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TECHNOLOGICAL INNOVATION IN TOBACCO PRODUCTS:

Impacts on perceived value, health, and social acceptance

Manuel Abreu Castelo-Branco de Mascarenhas Gaivão

Master Thesis

presented as partial requirement for obtaining a Master's Degree in Data-Driven Marketing

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Instituto Superior de Estatística e Gestão de Informação
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Master Thesis presented as partial requirement for obtaining the master's degree in Data-Driven Marketing, with a specialization in Digital Marketing and Analytics

Supervised by

Mijail Naranjo, PhD, NOVA Information Management School

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism, any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Lisboa, Jun-16-2025

Manuel Abreu Castelo-Branco de Mascarenhas Gaivão

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ABSTRACT

The tobacco industry has experienced huge transformations as a consequence of technological innovation and changing habits and beliefs, impacting consumer experience and perspectives. New and innovative products like HTP (Heated Tobacco Products) and E-cigarettes are growing trends as smoking habits change, delivering less harm but igniting a significant debate against conventional cigarettes. The present study aims to understand how innovation in smoking products is affecting *Perceived valu*e, *Health concerns* and *Social acceptance*. The methodology encompassed a systematic literature review conducted through the analysis of 33 selected articles to assess the prevailing level of knowledge related to the theme. The results distinctly show that technology affects not only Perceived value but also Social acceptance and Health concerns. As the tobacco industry and market continue to change, technological innovations like HTP and E-cigarettes are seen as more valuable, socially acceptable, and less dangerous. How consumer experience is built affects Perceived value and Social Acceptance and, with minor intensity, affects Health concerns. Finally, the distribution strategy may also have an impact on Perceived value but will not impact on Social acceptance or Health concerns. This finding may be used by tobacco companies in their product and marketing strategy.

KEYWORDS

Technological Innovation; Consumer Experience; Perceived Value; Health Concerns; Heated Tobacco Products; E-cigarettes;

Sustainable Development Goals (SDG):

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

BAT	British American Tobacco
E-cigarettes	Electronic Cigarettes
HTP	Heated Tobacco Products
JTI	Japanese Tobacco International
MRTP	Modified Risk Tobacco Products
PMI	Philip Morris International
VRMC	Virtual Reality Medical Center
WHO	World Health Organization

1. INTRODUCTION

Presently, we live in a world surrounded by technology, a digital world where technology is increasingly embedded in people's routines. In this new era, the world is witnessing what has been denominated the "Digital Era". This historical period of digital modernization has opened the opportunity for technology and innovation to conquer their space, thrive, and make an impact on people's lives and the goods and services they interact with (Zhang, 2024). It has been brought forward by several authors how consumers are becoming more interested and dependent on technologically driven products not only to fulfil the primary purpose of those items but also to embrace these progress and innovations so that they can live and signal a certain way of life in society (Hunjet et al., 2019).

Regarding the tobacco industry, this sector has been through a notable transformation motivated by the new technological developments that are transforming the way consumers perceive the motivation and experience regarding the tobacco industry (Triossi & Cloos, 2022). Out of the most well-known innovations, with the highest market share, come some heated-tobacco solutions from three different manufacturers: IQOS marketed by Philip Morris International (PMI), British American Tobacco's (BAT) with GLO, and the Japan Tobacco International (JTI) product with PLOOM (Znyk et al., 2021). According to the most renowned experts in the tobacco industry, the future of smoking will inherently have to go through and be shaped by a technological transformation (Kulcsar & Molnar, 2023).

One major appeal of heated tobacco is its perceived lower health risk for users. However, whether HTP (Heated Tobacco Products) and E-cigarettes are risk-free is still up for debate. At first, these products were marketed as a less dangerous solution, but there is still a lack of complete knowledge about the possible consequences of these alternatives (Triossi & Cloos, 2022). The fact that there is not a reasonable number of long-term studies related to HTP and E-cigarettes raises doubts in medical and health organizations about the safety of this product. Despite the World Health Organization (WHO) having the same goal as Tobacco companies, that is, a smoke-free world, the institution strongly discourages the less dangerous smoke-free products, such as HTP and E-cigarettes, and encourages countries to regulate them similarly to cigarettes (Triossi & Cloos, 2022).

The present study aims to contribute to the available knowledge on the topic of the tobacco industry's relationship with innovation, looking to understand how consumers respond to the

introduction of these innovative and advanced products (IQOS, GLO, or even PLOOM). Within this goal, the study will attempt to answer the following research question:

How innovation in smoking heated products is affecting the response of consumers in terms of:

- Perceived value: the intent is to understand what determines the value that consumers recognize and attribute to these new technology-driven tobacco products.
- Health concerns: the aim is to try to understand whether technology has created a less harmful product solution when compared to traditional options.
- Social acceptance: the purpose is to investigate whether these recent and innovative products, such as E-cigarettes, are well accepted by smokers and by society.

The present study is organized as follows: a literature review is provided in chapter 2, and the methodology is explained in chapter 3, chapter 4 presents results of the research, and chapter 5 provides the discussion of the hypothesis; Conclusions, limitations, and implications are presented in chapter 6.

2. LITERATURE REVIEW

2.1 HISTORY OF SMOKING

Mishra & Mishra (2013) provide a detailed history of smoking. According to archeological studies, it is suggested that the first recorded use of tobacco took place in the year 1 B.C., when some upper-class Mayans first used tobacco for religious, spiritual, and festive purposes. Between the years 470 and 630 A.C., the tobacco plant was introduced in North America, specifically in the "Valleys of Mississippi," by the same people, the Mayans, who were spread through Southern America. As time went on, tobacco was used by all local tribes in America. Later, the Shaman used tobacco for religious purposes, and several people used it to treat a variety of illnesses, such as asthma, intestinal issues, and fever, among others. Different forms of using tobacco (pipes, cigars, or snuff) were spread throughout the world by Portuguese and Spanish navigators after the Discoveries in the 15th century. From then to the beginning of the 21st century, tobacco usage became widespread, especially in the form of cigarettes, with the United States of America, China, and Brazil being the markets most heavily reliant on cigar consumption. (Mishra & Mishra, 2013).

Throughout recent history, tobacco use has been increasingly linked to cardiovascular diseases, such as cancer. Already in the 16th century, it was understood that smoking might cause diseases (US Department of Health, Education, and Welfare, 1964). The notion that cigarette smoking can be detrimental has its roots in the 16th century, when there was debate about whether tobacco was hazardous, dangerous, and thought to be terrible for smokers' health. At the same time, there was also the assertion that tobacco leaves offered many health advantages. As science and technology advanced at the start of the 20th century, several cases linking smoking to heart disease started to be discovered. Even though it wasn't until a few years later that tobacco became officially recognized as a product with many adverse effects on health. An increasing number of studies connected tobacco use to cardiovascular diseases and deaths, strengthening the notion that tobacco use was connected to harmful products and diseases (US Department of Health, Education, and Welfare, 1964). However, the US Department of Health, Education, and Welfare official indications that tobacco use is one of the main causes of cardiovascular illnesses, such as cancer, only applied beyond the age of 60. (US Department of Health, Education, and Welfare, 1964).

