as unique identifiers: the risks versus the rewards*	Media Culture & Society vol.35(1), pp. 78-86	2013	14
Smith, A.D.	*Evolution and acceptability of medical applications of RFID implants among early users of technology*	Health Marketing Quarterly 24(1-2), pp. 121-155	2008	13
Smith, A.D.	*Microchip implants' logistical efficiencies and ethical issues*	International Journal of Mobile Communications vol.10(3), pp.281-302	2012	6
Smith, A.D.	*Gender preferences of efficiencies and ethical issues: Commercial, personal, and governmental applications of RFID-based implants and technologies*	International Journal of Business Information Systems 12(4), pp. 455-492	2013	4
Broudy, D., Arakaki, M.	*Who Wants to Be a Slave? The Technocratic Convergence of Humans and Data*	Frontiers in Communication vol.5.	2020	1

A review of the literature showed a lack of publications directly related to the subject of payment microchips/payment implants. At the same time, business practice shows that such solutions are becoming available on the market, an excellent example of which are payment

chips from, for example, Walletmor, which are already used by Germans, Dutch, Scandinavians and several dozen Poles (https://walletmor.com).

The literature review was supplemented by an analysis of the content published on this topic on the Internet. The overall number concerning the issues of microchips implants, including payment implants, is still relatively low, which suggests a rather limited level of popularity of the discussed issues. This is confirmed by the value of the Presence Score indicator, which allows you to measure the popularity of a given topic on the Internet. In the analyzed case, its value is at the level of 44%, which suggests a moderate level of interest in this issue in relation to other topics. The first comments in this regard appear only in November 2017, and their intensification in subsequent years is periodic and seems to be rather related to specific events related to this issue (e.g. research by Elon Musk, launch of Walletmor payment chips on the market, etc.).). The assessment of the range of published mentions indicates a clear advantage of non-social mentions (62%). 1/3 were Web mentions, and almost 18% were video publications. Slightly more than 14% were microblogs and news (12.8%). Almost 11% were mentions on blogs, and 10.3% were publications in the form of podcasts. Among the most influential sites in the analyzed topic were YouTube, Twitter and Yahoo.

The topic of microchip implants was embedded in a broad context, as evidenced by the most frequently appearing trending hashtags. Among them were: #biohacking, #health, #wellness, #mindfuelness, #technology, #biotechnology, #regenerativemedicine, #antiaging, #selfhelp #cryprocommunity, #bodybuilding, #futurism. The context of discussions around the phrases: microchip implants and payment implants was also analyzed, and its visualization was presented in the form of a "word cloud", where the frequency of occurrence was reflected in the size and thickness of the font (Figure 6).

Figure 6. Context of a discussion.
[Source: own study]

The analysis indicates the multiplicity of topics discussed, often unrelated and their large dispersion, which is typical for new issues, with an unsystematized conceptual structure, in the initial periods of market commercialization. The most frequently appearing keywords can be entered into two threads: medical and health-promoting applications of microchips implants (e.g. wellness, health, therapy, help) and transformation and reprogramming of the human body (e.g. technology, biohacker, transformation, body). The study of affective states conducted through sentiment analysis allowed for recognizing emotions in published content. And although publications with a positive color prevail (Figure 7), which accounted for 79.9% in the analyzed period, at the same time the analysis of the published content indicates a fairly large polarization of attitudes related to this issue.

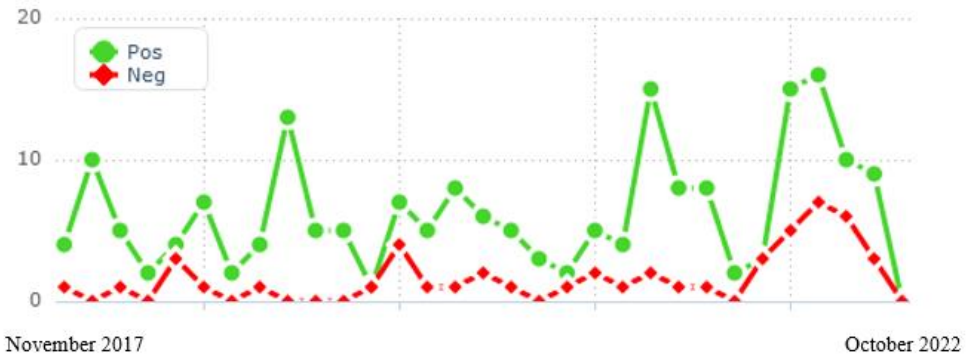

Figure 7. Sentiment analysis.
[Source: own study]

Human evolution, including in the consumer dimension, is undoubtedly driven by technology, while its acceptance and commercialization of digital technologies change their position - technology for humanity (Kotler et.al., 2021 The authors' research focuses on the potential for human-technology synergy and augmentation possibilities. This area is still a novelty, which justifies the need for further research in this area.

