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The Market Trajectory of a Radically New Product: E-Cigarettes

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Abstract

The study analyzes the diffusion of electronic cigarettes as an innovation, as well as how industry, society, and the individual affect its market dynamics. The study is based on five surveys conducted during the years 2017–2019, and including participants of all ages (age 12 to 80 and beyond). The article describes indicators for evaluating the sustainability of a really-new product like electronic cigarettes, following the market trajectory of this product as it sets its dominant design and shapes the use-system for the product type from now onward. This process has two phases: trial and adoption. The probability of each nicotine product type's adoption is different, depending on the prevalence of trials of that product among the population. The results of e-cigarette trials and additional indicators reveal the point (critical mass-point) where social influence outweighs rational evaluation by the individual regarding nicotine products. By using triers' prevalence as the indicator for measuring an entry of really-new product into the market, the authors could identify the sustainability of that really-new product at a much early phase. Therefore, the prevalence of triers can be used as a predictor for the diffusion rate of an innovative product in a certain population and should be measured. The authors also propose a regression model that estimates the prevalence of triers based on the extent of users in the population.

Keywords: demerit good, electronic cigarette, innovation, diffusion, nicotine

1. Introduction

Research on the market diffusion process of an innovation is limited by opportunities to study the entrance of a really-new product. The entry of electronic cigarettes into the nicotine market during the first years of the 3rd millennium (Grana, Benowitz, & Glantz, 2014), provides a unique opportunity to study market dynamics following the launch of an innovation. The results of this study could be also valuable for research in public health and tobacco control.

The introduction of electronic cigarettes provided an opportunity to review current theories from the field of business marketing on the adoption process of an innovation, and to try to proceed toward a more detailed understanding of the conditions under which a consumer-packaged goods (CPG) enters the market. Nicotine products are defined as 'demerit goods' (Musgrave, 1959) (Note 1). Otherwise, the consumption of nicotine substances resembles the consumption of other CPG such as soft drinks or chocolate.

The new type of ENDS (electronic nicotine delivery system) products known as electronic cigarettes (Ayers, Ribisl, & Brownstein, 2011) can be defined as a really-new product (*def.* Urban, Weinberg, & Hauser, 1996). In contrast to other non-combustible products, they contain only liquid nicotine and no tobacco. According to a report by Euromonitor International (2017), the market share of electronic cigarettes in 2014 was almost undetectable in Israel (MSH of < 0.1%), and continued to be negligible in the following years (MSH of ca. 0.5% in 2016). Commercial activities surrounding electronic cigarettes during 2017–2018 (Israel Ministry of Health, 2019) indicated the expansion of their use beyond a negligible rate. Recent equivalent data on marketing developments in additional countries (Hammond et al., 2019; Huang et al., 2019), indicates that a similar change occurred all over the western hemisphere. The accelerated diffusion of this innovative product provides a unique opportunity to witness the process as it happens.

Tracing the stages of a product's diffusion in its target audience according to the scale of active adopters of that product is accepted methodology (e.g., Bartels & Reinders, 2011; Im, Mason, & Houston, 2007; Rogers, 2003; Taylor & Todd, 1995; Wood & Swait, 2002). However, researchers have paid little attention to the trial stage, as

well as to the possibility of a trial rejection by consumers. The current study shows that the rate of active adopters is only the tip of the iceberg, and that below the surface, unseen until now, lies the rest of the market in the form of triers who have not continued their experience at this stage. The authors also suggest a regression model, which can predict the prevalence of triers in the population based on the extent of users of the same product.

1.1 Study Goals

The aim of this study is to analyze the diffusion of a new consumer product, as the influence of industry, society, and individual consumers shape its market dynamics. We view the entry of the electronic cigarette as a really-new product to be an opportunity to analyze the nicotine market, and to understand its market dynamics into the future by employing three perspectives: the industry point of view, sociological approaches, and analysis of individual cognition.

2. Literature Review

The entry of a new product into the market starts when an industry offers the public a novel service, which the public can either accept, by purchasing the product or ignore (Wasson, 1974).

2.1 The Industry Perspective

The losses suffered by several nicotine products manufacturers in 1982–1983 following tax increases were a sign for the industry of an end to the golden age of profit and the beginning of a long period of decline (cf. Albert, 1984). The nicotine industry needed to reverse its market dynamic from decline to growth by creating a new category of nicotine products (cf. Urban et al., 1996). Such a really-new product must have the following qualities (Aggarwal, Cha, & Wilemon, 1998):

- It is incomparable with any other current product types on the market;
- It sets standards for future innovations;
- It forces consumers to invest considerable efforts to learn how to use it;
- It is accompanied by complementary products unmatchable by the current product types on the market;
- It is perceived, at first, as very risky, due to the lack of performance evidence;
- It attracts considerable attention.

The very definition of innovation as a new type of product also rests in the risk it poses for the manufacturer: the risk of market cannibalism of the company's existing products by the innovative product. The manufacturer can define and promote its innovative product as an extension of an existing product, which can lead to a cannibalization of the market by the innovative product (Johnson & Jones, 1957). For that reason, market leaders reveal a reluctance to adopt new ideas, preferring stability ("don't rock the boat"). Larger companies have more to lose than small companies (Wasson, 1974) and are usually forced to adopt the new product after it is launched by other less significant competitors and proves to be a success (de Kluyver, 1977).