Although the absolute number of tobacco users has increased as the world's population has grown, there has been a relative decrease in the consumption of conventional tobacco globally throughout the end of the 20th century, both among men and women. As more and more individuals became aware of the causes and effects of tobacco smoking, consumption has decreased in relative terms, although it has increased in absolute terms (Ng et al., 2014). Countries across the world have been working hard to inform their citizens about the harmful effects of tobacco use, but initially this wasn't particularly successful due to the lack of knowledge about the consequences of nicotine. Reducing the proportion of consumers linked to the tobacco industry was only feasible later, with the advent of tobacco reduction programs and greater understanding of its adverse consequences (Ng et al., 2014).

People became aware that conventional tobacco was directly linked to cardiovascular diseases because of scientific and technological advancements that made it easier and easier to link tobacco use to all lung and heart-related illnesses throughout time. However, a portion of the general population still held the opinion that tobacco was harmless despite all the information that was available in the twenty-first century (Ng et al., 2014).

The tobacco industry's new technology goods, known as E-cigarettes and HTP, gained traction at the start of the twenty-first century by breaking into new markets, including the US and Europe.(Noel et al., 2011). It's crucial to note that HTP, in addition to E-cigarettes, are becoming extensively approved and used in a number of nations (Rodrigo et al., 2021).

2.2 SECTOR TRANSFORMATIONS: THE ROLE OF TECHNOLOGICAL INNOVATION

Following public awareness of the harmful effects of smoking, tobacco corporations began to take consumer health seriously and are experimenting with non-traditional tobacco alternatives. Recently, the offer became focused more on heat-not-burn tobacco, leaving behind the heavy weight in sales of combustible tobacco. (O'Connor et al., 2022).

The critical change in the tobacco sector began when tobacco companies started phasing out the sale and consumption of conventional tobacco, with the alternative being the creation of smokeless products (Edwards et al., 2022). The largest 4 companies in the tobacco sector (PMI, BAT, JTI, and Imperial Brands) have been changing their approach to the market with new products and new marketing strategies. (Edwards et al., 2022).

The emergence of HTP represents a notable development within the tobacco industry. In contrast to conventional cigarettes, heated tobacco products don't burn. Along with a packet of tobacco sticks, they include an accessory that heats the sticks rather than burning them. The device heats the tobacco to 400 degrees Celsius once the user inserts the tobacco stick inside. PMI IQOS ILUMA, BAT GLO, and JTI PLOOM TECH are among the main examples. (O'Leary & Polosa, 2020).

Despite being somewhat comparable to HTP, E-cigarettes don't burn; instead, does it cause the liquid's temperature to rise among the many components of this liquid is nicotine. When the heated liquid is inhaled by the user, an aerosol is created which produces an appearance that smoke is coming from the e-cigarette. Reusable, refillable, and disposable E-cigarettes are the three types available. E-cigarettes are designed and engineered so that the user can regulate the device's energy in some way. (O'Leary & Polosa, 2020).

There is not much long-term research on the true negative health effects of these products, although they seem to be less harmful in terms of health: HTP is approximately 80%–95% less toxic than conventional cigarettes. (O'Leary & Polosa, 2020).

Figure 1 schematizes the introduction of technology in tobacco products.

Figure 1 - Smoking and technology

2.3 CONSUMER CONCERNS ABOUT THE TOBACCO INDUSTRY

Since the younger generation is dispersed throughout many nations, it is crucial to comprehend what is happening with this new wave of technological products in the tobacco industry. The youngest people are the ones who are embracing these new experiences with electronic cigarettes, and in many nations, including the United States of America, it is starting to become a trend. (Bello S., 2019). Quitting smoking is the best way to prevent any health hazards associated with the tobacco industry. The greatest option for smokers who are unwilling to give up is to use heated tobacco products, which have significantly fewer dangers than traditional cigarettes. (Rodrigo et al., 2021).

The toxic and harmful effects of smoking have been well known for quite a long time (US Department of Health, Education, and Welfare, 1964). Countless diseases, namely oncological ones, result from the use of tobacco products, mostly traditional cigarettes (Romaszko-Wojtowicz & Doboszyńska, 2021).

The tobacco industry asserts that heated tobacco products exhibit a substantially diminished level of harmful constituents in comparison to conventional cigarettes, claiming that the levels of toxins appear to be considerably lower. Consequently, the question arises as to whether HTP and E-cigarettes should be perceived as a healthy option, i.e., whether using these products is really a healthier choice. (Romaszko-Wojtowicz & Doboszyńska, 2021).

Experts conclude that HTP and E-cigarettes are considered less harmful, adding that in the long run, these products are less harmful to a person's health (Newland et al., 2019). A study on equipment for the GLO product showed that when compared to traditional cigarettes, the initial GLO version might be regarded as a low-risk product for consumer health (Goodall et al., 2022). However, it is also claimed that the fact that HTP and E-cigarettes contain nicotine, even if in less harmful levels, could have similar effects to those of conventional tobacco (Newland et al., 2019). Several authors point to the lack of long-term evidence on the effects of HTP and E-cigarettes on health and to the fact that a large part of the existing studies is sponsored by the tobacco companies which have a conflict of interest in the matter (Bello S., 2019; Newland et al., 2019; Wilson et al., 2020).

When one of the Big Four in the tobacco industry launched its new product, IQOS, it sent a message stating that their product was different and modified and was an alternative to the traditional cigar (Romaszko-Wojtowicz & Doboszyńska, 2021).

Based on what is already known and, on the data presented about these new introductions in the tobacco market, some conclusions have been made pointing to the fact that they are less harmful and cause less damage to the health of the tobacco consumer (Dixit, 2016). According to several recently released studies, all the chemical fusions and reactions made by heated tobacco have presented less unfavorable consequences when compared with the traditional alternatives (Znyk et al., 2021). However, some of the components and ingredients included in these new products have still been found to be noxious (Znyk et al., 2021). The fact that a significant number of registered instances where these products have been linked to diseases and even fatalities in their users has been collected has been causing a significant amount of concern regarding their potential health impacts (Dixit, 2016). Ultimately, there are still numerous unanswered questions regarding the potential implications that progress in this industry may bring and the impact it may have on the health of society (Dixit, 2016).

According to the World Health Organization there are four primary points of view about the prevalence of tobacco use (World Health Organization, 2024).

1) "The impact of tobacco control policies over the long term." Given that the number of deaths and illnesses from conventional tobacco use has dropped slightly, the first topic addresses how hard it is for governments to figure out whether the laws and regulations they have put in place are truly having an impact. Since these rules are being implemented today, their impact won't be felt until the following generation.