METHODS

The completed research is part of a broader research project on the dynamics and factors determining social acceptance of payment implants as an example of Human Enhancement Technology (the scope exceeding typical human skills), and is of the nature of preliminary research. At this stage, the identification of features attributed to users of this form of augmentation was limited to assessing social attitudes towards it.

Due to the fact that research on the social acceptance of payment implants from the perspective of their users has not been conducted on a large scale so far, no hypotheses have been defined regarding the relationship between the analyzed personality traits and attitudes towards payment implants. However, a number of research questions relating to the purpose of the study were considered at this stage:

- What is the future of the co-evolution of technology and human?
- What may determine the popularization of payment implants in the context of the development of HET?
- What concerns and challenges does this entail?
- How is a person who makes a payment via a payment implant perceived socially?
- Does this ratio change depending on the sex of the person who decided to implement and use payment implants?
- Do the values resulting from the declared faith influence the perception of payment implant users?

The authors decided that these answers can be a starting point for in-depth exploration and analysis of the profile of people interested in microchips implants, with particular emphasis on

payment implants and the factors determining this process. It will then allow to assess the effectiveness of existing models of social acceptance of this type of innovation.

The study used the aspect of projective techniques, recognizing that the existing attitudes towards payment implants may be unconscious by a person, or may be conscious, but for various reasons, they are not verbalized (e.g. fear, social stigmatization, potential ostracism) or those that are verbalized differ from the actual attitudes of the individual (human versus society). At the same time, they affect the readiness of a person to make a decision about the implementation and use of this type of microchips implants. This requires identifying and evaluating these motives indirectly, which draws on Haire's research on consumer attitudes (Haire, 1950). On this basis, a 5 x 2 online experiment was designed (different forms of payment x gender of the payers). The various forms of payment currently used on the market include: cash, payment card, watch (smartphone/iPhone), wearable device (smartwatch) and payment microchips. Their selection was preceded by an analysis of consumers' payment habits. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Each participant in the study gave informed consent to participate in it. The experimental stimulus was the pictures presenting various forms of payment made by a woman or a man. Respondents were then asked to rate the indicated personality traits of the person making the payment, selected on the basis of the Big Five Aspects Scale (Struss et al., 2014). Next, the respondents were asked to answer a few questions about their attitude to the technology, including payment chips, along with an indication of the factors that, in their opinion, will determine the process of their popularization in the coming years. Due to the fact that a high polarization of extreme attitudes towards payment chips was observed in social media, including their religious context, it was decided to include a question about the respondents' faith in the research questionnaire. Finally, the questionnaire consisted of 17 questions divided into three blocks of questions. The first one included questions about the respondents' characteristics, the second one included questions measuring selected personality traits of payment chip users. The third part referred to the opinions declared by the respondents regarding the development of payment implants. A five-point Likert scale was used to measure the analyzed attitudes. The authors did not introduce a time limit that would restrict the time needed to complete the research questionnaire. The study was preceded by a pilot study, which allowed to verify the correctness of the adopted methodological assumptions and eliminate possible ambiguities in the formulations. After this validation process, the questionnaire was used in the real research.

Sample

1,017 respondents over 18 years of age took part in the study, 52% of them were women. Representatives of Generation Y dominated, constituting almost 40% of the respondents. The second largest group were representatives of Generation X (slightly over 31%). Respondents had secondary education 44.9% and higher education 41.4%. Almost 46% of the respondents declared their level of technological advancement as high. Almost 60% of respondents assessed their financial situation as average, and every third found it good. Believers accounted for 75.6%, of which 40.4% admitted that they are not only believers, but also practitioners. In the case of the question about faith, slightly more than 9% of respondents refused to give their answer. Detailed characteristics of the community are presented in Table 2.

Table 2. Characteristics of the sample according to the characteristics of the respondents.