An additional risk is a misjudgment by the manufacturer's experts on the actual innovativeness of the product and its technology. A product could appear as "revolutionary" to experts but is perceived by the public as almost identical to its equivalent or predecessor products (Wasson, 1974) (Note 2).

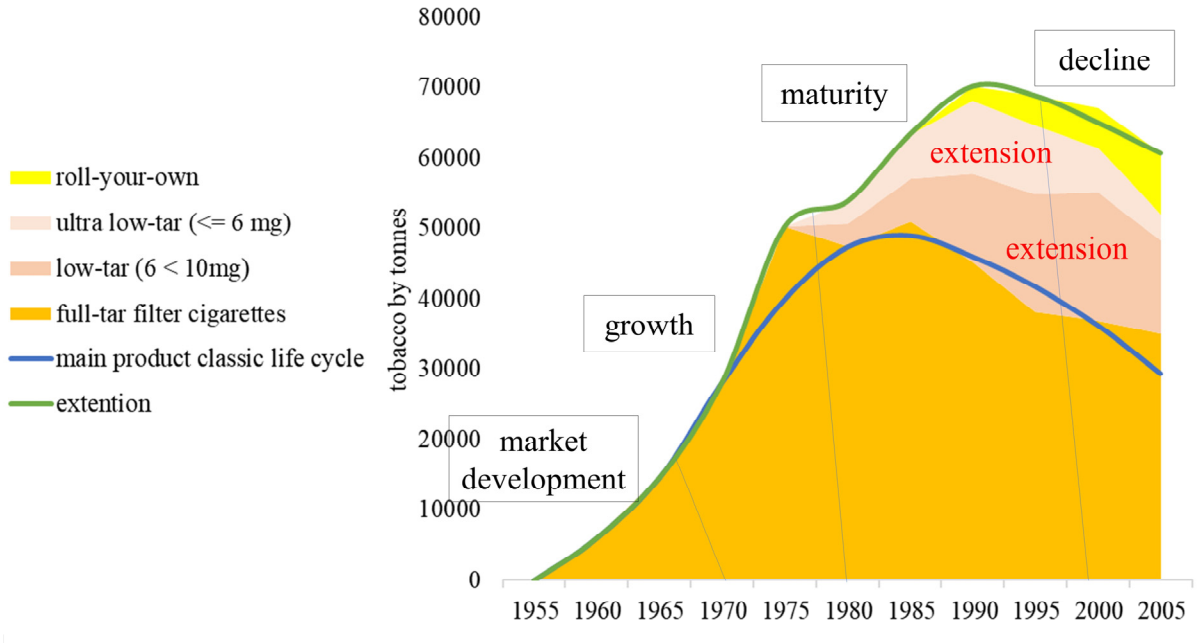


Figure 1. The product life cycle of filter cigarettes with its extensions in France

Note. Based on data of Hill (2004, 2015).

This was the case for developments in the nicotine market (*illus.* Figure 1). The market leaders — Philip Morris International, British American Tobacco, and R. J. Reynolds — were under pressure to produce a new type of nicotine product to replace the declining combustible cigarette, but the breakthrough was made by a small company named Pax Labs, which now is known as "JUUL Labs." Only then did the market leaders introduce a product similar to the successful design of JUUL.

2.2 The Market Reflection—The Product Life Cycle Model

Several scholars have noted the product cycle dynamic of cigarettes, defining them as a product in a stage of decline (Thun, Peto, Boreham, & Lopez, 2012; Vardavas & Agaku, 2015), based on the model offered by Alan Lopez, Neil Collishaw and Tapani Piha (1994), which describes the dynamic using the language of disease. The nature of nicotine products is to act as a commodity because that is what they are. The economic equivalent to the epidemiological model of Lopez, Collishaw and Piha is the "Product life Cycle" model formulated by Theodore Levit (cf. Crompton & Hensarling, 1978; Enis, La Garce, & Prell, 1977; Levitt, 1965; Polli & Cook, 1969; Wasson, 1974), which goes through these four stages:

- **Market development:** The new product is first launched into the market, before there is a proven demand for it, and before its qualities have been fully demonstrated. At this stage, the rate of sales is low.
- **Market growth:** Demand begins to accelerate, and the total market expands rapidly.
- **Market maturity:** Demand reaches stability as new purchases are based on needs for product replacement and population growth.
- **Market decline:** The product begins to lose its attraction among its current consumers and sales gradually decline.