2) "Tobacco control's fundamental role in reducing the prevalence of tobacco use." This second perspective emphasizes the essential part that governments have played in reducing the incidence of tobacco use among the population. Governments have implemented a variety of laws and regulations, such as the near-complete ban on advertising, the one-time tax hike, and the increasing number of places that have begun to forbid the use of conventional cigarettes, among others.

3) " Maintaining an eye on and adapting to new products." Electronic cigarettes and even heated tobacco products are examples of adaptations developed by tobacco firms that are well-monitored by the government, meaning that they do not undermine the tracking that is in place to minimize the use of conventional cigarettes.

4) "The challenge of restricting teenagers' access to tobacco." Tobacco is now readily available to young people, which has alarmed governments. Avoiding young people from having easy

access to tobacco requires an understanding of their motivations and what drives them to use cigarettes.

2.4 New marketing strategies and Consumer Experience in the tobacco industry

Consumer behavior is defined by the diverse principles, convictions, beliefs, and actions of everyone. It can be argued that each consumer is shaped by their sociocultural contrasts, which makes it challenging to categorize consumers into a single homogenous group (Nassè, 2021).

The way the consumer behaves or interacts can be related to the consumer experience. Consumer experience, in practical terms, is the way consumers perceive and think about the interactions they have with different companies, whether indirectly, with posters in the street or TV ads, or directly, when they are in a physical store talking to an employee. The consumer experience focuses on 3 important aspects: (i) the way they are approached by the company; (ii) the quality of the product or service; and finally (iii) the environment and sensations when using the product for the first time (Anene et al., 2023).

Tobacco companies have been taking active approaches to improving consumer experience. New products and less risks for health have profoundly affected the public positioning of tobacco companies that look to reconcile the modernization of the tobacco industry with the necessary health precautions (Glantz, 2018). BAT is working to reduce harmful effects while offering new alternatives to cigarettes. Another large company, Imperial Brands, stated that one of its main goals was to develop a portfolio of sustainable products for the future, to reduce diseases associated with traditional cigarettes. PMI has clearly expressed its desire to reduce sales of conventional cigarettes and has proposed several targets for phasing out conventional tobacco sales (Edwards et al., 2022).

The reduced harmful effects of HTP and E-cigarettes have had profound consequences on the tobacco companies' marketing strategies. While the World Health Organization completely banned tobacco advertising (World Health Organization, 2005), some communication with customers has been authorized based on these products being considered modified risk tobacco products (MRTP) and therefore representing reduced harm to health (Berg et al., 2023).

Marketing communication focuses on reduced odor and ash, available flavors, and on the technological aspects of the product (Berg et al., 2023; Freeman & Chapman, 2009). The use of open-source marketing - regular communication with online communities of users - has also

allowed for some innovative approaches, as customers are more inclined to interact with brands, and the Internet encourages increased involvement in brand promotion: CAMEL engaged its customers to renovate its packaging (Freeman & Chapman, 2009).

New products that are less harmful and cause fewer problems and illnesses than traditional cigarettes are more appealing to today's consumers who are increasingly focused on finding healthier options (Kulcsar & Molnar, 2023). Customers' preference for HTP and E-cigarettes over conventional cigarettes can be explained by the reduced olfactory and olfactory-related feelings linked to the use of heated tobacco products. Their increased visual attractiveness is the main reason behind this (Kulcsar & Molnar, 2023). Furthermore, in selecting tobacco markets globally, consumers have the option to purchase E-cigarettes in diverse flavors or aroma options. This characteristic is positively viewed by tobacco users and may encourage increased use of HTP and E-cigarettes (Kulcsar & Molnar, 2023).

In addition to the characteristics and reasons that explain the acceptance of consumers of HTP and E-cigarettes, it is interesting to note that the segmentation of people associated with this transformation shows significant differences. Many people continue to smoke traditional cigarettes. However, the consumer journey in relation to new and technologically heated tobacco products reveals different segmentations, depending on the type of product used. Studies on HTP and E-cigarettes indicate that consumers largely belong to younger age groups, with higher levels of education and from more favored social groups (Rodrigues, 2018). HTP and E-cigarettes represent a sustainable business strategy and offer strategic opportunities for this sector of the tobacco industry (De Andrade et al., 2020).

2.5 IMPACT OF REGULATION ON TOBACCO CONSUMPTION

The recognition that conventional cigarettes are bad for health has led many countries to focus their efforts on trying to get people to stop smoking cigarettes. However, many governments are supporting the introduction of HTP and E-cigarettes into the market, as a way to allow consumers to continue smoking, but with fewer associated risks (Goodall et al., 2022).

Like other regulations, as tobacco laws develop and become ingrained in society, they are impacted by the most prevalent behaviors that are subsequently deemed acceptable or unacceptable by the community. (Hoek et al., 2022). These norms and regulations are shaped by the contexts in which they are found. It will be simpler to standardize the tobacco industry's

regulation if there is support and a positive atmosphere surrounding it. For example, if a law requiring the provision of ashtrays in public areas is supported and accepted, this rule will be more standardized (Hoek et al., 2022).

But there is also the other "side of the coin", where these standards and regulations are not widely accepted, deterring many people from giving up tobacco and occasionally eradicating social norms and practices like smoking in previously acceptable locations (Hoek et al., 2022). The success of tobacco management programs depends heavily on customers' trust in tobacco legislation (Antin et al., 2021).

In previous years, tobacco corporations frequently manipulated social norms surrounding tobacco use in our society, leading individuals to believe that smoking is perfectly fine (Hoek et al., 2022). Due to the large tobacco firms' diminished acceptance of traditional cigarettes, many people no longer use conventional tobacco (Hoek et al., 2022). Nevertheless, tobacco businesses have never gone downhill and have been looking for new ways to reclaim their former credibility, placing significant bets on changes in the industry and advancements and innovations in their goods (Hoek et al., 2022).

2.6 VIRTUAL REALITY: ANOTHER INTERACTION OF TECHNOLOGY AND SMOKING

The potential of virtual reality to facilitate the exploration of virtual environments has gathered significant attention from multiple sectors, including the tobacco industry. This attention is underpinned by the technological opportunities it presents (Chavan, 2024).

Virtual reality is a technology that allows for the potential to reinvent immersive ecosystems that are capable of simulating consumer situations to allow for smoking (Zamboni et al., 2022).

Virtual reality and augmented reality have played a pivotal role in health, linked to various treatments relating to human behavior and the monitoring of many diseases, which may attack people who smoke tobacco, such as cancer. (Tatnell et al., 2022).

There have been promising developments in the use of virtual reality in the context of interventions to stop smoking (Goldenhersch et al., 2020). Studies conducted on the effectiveness of smoking cessation using virtual reality made it possible to observe positive results where; by using virtual reality, the smoker was able to quit smoking (Tatnell et al., 2022).