Feature	Number	Structure in %
GENDER		
Woman	529	52.0
Man	488	48.0
AGE (*according to the Gartner classification*)		
1957 – 1964 (Generation Baby Boomers)	104	10.3
1965 – 1979 (Generation X)	324	31.8
1980 – 1994 (Generation Y)	403	39.6
1995 – 2004 (Generation Z)	186	18.3
EDUCATION		
Basic	139	13.7
Medium	457	44.9
Higher	421	41.4
FINANCIAL SITUATION		
Very bad	15	1.5
Bad	93	9.1
Average	582	57.2
Good	305	30.0
Very good	22	2.2
LEVEL OF TECHNOLOGICAL ADVANCED		
Average level of technological advancement	336	33.0
High level of technological advancement	465	45.7
Very high level of technological advancement	216	21.3
ATTITUDE TO FAITH (*religion*)		
Practicing believers	411	40.4
Non-practicing believers	367	36.1
Atheist	145	14.3
Refusal to answer	94	9.2
TOTAL	**1017**	**100**

[Source: own study]

RESULTS

Descriptive analyses

Only less than 6% of the respondents, given the current level of their knowledge about microchips and payment implants, would agree to have them implanted, with men showing a greater tendency in this regard. Despite the high polarization of extreme attitudes towards payment implants in the religious context observed in the media, the study did not find such a relationship.

On the other hand, the respondents do not rule out that payment implants may in the future become as a popular solution as smartwatches they currently own. The perspective of a decade seemed most realistic for the respondents, which was indicated by 1/5 of them and almost 34% claimed that in their opinion, popularization of payment implants is not possible at all.

Respondents were of the opinion that the level of popularization of payment implants may be influenced by their available functionalities and adaptation to the expectations of potential and actual users. Attention was primarily paid to the health dimension of this type of implants, including the possibility of real-time monitoring of basic health parameters (57%), and the fact they could become a carrier of information about our blood type, chronic diseases and/or allergies (54.9%) as well as about drugs taken by the user on a regular basis, along with their

doses (53%). The respondents also indicated that such chips could in the future replace or become an alternative to the current documents, such as ID or a driving license, which was pointed out by every second respondent. It was also mentioned that the dynamics of popularization of payment implants as an alternative payment tool could be directly influenced by banks that would offer them for free (without having to pay for their purchase or use), which was indicated by 53% of the respondents.

They also recognized that the biggest barrier in the process of popularizing payment implants is currently the lack of trust towards them, which is largely due to the nature of the narrative that accompanies them in the media, as well as the lack of reliable knowledge about them. Respondents were primarily concerned that payment chips could in the future become a tool for surveillance of their behavior, which could affect their status and social position (76.4%), as well as their rights and privileges, limiting or extending them (almost 74%). The respondents were also afraid of the possibility of their digital identity being stolen (77.2%), especially when payment implants carry more and more information, including confidential information, about their users. It was also pointed out that it is necessary to intensify works aimed at increasing the miniaturization of microchip implants, so that their introduction into the body does not require systematic skin incision (health and aesthetic aspects). In their opinion, this would eliminate some of the related concerns, especially in the context of the rapid aging of technology. According to the respondents, the level of trust towards payment implants in the near future will be influenced by:

- voluntary level of the decision to implant them (65.5%) - voluntariness is a factor that, in the respondents' opinion, gives them a right to choose payment tools most suited to their needs, and to make decisions in accordance with their preferences (I am the decision maker);
- subjective assessment of the level of ethics of the technologies used and solutions based on them (63.8%) – the more payment implants are contrary to what is socially considered good, moral and proper, the greater the resistance to them may become;
- subjective assessment of the applicable legal legislation from the point of view of the effectiveness of user privacy protection (61.1%) – the lower the level of trust in the existing legislation in this area, the lower the level of interest in payment implants and the lower the willingness to accept them. There is a significant negative relationship between age and the assessment of factors determining the level of trust in payment chips (the older the respondents, the lower their level of trust in this tool).

Main results

The conducted analysis showed that there are significant differences in the perception of people using payment implants, taking into account the gender of their users. The juxtaposition of these features, based on the provided contextual clues (various forms of payment), illustrates the social attitude towards users of this form of augmentation (Table 3).

The higher the age of the respondent, the more sociable a man using a payment implant was perceived (H=11.832; df=5; p=0.037), and a woman more dutiful (H=12.696; df=5; p=0.026). At the same time, with the increase in the level of education, a man who used a payment implant on a daily basis was considered a very active person (H=6.640; df=2d;

p=0.036), and interestingly, n the same situation, the woman appeared to be a very active person, but focused only on her own convenience (H=11.677; df=2; p=0.003).