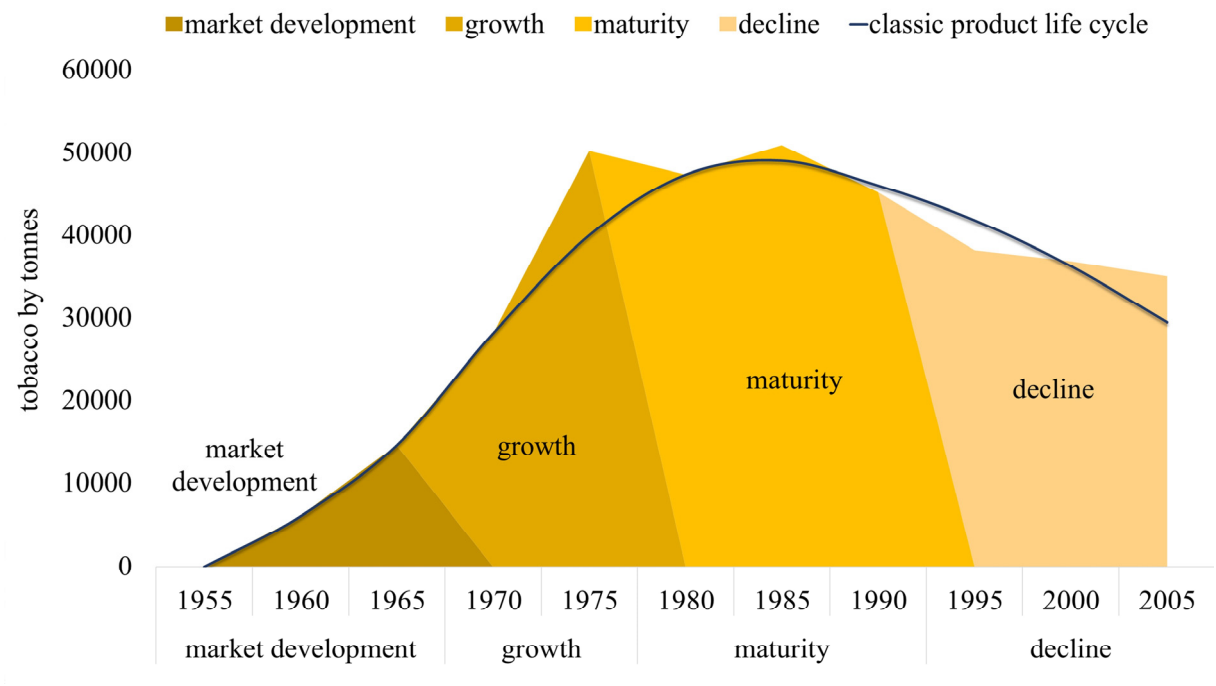


Figure 2. The product life cycle of filter cigarettes in France base on Levitt's model (Levitt, 1965).

Note. Based on data of Hill, 2004, 2015.

Sales of nicotine products follow the market dynamic anticipated by Levitt's model (Figure 2). The basic indicator of the future potential of the market, according to the product life cycle approach, is the population, which did not try the product even once. Once the product has been tried at least once by almost all the population, its potential for market growth is nil. Sales of the product will start to decrease, as other really-new products enter the market for the same need (*illus.* Figure 3), and regular consumers begin to abandon the product for a more innovative substitute (Saviotti, 2002), creating an endless cycle of industrial progress (cf. Phillips, 2016; Schumpeter, 2003[1950]).