One of the main goals of therapy for emotional manifestation is to make people stop using traditional tobacco products (Wiederhold et al., 2017). In order for users to understand what factors can trigger their cravings, a Virtual Reality Medical Center (VRMC*)* program has shown the possibility that users are brought into virtual environments where they are exposed to potential stimuli that trigger smoking behavior. These triggers can be objects, such as real packs of cigarettes, lighters, ashtrays, or situations that may be created in this environment where the users experience induced peer pressure. After these tests are completed and people have a better understanding of their symptoms and what causes them to smoke, users take conscience of what they can do to get rid of these symptoms (Wiederhold et al., 2017).

3. METHODOLOGY

To conduct a systematic literature review, a step-by-step procedure was developed (Gusenbauer & Gauster, 2025; Xiao & Watson, 2019).

The first step was to establish the search criteria. The time interval of 2000-2025 was defined. This time period was considered relevant since the technological changes and innovations in smoking are quite recent. The objective was to find material that might be relevant to the subject under study: information on the tobacco industry and the experiences of its consumers (Xiao & Watson, 2019).

In the second step, Google Scholar, Typeset.io, and Scopus platforms were searched for articles. The research was focused on the question "understand how technology in smoking products is affecting consumer experience in terms of: (i) Perceived value, (ii) Health concerns, a (iii) Social acceptance. Therefore, the following keywords were applied in the search: (i) Technological Innovation, (ii) perceived value, (iii) health concerns, (iv) consumer experience, (v) heated tobacco products, (vi) E-cigarettes. Two criteria were utilized to choose the articles for the literature review: (i) articles that merged with two of the keywords and (ii) peer-reviewed journal publications. (Xiao & Watson, 2019). This search provided 59 documents.

The third step was to review the eligibility and quality of the articles retrieved. These were basically "journal articles," and occasionally company documents or even dissertations that contained a wealth of material that aided in the writing of this study. A general and abstract analysis was performed. Following this step, 33 articles were retained. The other articles were not used because, among other things: (i) the articles were not peer-reviewed, (ii) they were not about technology and the tobacco industry, (iii) some of the papers were not inside the chosen time frame (Xiao & Watson, 2019).

For the fourth step, the goal was to analyze and systemize the data. After reading and analyzing the 33 articles more thoroughly, a table that contains the main focus and a summary of the main findings of each article was built. The literature review based upon this table had two specific goals in mind: to gain a deeper understanding of the theme and to establish a strong theoretical foundation through a schematization of the contents. After that, articles were screened to understand if and how each topic was addressed (Perceived value, Social acceptance, and

Health concerns). Results were grouped under 3 dimensions, Technology, Consumer experience and Distribution.

Finally, conclusions and limitations were developed in step 5.

Figure 2 systematizes the methodological process

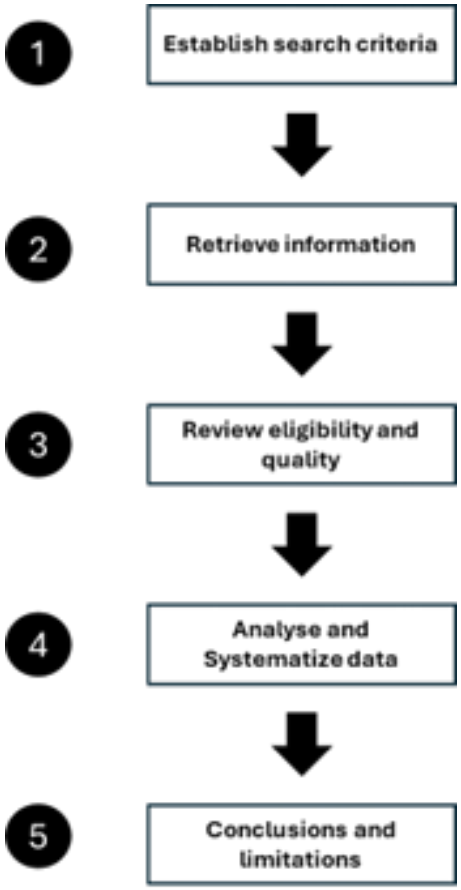

Figure 2 - Methodological steps

4. RESULTS

Out of 33 articles related to tobacco, there was a concentration of articles between 2020 to 2022. At least one article was published annually between 2015 and 2024, and the year with the most articles published is 2022.

Figure 3 systematizes the articles by publication year.

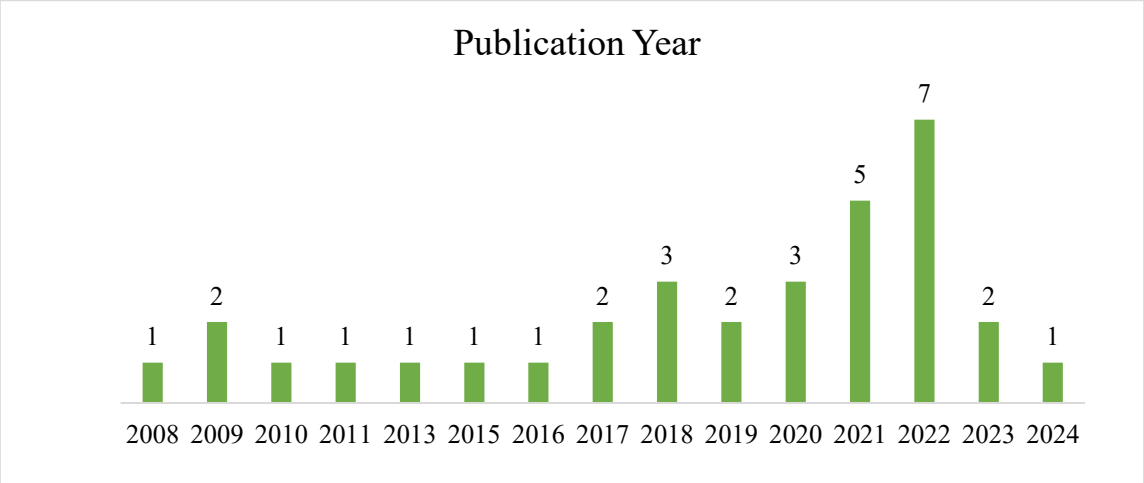

Figure 3 - Publication year

Figure 4 presents the studies evaluated by article type.