It was also found that the higher the declared level of technological advancement, the higher was both the perceived level of creativity of a man using the payment implant (H=10.290; df=2; p=0.006) and their regularity in actions (H=8.627; df=2; p=0.013) and reliability in their implementation (H=6.482; df=2; p=0.039). In the case of women, they were considered more intelligent (H=6.931; df=2; p=0.031) and bolder (H=7.577; df=2, p=0.023), but at the same time, they were once again defined as people who put a lot of emphasis on their comfort (H=13.911; df=2, p=0.001).

The declared level of religiosity also influenced the perception of payment implant users. The higher it was, the more a man was perceived as a man prone to irritation and anger (H=10.336; df=2; p=0.006). Interestingly, in this case, the traits attributed to women were positive. They were considered as dutiful (H = 9.281; df = 2; p = 0.010), responsible (H = 10.221; df = 2; p = 0.006) and cognitively open (H = 9.698; df = 2, p = 0.008). The higher the declared level of religiosity, the more the woman was assessed as more creative (H=9.987; df=2; p=0.008).

Gender also turned out to be a factor having a significant impact on the differences in the perception of payment implant users. Women, more than men, perceived a man using this form of payment as better organized (U=019.00, Z=-2.365, p=0.018), reliable in achieving the assumed goals (U=2095.50, Z=-2.025; p=0.043), and conscientious 2.455; p=0.014) and a person of great imagination (U=1933; Z=-3.193, p=0.001). In the case of women using payment implants, they were perceived by other women, only as active (U=2090.50; Z=-2.053; p=0.040).

Importantly, no other relationships or interactions between variables turned out to be significant.

Table 3. Main characteristics attributed to people using payment implants.

MAN	WOMAN
Conscientious	Conscientious
Active	Active
Creative	Creative
Systematic	Intelligent
Sociable	Bold
Reliable in achieving the assumed goals	Responsible
Well-organized	Cognitively open
Endowed with great imagination	Focused on her own comfort
Prone to irritation and anger	

[Source: own study]

DISCUSSION

The research shows that the profile of people using payment implants perceived by the society differs depending on whether their user is a woman or a man, which will be important for market practice in the process of popularizing this tool, both in the narrow sense (a new form of payment) and the wider one (HET). The way in which people using payment implants are currently perceived, as well as the further nature of changes taking place in the arrangement of

these features (e.g. new features, change in the intensity of already identified features, disappearance of some currently indicated features) will be important for the dynamics of the implementation of this form of augmentation and its social acceptance. Demographic and behavioral characteristics of consumers (including both, those who use payment implants, and those who have not yet decided to do so), as shown by some earlier research (Trütsch, 2020; Schönthaler et al., 2022), will be crucial. This also applies to their perception as individuals functioning in a given society and the moral standards recognized by them.

It was noted, however, that although negative opinions about payment implants and their users are quite often verbalized in the social sphere, the features attributed to them in the study turned out to be basically positive (which was also confirmed by the sentiment analysis). The narrative currently conducted in the media is undoubtedly highly emotional and set primarily in the context of the negation of humanism, however, the individual assessment of such solutions may not be so strong and focus more on their pragmatic aspects. This will lead to a gradual weakening of the importance of the applicable norms, as mentioned, for example, by Risselada et al., 2014; Žnidaršič et al., 2021. However, it may suggest that the gradual, deepening synergy between a human and technology does not have to ultimately lead to a real denial of what at the current level of human evolution we consider to be the paradigm of our being, and which will indicate further directions of their mutual coevolution.

The list of features currently attributed to women and men using payment implants shows that those identified with the conscientiousness, intellect and extroversion of their users predominate, while in the case of women using payment implants, attention was drawn to the fact that they may be more than men focused on their own convenience. It seems reasonable to further deepen research in this area. However, when comparing the characteristics attributed to women and men using payment implants, it is difficult to conclude that there are currently arbitrary rules that would allow for an unambiguous assessment of their decisions on augmentation at a generalizing level for all users. Discrepancies in the juxtaposition of the discussed features will undoubtedly be even more pronounced when taking into account cultural differences, at the next stage of the research conducted by the authors.

The prerequisites and limitations identified in the study regarding the decision to implement payment implants are in line with previous research on the issue of HET (e.g. Franks &Smith, 2021).