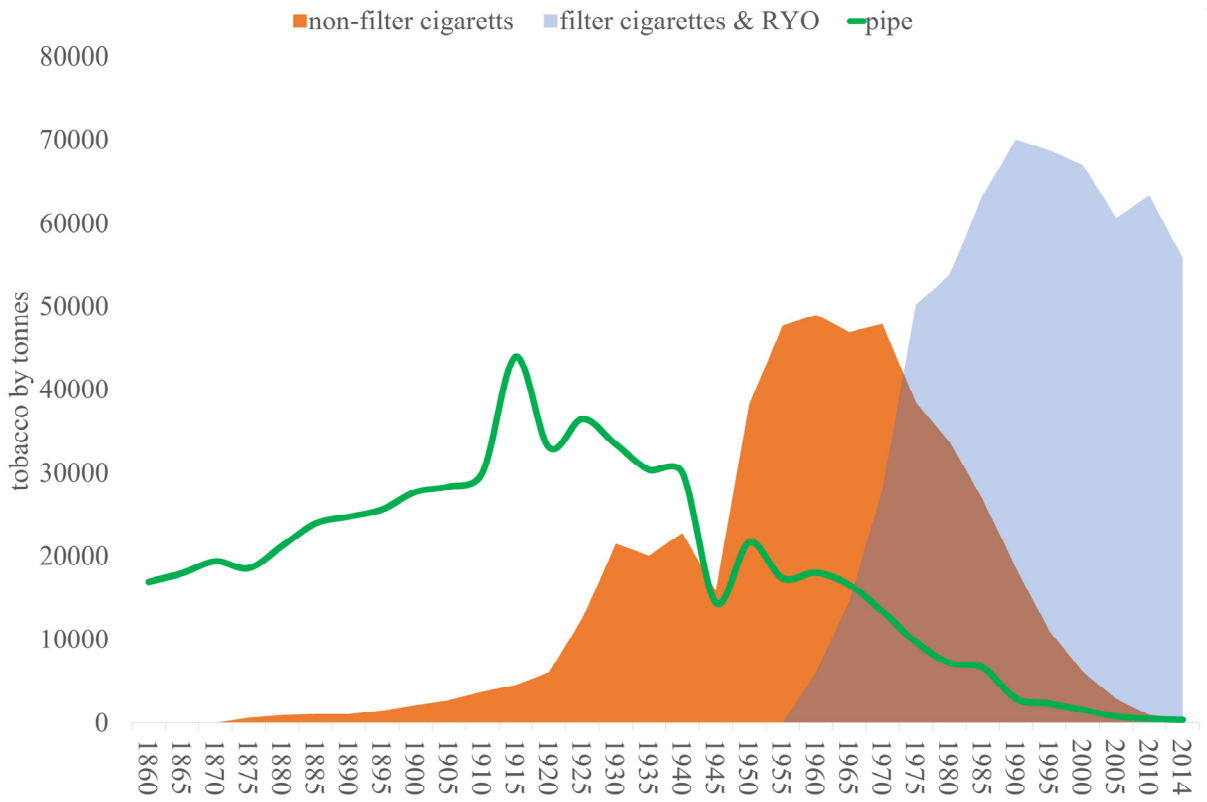


Figure 3. Product life cycles of selected categories of nicotine products in France

Note. Based on data of Hill, 2004, 2015.

By the end of the 2nd millennium, the filter cigarette and its extensions entered the stage of decline, with consumers also abandoning all other types of nicotine products and leaving the industry with just one profitable segment (Note 3). This development reduced the size of the nicotine market back to the pre-filter cigarette period. After 150 years, the life cycle of these second industrial revolution products (Note 4) entered its decline stage (*illus.* Figure 4).

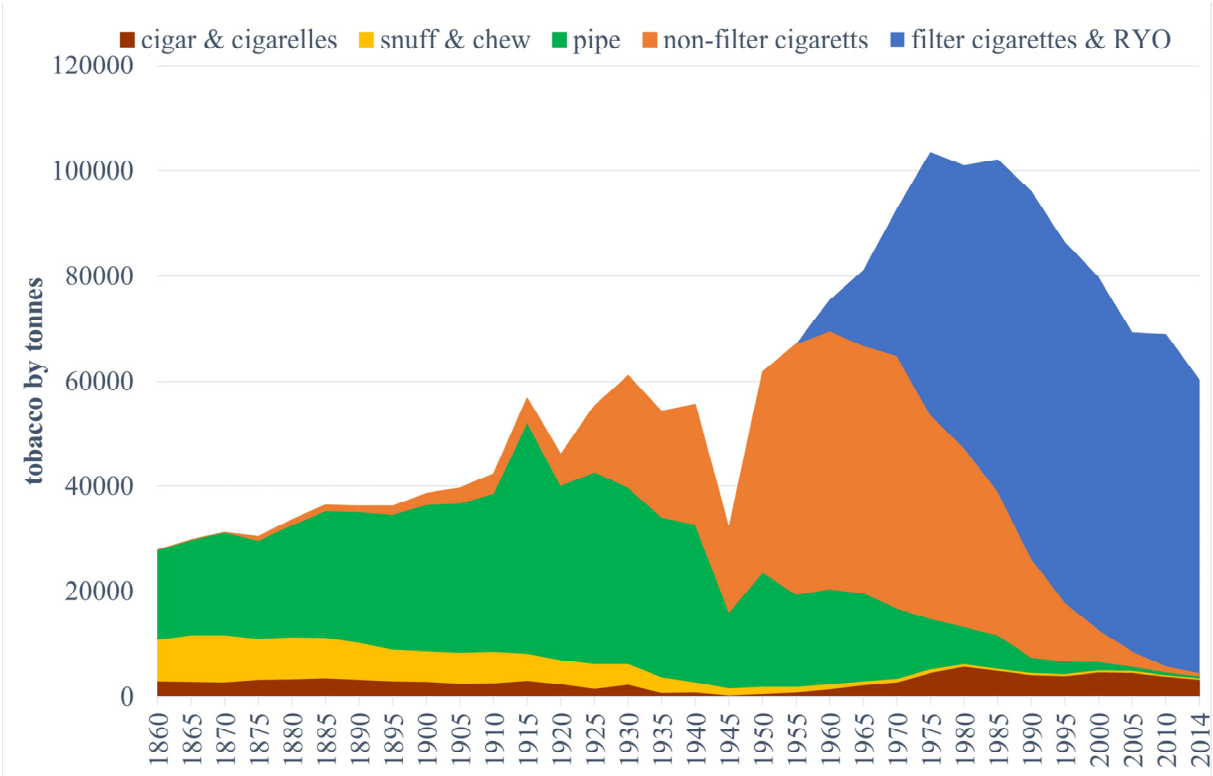


Figure 4. The product life cycle of selected categories of nicotine products aggregated in France

Source: Hill, 2004, 2015.

As predicted by Judith Mackay and Neil Schluger, the decline of the combustible cigarette was not the end of the game, but rather a sign for the wave of new nicotine products which provide alternative means of nicotine delivery, such as electronic cigarettes (Mackay & Schluger, 2015).

2.3 Public Response

Two disparate approaches have developed over the years for the analysis of individual consumers' responses to the launch of a really-new product: The first sets store by individual rational evaluation; yet, that rational evaluation is overpowered by social influence among individuals who are insecure about their social status (Bourne, 1956). The second approach emphasizes the influence of personality on innovativeness and consuming behaviour, classifying different personalities according to their tendency for innovativeness (e.g., Im, Bayus, & Mason, 2003; Rogers, 2003; Wood & Swait, 2002).