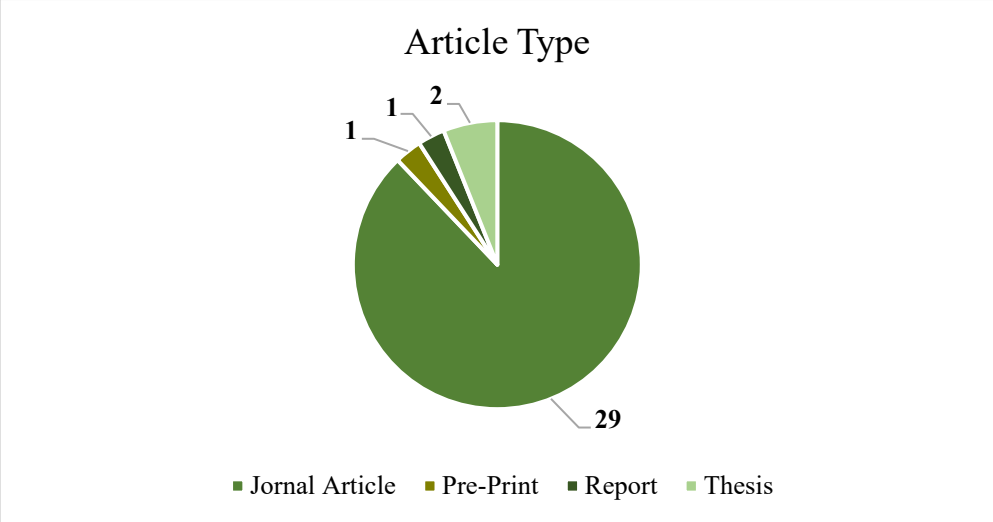

Figure 4 - Study type

The study types are Journal Article, Pre-print, Report, and Thesis. Journal articles (29/33) represent a major part of the retrieved studies due to the choice criteria when choosing the articles. Two of the studies are master thesis, one is a preprint, and another one is a report.

The articles that addressed the selected topics of Perceived value, and Health concerns and Social acceptance are included in Table 1. This table displays each article's primary topic and key findings, both positive and negative, showing a variety of elements that are useful in responding to the theme.

Author	Main Focus	Main findings
(Noel et al., 2011)	Electronic cigarettes in the context of the tobacco industry	Positive: Compared to traditional cigars, electronic cigarettes are regarded as a less harmful alternative. Negative: The lack of regulations and the fact that there aren't many studies on the effectiveness of stopping tabagism are some drawbacks.
(Mishra & Mishra, 2013)	History of tobacco consumption	Positive: The essay emphasizes how history and culture have shaped the tobacco industry, which further supports the idea that the tobacco industry has persisted throughout history. Negative: The article discusses and illustrates the numerous detrimental effects of smoking, including the illnesses that arise from it.
(Dixit, 2016)	The consequences and health impacts of using (ENDS),	Positive: This kind of product (ENDS) has less toxicity and fewer harmful risks, suggesting that switching from traditional cigarettes to this kind of product lowers both harmful substances and health-related risks. Negative: Smoking E-cigarettes carries some danger, and there may still be an impact on vascular dynamics even if this kind of product is thought to be less detrimental to health. Long-term research and data on the effects of this kind of product are scarce.
(Wiederhold et al., 2017)	Virtual reality in tobacco industry	Positive: Virtual reality has the potential to be a valuable aid for quitting smoking, increasing the efficacy of programs aimed at quitting. This article indicates that these smoking cessation programs are less intimidating than other smoking cessation methods. Negative: There are certain drawbacks to these programs, such as the paucity of research and testing on them. The data from these programs may be biased because of the proximity of the group.
(Bialous & Glantz, 2018)	Impact of HTP on smoking industry	Positive: The article discusses how new technologies have led to the development of tobacco products that are less hazardous to human health. It also notes that these heated tobacco devices tend to lower the risks of the toxic constituents. Negative: The author harshly condemns the corporations in the industry for marketing the notion that HTPs are less harmful, even if the essay acknowledges that they might be less toxic than traditional cigarettes.

(Glantz, 2018)	Perception of risks of HTP	Positive: According to the article, heated tobacco devices are safe substitutes that pose less risk to health. Some evidence suggests that HTP has fewer toxins than regular tobacco. Negative: This article discusses how the lack of long-term research on HTP and E-cigarettes makes it impossible to determine with certainty whether they are actually less harmful to people's health. This article discusses deceptive marketing, which causes many customers to purchase HTP.
(Rodrigues, 2018)	The impact of cigarettes on the perception of consumer	Positive: This article discusses several aspects, beginning with the fact that consumers are more likely to select these new HTP because they believe they are healthier. Customers may personalize their smoking experience with a variety of flavors, accessories, and nicotine levels, which is another reason they choose these HTP over traditional cigarettes. Negatives: The first is the challenge of not being able to use this new technology. Furthermore, it's critical to remember that many users of the HTP and E-cigarettes are "duelists," continuing to smoke traditional tobacco.
(Newland et al., 2019)	Characteristics HTP	Positive: This article approaches the new features that call "heat not burn", that release less harmful chemicals. The related health effects of HTP and traditional tobacco are also contrasted in this article. According to this article, there is preliminary evidence that HTP is healthier. Negative: the primary findings center on the lack of long-term research and studies about tobacco and proof about the true impacts of these novel tobacco products. This article reveals that there is a higher chance of encouraging consumption by young adults due to the marketing of these new HTP.
(Bello S., 2019)	People's perception of HTP and the Normalization of tobacco industry	Positive: According to this article's major findings, compared to traditional cigarettes, this type of tobacco product is less harmful to health. Some information about IQOS's constituents, stating that they produce fewer toxins and have fewer negative effects on consumers. Negative: IQOS does not entirely eliminate the health risks; some of the chemical components in this kind of product can damage specific organs; many people use E-cigarettes just as frequently as traditional cigarettes.
(Goldenhersch et al., 2020)	Virtual reality in tobacco industry	Positive: This article's primary findings, which examine a program designed to help people quit smoking, were that the program was well-received and attended by many, with a high % of participants completing the entire program. It also demonstrated that virtual reality is a useful tool for quitting smoking. Negative: While a significant portion of participants completed the treatment by the end, few completed it within the schedule specified by the program, raising questions about the program's actual efficacy in helping individuals quit smoking.