LIMITATIONS

The publication is not free from cognitive and methodological limitations. However, it takes up new issues both from the point of view of science and market practice. The obtained results are declarative in terms of identifying the potential dynamics and directions of further development of payment implants, including the identification of its barriers and reasons (respondents did not have such chips implanted). In this respect, they are idiographic in nature, which means that the obtained results concern only the surveyed group of respondents and require the inclusion of current users of payment implants in further research. The study did not take into account the binary division of respondents' gender. However, this category will be introduced at subsequent stages of the research, which, in the authors' opinion, will create a

natural space for self-determination about the respondent's identity and will broaden the cognitive perspective of the analyzes conducted. Additionally, at this stage of the research, the analysis of the basic relationships between variables was limited, which constitutes a basis for further exploration of the analyzed issues and the starting point for critical reception, reflection and further considerations in this area. It would also be advisable to include qualitative methods, allowing for a deeper understanding of the motives and predictors behind the decision on this form of augmentation, including taking into account cultural differences (e.g. moral, religious).

CONCLUSIONS

Technology not only leads to changes in who we are today, but also in what direction we will continue to develop. The human is an inseparable part of the surrounding world, which is a complex system that is constantly evolving (Gladden, 2018). It is a system that as a whole determines its behavior (holistic approach) and at the same time is influenced by each of its parts (reductionist approach). As a consequence, in order to understand the interdependencies between human and technology and their social connotations, we must look not only at the dynamics and nature of changes taking place on each side of this interaction in a fragmentary way, but also at their interdependencies and connections in a comprehensive way, taking into account including the possibility of their mutual adaptation and co-evolution. The biosphere and the technosphere not only interpenetrate, but also co-create each other. The tightening of the process of integration between human and technology is a complex, multidimensional and multi-stage process. This may lead to a situation where gradual augmentation will equip a human with advanced technological devices that are not the result of natural evolution, as a result of which the human will will become a form of non-biological technology (Woodrow, 2019). This is important both from the point of view of the individual and the whole society.

Payment implants, regardless of whether they are perceived in a broad perspective (HET element), or in a narrow perspective (another alternative form of payment), create the possibility of going beyond what we currently know and morally accept. Human still seems to be a kind of "work in progress", still requiring work, modification and improvement in the direction desired by them (Bostrom, 2003). However, it is important to realize the importance of technology in the process of human evolution, including through the process of its technological augmentation, the factors determining it, including those that stimulate or weaken it as well as the resulting consequences.

IMPLICATIONS FOR RESEARCH, APPLICATION, OR POLICY

Research implications

Payment implants are definitely a new area of research, exploration and market applications, which causes many extreme opinions and attitudes towards them. The conducted research is part of the ongoing discussion on the scope of the gradual blurring of the boundary between

the biosphere and the technosphere, and the mutual co-evolution of human and technology. They provide knowledge about the social perception of payment implant users, taking into account their gender, while looking for predictors of the basis of our attitude towards them. The research results allow to create a profile of payment implant user, which is a kind of photograph of current attitudes towards this form of augmentation. Further research on the issue of payment implants, or more broadly HET, conducted by the authors, will be focused on the analysis of the level of social acceptance of such solutions, including a comparative analysis of the most frequently used models and their constructs. Linking them further with the analysis of personality traits attributed to people who use various forms of augmentation, including payment implants, may allow for the identification of differences in the profile of people interested in it, including individual levels of HET. Further research should be carried out in two parallel perspectives. On the one hand, it should take into account common social opinions and attitudes as the context in which the phenomenon is embedded, and on the other hand, should deepen the analysis of individual attitudes, with particular emphasis on the group of people who have already undergone augmentation (current users of payment implants), including cultural differences.

Practical implications

The conducted research provides information that may be an indication as to why certain forms of augmentation, including payment implants, may be socially accepted or negated. The obtained results may turn out to be an interesting material for the creators of various solutions that fit into the idea of HET, including the creators of the next generation of payment implants (e.g. in terms of miniaturization of the device, looking for ways to slow down the pace of technology aging, creating new functionalities), as well as organizations offering services, including banking institutions (e.g. gradual expansion of payment methods available to their clients, building awareness, knowledge and trust towards this form of payment, creating positive emotions around it). At the same time, indicating the spectrum of features attributed to people using payment implants (taking into account their gender distinction) may be important from the point of view of building a narrative augmentation around this form, referring to socially recognized ethical norms and values, including moral and religious ones, which may become more and more important as the analyzed solution becomes popular.

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