2.3.1 The Individual Perspective

The rational evaluation approach is based on the assumption that the consumer has a constant need for a product group attribute, but each consumer differs in his/her "most preferred" product (Lancaster, 1990, 1991; Wasson, 1974) (Note 5). The product is, in fact, the perception of a desire-set; certain needs which it aims to satisfy. The active consumers in the market are those who rank their desire-set as close as possible to the product perception (Kamakura & Novak, 1992; Lancaster, 1966; Menger, 1871). Each consumer has a different desire-set since it is determined by his/her personality and motivations (cf. Eysenck, 1998 [1947]; Mowen, 2000).

Over the years, many variables — such as the need for a change, risk, or the extent of practice needed for the use of the new product — were proposed as influencing the individual desire-set (e.g., Brown, Massey, Montoya-Weiss, & Burkman, 2002; Chatterjee & Eliashberg, 1990; Clark, 1985; Hiebert, 1974; Meenaghan & O'Sullivan, 1986; Miller, 1987; Mowen, 2000; Nelson & Winter, 1982; Ostlund, 1974; Parasuraman, 2000; Raju, 1980; Steenkamp & Gielens, 2003; Wood & Swait, 2002). The main instrument for the rational evaluation of these considerations is information (Moreau, Markman, & Lehmann, 2001; Olshavsky & Spreng, 1996). Innovators need less information than imitators for filling the knowledge gap, which they do use logic, skills, or extensive familiarity since they do not have a reference to imitate (Cohen & Levinthal, 1990; Saviotti, 2002).

The information processing, as described above, takes place primarily during the early phase of symbolic

adoption, defined by Gerald Klonglan and E. Walter Coward as the stage of decision-making before trying the product for the first time (Klonglan & Coward, 1970). They distinguish the early phase of decision making from the acquisition phase (*illus.* Figure 5) (Note 6).

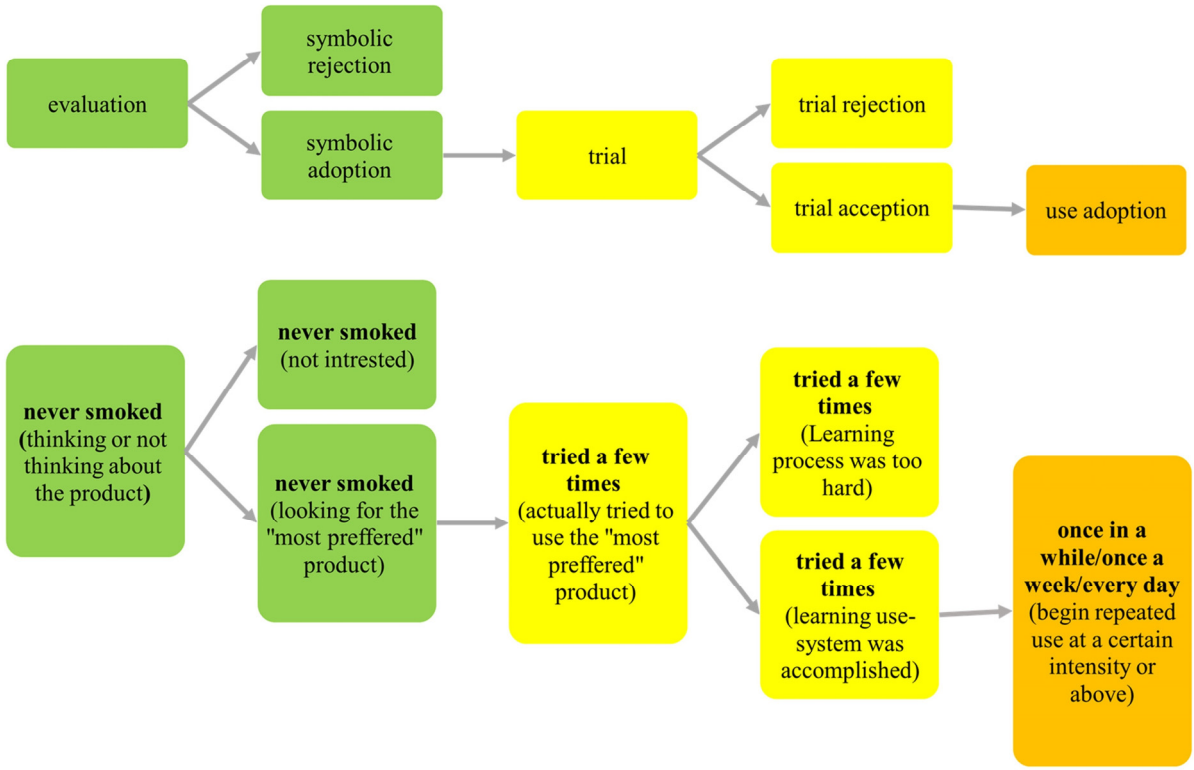


Figure 5. Comparison between a generic consumption flowchart and nicotine consumption terminology (Note 7)

Sources: Klonglan and Coward, 1970; Mittelstaedt, Grossbart, Curtis, and Devere, 1976.