(De Andrade et al., 2020)	Technology transformation in tobacco industry	Positive: The article's main positive findings center on how corporations in the tobacco industry have easily transformed a once harmful industry by using technology to develop new heated tobacco products or even E-cigarettes, thereby revolutionizing an entire industry. Negative: It has taken a while for people to start liking HTP and E-cigarettes, despite all the technological advancements in the tobacco industry. As a result, businesses in this industry have had to wait before they can profit and reap the benefits of this kind of product.
(Wilson et al., 2020)	HTP vs Traditional cigarettes in health	Positive: The use of products like vaping significantly lowers the risks of health and cancer-related issues, and many of the chemical elements that are present in traditional cigarettes due to combustion are reduced or almost nonexistent in this kind of technological product like the vape. These are the main positive findings. Negative: Although it is claimed that these new technologies lower the risk of cardiovascular disease, it is also well recognized that there are risks involved.
(Rodrigo et al., 2021)	Health and technology risks in the HTP products	Positive: It is vital to note that according to this article, a person's smoking time is 25 times shorter when taking into account the HTP than a traditional cigar, and when discussing E-cigarettes, this number is fixed at intervals of 69–112 times shorter than a traditional cigar. Negative: It is evident from the primary negative findings that there aren't many studies on these new technical items and that there isn't much long-term proof. It's critical to note that this study indicates that there is little information available regarding the health risks associated with lifetime exposure to high amounts of nicotine.
(Antin et al., 2021)	HTP perceived safety	Positive: This article's main findings are that consumers who don't want to quit smoking but are scared of the risks can try these HTP and E-cigarettes are a less dangerous option than conventional cigarettes. Negative: If, on the one hand, users of smokers of traditional cigarettes start to feel some security in these technological products, on the other hand, medical institutions and competent authorities are not completely restricted in these products.
(Znyk et al., 2021)	Harmful chemicals and addiction risks	Positive: This article's primary conclusions are that PCTs have fewer harmful chemicals than traditional cigarettes. Negative: The primary drawbacks of these new tobacco products are that, despite not emitting combustion, they contain a lot of nicotine, which easily leads to addiction in users. The possibility of airway illnesses exists.
(Romaszko-Wojtowicz & Doboszyńska, 2021)	HTP safety evaluation	Positive: research has already shown that the new HTP are actually less harmful than traditional cigarettes. Additionally, by heating the tobacco stick rather than burning it, fewer toxins are produced, which may make it less dangerous. Negative: These new products contain nicotine, which is extremely addictive and can cause cardiovascular illness. Furthermore, there are no long-term research on the true health effects, so we are unsure if they are comparable to or worse than traditional cigarettes.

(Zamboni et al., 2022)	Virtual reality in smoking industry	Positive: This article's primary positive conclusions are that using virtual reality helps lessen the desire to smoke, extending people's lives, and that using therapies like Citizina and Nirdoch can help people quit smoking and using nicotine. Negative: Because these substances have not been thoroughly examined, using them may cause some discomfort. Additionally, because the entire program is virtual, the individual participating may experience some pain, which may lead to illness or other issues.
(O'Connor et al., 2022)	Consumer experience in tobacco	Positive: The article's primary positive findings are that many people are choosing to buy these new HTP over traditional cigarettes because there are a bunch of options available for these products, and the nicotine content of these new products is comparable to that of traditional tobacco, which encourages people to switch from their old products to these new ones. Negative: The new HTP and E-cigarettes are products that the industry has talked about a lot about as less harmful alternatives, but these companies still sell a lot of traditional tobacco, raising doubts about their true motivations. Finally, just because HTP and E-cigarettes are marketed as less dangerous does not imply that they are healthier.
(Goodall et al., 2022)	HTP risks and components	Positive: After analysis, the primary conclusion of this article is that, in comparison to traditional cigarettes, the technology of these new smokeless heated tobacco products is less hazardous to health and poses fewer dangers and damages. Negative: Despite claims that this kind of heated tobacco product with smokeless technology is less damaging to health, it's crucial to understand that there aren't many long-term studies, making it impossible to predict the potential causes of these products in the future.
(Tatnell et al., 2022)	Virtual reality in cessation	Positive: This article's primary findings center on the fact that it notes that virtual reality has been utilized in a fair number of studies and that it has been used to construct several studies connected to smoking cessation. Negative: Like anything else in life, there have been both successful and unsuccessful performances, which has caused some uncertainty about whether virtual reality is a reliable tool and why some studies performed well while others did not.
(Hoek et al., 2022)	Theories influencing smoking behavior perception.	Positive: The use of Endgame tactics can lead us to shift the focus given to individual responsibility and accountability to rather an emphasis on the need of government-led, structural changes. Negative: Tobacco companies, in an effort to renormalize smoking behaviors, are using Corporate Social Responsibility campaigns and take actions in that sense and justifying harm reduction.

(Triossi & Cloos, 2022)	Philip Morris Marketing strategies	Positive: Product development innovation happening at PMI as they launched IQOS, which aims to provide an alternative to traditional smoking products; there is a clear strategic diversification happening, as the company is shifting to RRPs, indicating a more proactive approach to adapt to shifting consumer demands and legal requirements. Negative: Despite innovations accomplished, PMI faces some regulatory obstacles as it must comply with strict laws, particularly in places such as the EU, which may impede the acceptance and promotion of innovative products; there is still some public skepticism as some stakeholders doubt the sincerity of PMI's reform, and there is persistent cynicysm about the health claims made by RRPs.
(Edwards et al., 2022)	Tobacco industry's deceptive transformation	Positive: This rubric offers a framework for evaluating transformation claims made by the industry, as, meanwhile, some businesses are selling more of their nicotine products. Negative: The primary transformation requirement of eliminating traditional tobacco products in five years is not being met by the tobacco firms; profit maximization is still taken as more of a priority than making advancements towards public health directives; businesses in this sector are still posing obstacles to tobacco control policies.
(Kulcsar & Molnar, 2023)	Tobacco industry in Hungary	Positive: The introduction of HTP as a substitute for traditional cigarettes is also covered in this article, which notes that consumers who previously only smoked conventional cigarettes now have a fresh perspective and option. Negative: The article's primary negative findings show that many young people continue to use traditional cigarettes and E-cigarettes, and that the tobacco business has been expanding despite daily taxes and levies. The reasons and effects of these new heated tobacco products are unclear, and there are still insufficient investigations on HTP.
(Chavan, 2024)	Virtual Reality	Positive: This article's primary positive findings demonstrate that virtual reality technology can be useful in fields like training, education, and health. It can significantly benefit all of these industries and enhance procedures that result in better customer experience. Negative: The primary results are the portion of data privacy and the high expense for all sectors.
(Berg et al., 2023)	Consumer behavior and marketing in HTP	Positive: The main findings of this article reveal that there was an authorization where companies could communicate that the use of IQOS is less harmful to health and less risky than convection cigarettes. With reference to new heated tobacco products for different digital channels. Negative: The main negative findings concern the weak and dangerous perception that consumers can have of the reduced exposure' message, confusing the meaning with 'risk-free'.
(Dutra et al., 2017)	PMI strategy HTP	Positive: The primary positive findings are that Philip Morris International has developed a smokeless HTP and is concerned with consumer purchasing decisions. In the market area, Philip Morris is a pioneer of aerosol products because he has already developed one. Negative: According to the primary negative findings, it is unclear whether the corporations in this industry genuinely want a smokeless world or if this is merely a calculated marketing ploy given that these new heated tobacco products were developed as an alternative to traditional cigarettes.

(Sussman & Sun, 2009)	Smoking cessation programs' effectiveness analysis.	Positive: This article's primary results, which seek to identify potential causes and additional resources that can help someone stop smoking, are as follows: Long, intentional, and motivating programs, as well as school clinics, have been effective in helping people quit smoking. New technologies are also useful tools for quitting. Negative: The main negative findings are that brief programs don't help individuals quit smoking, and poorly designed programs that are connected to the environment don't get people to stick with them.
(Muggli et al., 2010)	Tobacco Laws	Positive: This article's primary conclusions are: A significant step toward new rules that prohibit smoking and protect passive smokers was taken in Spain when they enacted a law prohibiting smoking in enclosed areas, or places that aren't outside. Negative: By encouraging bars, restaurants, and cafés to have designated smoking areas and by adding more ventilation to enclosed spaces, this law has helped businesses in this sector gain ground and strength. The large corporations in this industry have adopted this policy of permitting smoking in other nations by using Spain as an example.
(Parascandola, 2008)	Heated tobacco, alternatives, evaluation, risks.	Positive: The primary positive findings are that a sizable portion of the population is aware that technological products in the tobacco industry are less hazardous and harmful, that many of the study's consumers are willing to try these new, lower-risk products instead of traditional cigarettes, and that they provide access to technology in the tobacco industry. Negative: The primary findings are related to the lack of information regarding these products. Although they are thought to be less harmful, they still carry some risk, and consumers who wish to use these products (PREPs) need to be made aware of this in order to prevent confusion and health risks.
(Freeman & Chapman, 2009)	Open-source marketing, Web 2.0, consumer interaction	Positive: The article's primary positive findings show that customers are more inclined to interact with brands and that the Internet encourages increased involvement in brand promotion. The article talks about the tool of Open-Source marketing, which is a brutal tool for consumer engagement efforts. Negative: Because the goal of this consumer campaign was to try and go around many of the laws and regulations pertaining to tobacco, it deceived the public.
(McDonald & Ling, 2015)	Risk perception, tobacco normalization, and technological culture.	Positive: This article's primary findings discuss how these new technology tobacco products are revolutionary and provide a unique experience in contrast to traditional cigarettes. It also discusses how people can cut back on the number of cigarettes they smoke, which will lower the hazards to their health. Negative: The primary findings indicate that are a further concern is that the flavors and sensation provided by this kind of HTP and E-cigarettes make many young people desire to try these products, which are nonetheless dangerous even though they are thought to be less toxic.

Table 1 - Summary of reviewed articles

5. DISCUSSION

5.1 PERCEIVED VALUE

Consumers search for HTP's and E-cigarettes for a range of reasons, whether by innovation, convenience, or fashion (Noel et al., 2011). For instance, the HTP and E-cigarettes are perceived as something people want to have, as a product that is "clean, chic and pure" (Glantz, 2018), in other words, stylish, sophisticated, and natural. In addition, these products are viewed as premium products with a focus on technology-innovation (Berg et al., 2023; Glantz, 2018). These innovative tobacco products with modern technology offer a distinctive experience (Freeman & Chapman, 2009) because customers can personalize their smoking experience with a variety of accessories and nicotine levels (Rodrigues, 2018). Another point of value about HTP and E-cigarettes is the way of using these products: the set of sensations users can experience as touch, smell, and visual (Dutra et al., 2017; Newland et al., 2019). HTP and more specifically the IQOS, is being viewed as a luxury and exclusive brand; consumers empathize that the IQOS is a brand with a lot of quality and class (Berg et al., 2023; Triossi & Cloos, 2022).

Other elements that contribute to a positive perceived value are the packaging, the establishments where HTP and E-cigarettes are sold, the visual promotion and advertising, the product's clarity and beauty, and the technology itself (Bello S., 2019; Kulcsar & Molnar, 2023). Additionally, a large bunch of choices are available in terms of the variety of equipment and flavors (De Andrade et al., 2020; O'Connor et al., 2022) Finally, HTP and E-cigarettes are perceived as good for the environment representing a model intended for sustainability and long-term growth (O'Connor et al., 2022).

5.2 HEALTH CONCERNS

It is commonly stated that conventional tobacco use is one of the main reasons for cancer, cardiovascular disease, and death (Sussman & Sun, 2009).

Compared to traditional cigars, electronic cigarettes are regarded as a less harmful alternative, while not a risk-free product, HTP and E-cigarettes produce fewer toxins with a heat-not-burn functionality and have less negative effects on consumers, in spite of the lack of information about the long-term effects due to the fact that HTP and E-cigarettes are a very recent product (Bialous & Glantz, 2018; Dixit, 2016; Newland et al., 2019; Noel et al., 2011; Rodrigo et al.,

2021; Romaszko-Wojtowicz & Doboszyńska, 2021; Triossi & Cloos, 2022; Znyk et al., 2021). HTP and E-cigarettes are less harmful but not risk-free, and the fact that there are not many long-term studies about the effects of these new products requires more clarification about the conception of the product itself, the product's toxins and more medical information (Antin et al., 2021; Noel et al., 2011). Some E-cigarettes have fewer toxins than traditional cigarettes, although it was found that the level of some of these toxins is higher than was expected (Dixit, 2016). Despite HTP and E-cigarettes eventually being less harmful, as of today, these new products are not risk-free, and for now, they will not substitute 100% conventional cigarettes (Bialous & Glantz, 2018). HTP and E-cigarettes are considered less-harmful products, but because of the lack of information about long-term effects and some "influence" of big tobacco companies like PMI, researchers are not convinced that these products can substitute conventional cigarettes (Glantz, 2018; Hoek et al., 2022; Noel et al., 2011).

Consumers change to these new products because they want to feel healthier without having to quit smoking and perceive them to have fewer toxins as a safer alternative. These products are sold as being less harmful than traditional cigarettes and consumers want to try these products because they are convinced HTP and E-cigarettes are less harmful (Bello S., 2019; De Andrade et al., 2020; Freeman & Chapman, 2009; Newland et al., 2019; Parascandola, 2008; Rodrigues, 2018; Wilson et al., 2020; Znyk et al., 2021). Tobacco companies have transformed a once-harmful industry by using technology to develop HTP and E-cigarettes (De Andrade et al., 2020). HTP and E-cigarettes are a substitute smoking product that are safer (Antin et al., 2021) and the risks of getting cardiovascular diseases are lower (Romaszko-Wojtowicz & Doboszyńska, 2021). So, marketing strategies state that HTP and E-cigarettes are products that are "reduced risk", products that are a nicer and less dangerous alternative than conventional cigarettes. For instance, in the United States of America, HTP and E-cigarettes are considered reduced-risk products with less harmful toxins (Goodall et al., 2022; O'Connor et al., 2022). The use of heated tobacco products, although not completely safe for people's health and risks, ends up being less harmful for them (Wilson et al., 2020).

Some tobacco companies mention some hypotheses and statements about smoke-free products, and they declare that smoke-free products will bring advantages to consumers because of the risk-reduced effects of HTP and E-cigarettes (Edwards et al., 2022).