An individual will not try a nicotine product (never-user) when none of the perceptions of a given type of a nicotine product (combustible cigarette, electronic cigarette, pipe, hookah, etc.) correspond with the desire-set that is characteristically highly important for that individual's population group (Wasson, 1974). The individual develops confidence in the new product during the first attempt to use it (Ram & Jung, 1991).

Those who tried a nicotine product a few times and did not proceed to smoke regularly (triers) did not develop a nicotine dependency. They are either in the stage of deciding whether to accept or reject the product, or they have already rejected the product. Wasson describes these attempts as a learning period of the use-system for the consumer, a period, which demands effort and practice without the reward of satisfaction from the product. The trier needs consistent encouragements, to be motivated enough to finish his/her training. According to Wasson, the vast majority of triers succeed in mastering the technique to the level of satisfaction. Nonetheless, the learning process in the use of a new product is a barrier, which sets back the future market growth of the new product. The sign of the completion of the learning period to the point of satisfaction is the transition of the subjects from periodic use to repetitive use. Such consumers can be classified as acquisition adopters (Wasson, 1974).

Those who reach the point of adoption and are satisfied with the product will stick with that product over new alternatives, based on their positive experience with it (Bauer & Wortzel, 1966). Less satisfied consumers will look for new alternatives, which satisfy them and which blend into the current technological regime (Geels, 2005; cf. Wasson, 1974). They will decide to try an innovation only if they are convinced based on their information gathering that the new product is a better match to their desire-set than their current product (Olshavsky & Spreng, 1996).

Beyond these less satisfied consumers who continue to search for satisfaction, it is assumed, although not yet proven, that innovations also expand the market size, as new consumers who rejected other products for the same

need find the new innovative product to be a match for their desire-set (Saviotti, 2002; Thorelli & Burnett, 1981). The entry of additional types of products enlarges the variety of product types in the market and consequently enlarges the different types of consumers who consume the product-group (Crawford, 1972; Johnson & Jones, 1957; Wasson, 1974).

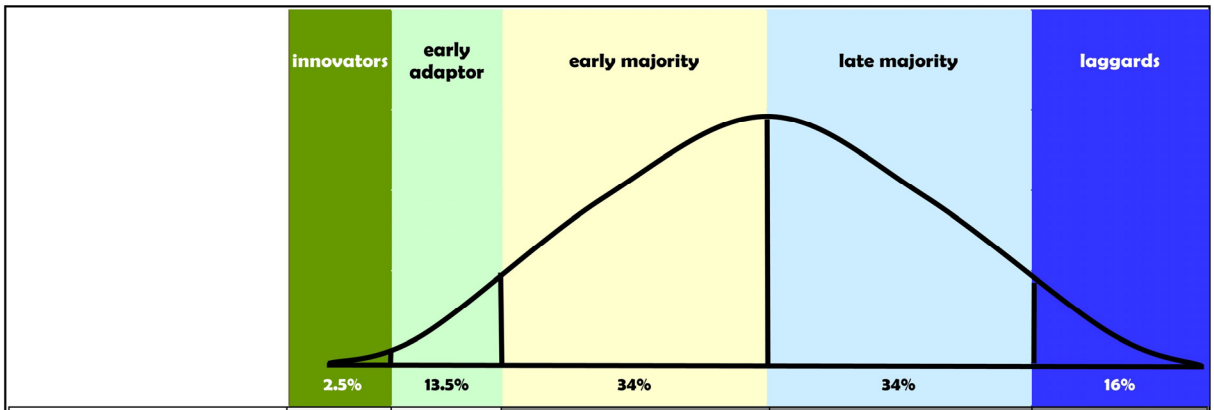
This is also the point of entry to addiction. Nicotine dependency evolves as the user proceeds from the trial stage to the adoption stage (DiFranza et al., 2000) (Note 8). This shift is the point where the user passed his/her last exit point from the market. The addictive influence of this product-group makes it extremely difficult for users who reach the "adoption stage" to reject their own adoption (Adams & Livingstone, 2015; Rogers, 2003).

2.3.2 The Social Perspective

Everett Rogers in his book *Diffusion of Innovations* layout the definitive terminology and definitions for the theory of diffusion (Rogers, 2003): He describes five intrinsic levels of inclination to adopt an innovation for each member of a social system (Rogers, 2003; Rogers & Beal, 1958) (Note 9): innovators; early adopters; early majority; late majority; and laggards (*illus.* Figure 6).

His variable for measuring the diffusion rate of an innovation was the number of individuals who either completely adopted the product, or were, at least, close to complete adoption (Rogers, 1958). The stages in his model focus on adoption while ignoring the rate of triers as an equivalent indicator. In practice, Rogers ignores the earlier work by Ryan and Gross (1950), who observed both the rates of triers and the rate of adopters. Ryan and Gross found a reverse correlation between the prevalence of adoption and the trial period. Moreover, the diachronic analysis by Ryan and Gross reveals that low adoption rates of a product could change over time, as the rate of use increases (*ibid.*).

At the stage where laggards begin to adopt the innovation, its use is so common that the product is considered to be a mandatory standard, and has already begun to be replaced by the next advanced product among innovators (Rogers & Shoemaker, 1971). The innovators tempt to try to satisfy the same needs by using an innovative product suitable to the current technological regime, and by that creating an endless cycle of innovation (Phillips, 2016).



	innovators	early adaptor	early majority	late majority	laggards
▪ **scientists as reference group**	high	high	low	low	low
▪ **commercial sources as reference group**	low	high	low	low	none
▪ **social ties outside the community**	high	high	low	low	none
▪ **social dependency**	independent	independent	dependent	highly dependent	highly dependent
▪ **social ties in the community**	low	high	moderate	moderate	low
▪ **friends as reference group**	low	moderate	high	high	low
▪ **neighbors as reference group**	low	low	moderate	moderate	high
▪ **family as reference group**	low	low	moderate	high	high

Figure 6. Adoption categories based on Rogers' definitions

Sources: Lionberger, 1954; Rogers, 1958; Rogers and Beal, 1958; Ryan, 1948; Ryan and Gross, 1943, 1950; Wilkening, 1950, 1951, 1952.

Ethnocentrism and collectivism are found to be negative influences on the innovativeness of the individual, regardless of his/her personality and psychological characteristics. Social influence on an individual is so comprehensive that it is not just additional value in an individual desire-set, but rather, it pushes the desire-set of the individual towards a preference for more traditional motivations conforming to existing social values (Steenkamp, ter Hofstede, & Wedel, 1999). As a result, the rate of social dependence reversely correlated with the individual tendency to adopt innovations. A higher social dependency means a more conservative approach by the individual (Wilkening, 1950).

The social surroundings are the individual peer-groups of friends within the entire community (Lionberger, 1954). An innovation can be condemned in one peer-group while being highly appreciated in another peer-group. Therefore, the tendency to adopt a certain innovation by the individual depends mainly on the opinion of that individual's closest friends (Warde, 2002).

3. Method

3.1 Data Collection and Sample

The research included five online surveys conducted between October 2017 and May 2019, among the Jewish population in Israel, using an online survey panel, "Midgam Project Panel." The surveys were conducted as follows:

Table 1. Stages of data collection

#	Dates	Sample	Ages	Main Subject
1	October 31–November 3, 2017*	844	12-64	The framing of nicotine products in the population
2	April 30–May 3, 2018**	1710	12 and above	The correlation between price and consumption of nicotine products
3	August 5–August 7, 2018	431	12-18	The effect of the school environment on smoking behaviour among youths
4	October 29–November 8, 2018	406	12-18	The effect of advertainment of nicotine products on youth
5	April 19–May 7, 2019	2300	12 and above	E-cigarette market penetration, and the consumer response

Note. * A small supplement was conducted on November 12, 2017; ** Small supplement was conducted on May 22, 2018.

Each participant entered his/her demographic data as part of the registration to the panel. The participants' collected answers were downloaded as CSV files and uploaded to an R platform (R Core Team, 2020) for tagging and preparation. The final survey was completely analyzed in R, including statistical calculation and the production of outputs. The analyses were weighted to be nationally representative by age and gender, based on the national demographic estimates of the Central Bureau of Statistics of Israel for 2017 (Israel Central Bureau of Statistics, 2018, Pl. 2.3).

The first survey in November 2017 was used as a preliminary observation of the state of smoking in the population, an experimental arena for understanding the right approach to measuring the behaviour and consumption of smoking products.

The questionnaire was based on the formal questions used in the Global Youth Tobacco Survey 2002 (GYTS, 2002). Since the GYTS questionnaire was meant for adolescents, it was unclear whether the formulation of the questions on the intensity of use and the product types which were tried and used was equally suitable for adults. Since both adolescents and adults consume nicotine products, the authors had to develop a measuring method suitable for both groups. This method was developed based on the outcomes of the previous surveys carried out prior to the last wave of Apr-May 2019. So that each survey sample could be compared to the previous one, the randomized samples of all five waves were designed to represent the same population. Although the data collected in the first four surveys is of limited value to the issues presented here, the contribution of those waves to the development of the methodology was significant. Each wave was conducted after a thorough study of the results from the methodological adjustments to the previous wave, until reaching the optimal method for researching the issues presented in this paper.