Virtual reality programs have positive effects in smoking cessation and less cardiovascular disease (Chavan, 2024; Goldenhersch et al., 2020; Tatnell et al., 2022; Wiederhold et al., 2017; Zamboni et al., 2022).

5.3 SOCIAL ACCEPTANCE

The appearance of the new technology smoking devices brought some renormalization of tobacco and HTP and E-cigarettes and generated better acceptance from society.

The marketing that is used for these products, related to a smoke-free product, has awakened many people to see and try it for the first time (Bello S., 2019; Bialous & Glantz, 2018; Glantz, 2018; Triossi & Cloos, 2022). Many people can smoke both conventional cigarettes and HTP, which is one more reason for people to like and accept this new digital product (Bello S., 2019). Consumers who smoke either HTP or E-cigarettes are perceived as stylish and fashionable people (Parascandola, 2008). Despite this industry of HTP and E-cigarettes being new, the growth and appearance of these products are more and more visible in the market and the approval and recognition of these products as a smoking alternative is growing in magnitude, as HTP and E-cigarettes are being sold in stores and big shopping centers (Bello S., 2019; Noel et al., 2011). Some authors believe that part of this social acceptance is due to a lack of restrictive regulation on HTP and E-cigarettes (Triossi & Cloos, 2022). HTP and E-cigarettes are well accepted by some people due to being perceived as a "toy": in other words, the products are not seen as something harmful to people but, on the contrary, are perceived as a gadget that people can play with (McDonald & Ling, 2015). Another element of acceptance is novelty, because people have the curiosity to experiment and be able to make choices (Parascandola, 2008).

Furthermore, HTP and E-cigarettes are shown as the new product trend, a new gadget that is safer (Romaszko-Wojtowicz & Doboszyńska, 2021; Znyk et al., 2021). Young people are the segment of the population most attracted to HTP and E-cigarettes: they perceive the gadget as elegant and sophisticated (Romaszko-Wojtowicz & Doboszyńska, 2021).

Big companies of the tobacco industry, such as PMI, show some studies regarding the potential and great features of this industry. (Hoek et al., 2022). However, in spite of this effort, many people remain skeptical (Triossi & Cloos, 2022).

Table 2 systematizes how the elements of each topic - Perceived value, Social acceptance, and Health concerns - are addressed in the reviewed articles. Some articles approach more than one topic, which shows the respective interconnectedness. The elements under each topic have been assigned to three broad themes: Technology, Customer Experience and Distribution. Technology includes elements related to the ability to create new functionalities for the product. Customer experience and Distribution comprise elements that are part of the marketing strategy. The elements that are classified as Customer Experience are the ones that affect the perception of consumers relative to the quality of the product. Finally, the elements that are included in Distribution are the ones that give visibility to the product during the purchase process. The strong relationship between Perceived value and Social acceptance is visible.

	Perceived Value (1)	Social acceptance (2)	Health concerns (3)	Citation
Technology	Product innovation	Digital product	Heat not burn	(1) (Berg et al., 2023; Glantz, 2018) (2) (Bello S., 2019) (3) (Bialous & Glantz, 2018; Dixit, 2016; Edwards et al., 2022)
	Personalization		Transformation of tobacco industry	(1) (Freeman & Chapman, 2009; Rodrigues, 2018) (3) (Antin et al., 2021; De Andrade et al., 2020)
Consumer Experience	Premium Brand Position	Marketing based on smoke-free	Less harmful and reduced risks	(1) (Glantz, 2018) (2) (Bialous & Glantz, 2018; Glantz, 2018) (3) (Bello S., 2019; De Andrade et al., 2020; Freeman & Chapman, 2009; Newland et al., 2019; Parascandola, 2008; Rodrigues, 2018; Wilson et al., 2020; Znyk et al., 2021)
	Lifestyle appeal / Luxury & Exclusivity		Smoking Free Reduced	(1) & (2) (Berg et al., 2023; McDonald & Ling, 2015; Triossi & Cloos, 2022) (3) (Goodall et al., 2022; O'Connor et al., 2022; Rodrigo et al., 2021)
	Approval as a safer alternative			(1) & (2) (Bello S., 2019; Noel et al., 2011; O'Connor et al., 2022)
	Visual Advertising and promotion	Curiosity		(1) (Dutra et al., 2017; Newland et al., 2019) (2) (Parascandola, 2008)
	Eco-friendly / sustainable	Growing Market Presence		(1) (Muggli et al., 2010; O'Connor et al., 2022) (2) (Bello S., 2019; Noel et al., 2011)
		Product trend		(2) (Romaszko-Wojtowicz & Doboszyńska, 2021; Znyk et al., 2021)
	Attractive and appealing image			(1) & (2) (Glantz, 2018; Romaszko-Wojtowicz & Doboszyńska, 2021)
	Smell			(1) (Dutra et al., 2017; Newland et al., 2019)
Distribution	Retail presence			(1) (Bello S., 2019; Kulcsar & Molnar, 2023)
	Packaging			(1) (Bello S., 2019; Kulcsar & Molnar, 2023)
	Variety of choices			(1) (De Andrade et al., 2020; O'Connor et al., 2022)

Table 2- Systematization of the topics associated with Perceived value, Social acceptance, and Health concerns.

6. CONCLUSIONS, LIMITATIONS AND IMPLICATIONS

The present study adds relevant insights to the understanding of how technology in smoking products is affecting consumer experience in terms of Perceived value, Social acceptance, and Health concerns. With HTP and E-cigarettes, the tobacco industry is evolving towards a "smoke-free" world. Customers may personalize their smoking experience with a variety of flavors, accessories, and nicotine levels. Curiosity about technological components and the fact that it is a new product with a lot of new functionalities drive many consumers into trying HTP and E-cigarettes. Young people are most attracted as they find the devices to be smart and elegant.

The results clearly show that technology affects Perceived value, Health concerns and Social Acceptance. As the tobacco industry continues to change, technological innovations like HTP and E-cigarettes are seen as more valuable, socially acceptable, and less dangerous. How consumer experience is built affects Perceived value and Social Acceptance, and, with minor intensity, Health concerns. Finally, the distribution strategy may have an impact on Perceived Value but will not impact Social acceptance or Health concerns.

It is important to understand the limitations of this study. The main limitation relates to the choice of keywords that were used in the search for the articles that constitute the object of the literature review. If other keywords had been chosen, different topics could have been generated, leading to a different selection of articles regarding the tobacco industry. Furthermore, the databases were limited to Google Scholar, typeset, and Scopus. While these are rather large databases, other repositories might lead to a different choice of articles.

As for the implications, how tobacco companies build their marketing strategies for HTP and E-cigarettes in terms of consumer experience and distribution will tend to have effects on Perceived value and Social acceptance. The results of the study suggest the need to continue long-term studies about how HTP and E-cigarettes affect health. The more information the tobacco industry has, the more people can know about the industry, leading to more informed decisions.

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