Table 2. Sample demographic weight, by survey waves

	Oct–Nov 2017	*Apr–May 2018*	*Aug 2018*	*Oct–Nov 2018*	*Apr–May 2019*
Gender:					
Female	51.8% (437)	56.4% (965)	59.4% (256)	52.0% (211)	52.4% (1205)
Male	48.2% (407)	43.6% (745)	40.6% (175)	48.0% (195)	47.6% (1095)
Total	100.0% (844)	100.0% (1710)	100.0% (431)	100.0% (406)	100.0% (2300)
Age					
Age 10–14	5.6% (47)	2.5% (42)	8.1% (35)	7.1% (29)	1.2% (27)
Age 15–17	29.3% (247)	15.7% (269)	67.3% (290)	66.5% (270)	9.2% (212)
Age 18–19	3.3% (28)	9.6% (164)	24.1% (104)	25.9% (105)	14.6% (335)
Age 20–21	1.7% (14)	8.1% (138)	0.2% (1)	0.2% (1)	13.8% (317)
Age 22–24	6.2% (52)	21.1% (360)	0.2% (1)	0.2% (1)	17.9% (412)
Age 25–29	8.2% (69)	15.1% (259)	-	-	11.2% (257)
Age 30–34	7.8% (66)	16.7% (285)	-	-	8.3% (192)
Age 35–44	14.9% (126)	3.8% (65)	-	-	5.6% (128)
Age 45–54	12.0% (101)	3.1% (53)	-	-	4.5% (104)
Age 55–64	11.1% (94)	2.6% (45)	-	-	7.4% (171)
Age 65 and above	-	1.8% (30)	-	-	6.3% (145)
Total	100.0% (844)	100.0% (1710)	100.0% (431)	100.0% (406)	100.0% (2300)
District					
Center	25.8% (218)	27.3% (466)	31.1% (134)	30.3% (123)	28.8% (663)
Haifa	10.9% (92)	11.3% (194)	11.1% (48)	10.6% (43)	10.3% (237)
Jerusalem	12.8% (108)	12.1% (207)	8.4% (36)	9.1% (37)	13.6% (312)
Judea and Samaria	8.9% (75)	10.1% (172)	7.4% (32)	6.7% (27)	6.7% (153)
North	9.2% (78)	7.5% (128)	8.1% (35)	10.3% (42)	8.7% (201)
South	13.5% (114)	14.2% (242)	15.8% (68)	14.8% (60)	12.0% (276)
Tel-Aviv	17.9% (151)	16.6% (284)	16.5% (71)	16.3% (66)	19.9% (458)
Unknown	0.9% (8)	1.0% (17)	1.6% (7)	2.0% (8)	-
total	100.0% (844)	100.0% (1710)	100.0% (431)	100.0% (406)	100.0% (2300)
Religious identity					
Religious	21.6% (182)	22.5% (384)	25.3% (109)	21.4% (87)	17.1% (393)
Secular	39.5% (333)	37.4% (639)	46.4% (200)	48.3% (196)	50.1% (1152)
Traditional	24.4% (206)	27.2% (465)	22.0% (95)	24.1% (98)	20.0% (460)
Ultra-orthodox	14.6% (123)	12.9% (221)	6.0% (26)	6.2% (25)	12.8% (295)
Unknown	-	0.1% (1)	0.2% (1)	-	-
Total	100.0% (844)	100.0% (1710)	100.0% (431)	100.0% (406)	100.0% (2300)

3.2 Measures

Since smoking is generally disapproved of by society, there is a concern about a social desirability bias among adults and youth (Moskowitz, 2004). To avoid this bias, several techniques were employed, such as thoughtful sequencing retrieval for factual questions, avoiding numeric questions about the intensity of smoking (cf. Tourangeau, Rips, & Rasinski, 2000), and the use of language compatible with the terminology used by nicotine users.

The basic classification of each subject was his/her experience with and use of nicotine products. The participants were asked if and for how long they have used nicotine products, whether cigarettes, hookah, IQOS, or e-cigarettes. According to the subjects' responses to this question, they were sorted in a way that affected the type of questions each subject was requested to answer. Never-smoked youths were required to answer only questions about their knowledge and opinion of nicotine products, while never-smoked adults were filtered out of the surveys in March–April 2018 and 2019 since the importance of their participation was less relevant to the objectives of these two surveys.

The product types options presented to participants who have tried (triers), used (former users), or use (active users) nicotine products today were packaged cigarettes, roll-your-own tobacco, hookah, cigars, and cigarillos, electronic cigarettes, and IQOS. Although JUUL is a brand of electronic cigarettes, the brand was presented as a separate type of product, to avoid misunderstanding by participants who use JUUL but see it as a different type of nicotine product (Note 10).

In the survey of March–April 2019, the active users and some of the triers were asked about the main reason that led them to try electronic cigarettes as a preliminary exploration of the subject.

3.3 Measurement Model

In addition to descriptive statistics, the researchers used an accelerated registration on aggregated results for examining the correlation between triers and users of a product.

In 1998, the World Health Organization (WHO) published a standard classification of smoking habits and intensity density, for the benefit of comparing smoking rates between countries (World Health Organization, 1998). Up until then, researchers used many different and inconsistent methods of measurement (Dent, Sussman, Johnson, Hansen, & Flay, 1987; Marcus, Giovino, Pierce, & Harel, 1993; Nafstad et al., 1996).

The WHO classification set the use of a base of 100 cigarettes since birth as a benchmark for defining a smoker (World Health Organization, 1998). Those who tried fewer than 100 cigarettes but were non-daily users were defined as non-smokers, which eliminated the distinction between triers and never-smokers. This categorization is methodologically problematic for several reasons:

- Categories measuring the numeric intensity of a behaviour increase the social desirability bias (Tourangeau et al., 2000);
- This limits the ability to measure addiction rates (DiFranza et al., 2000);
- and it limits the ability to estimate the distribution of nicotine products (*ibid.*).

The WHO also suggested classifying adolescents differently from adults, by defining any youth who smoked even once in the last month as a daily user (World Health Organization, 1998). However, inconsistent measuring makes it impossible to analyze the adoption of the product over a lifespan, from embracing the habit at an early age until cessation or death.

Although the WHO guidelines do not require it, the United States Centers for Disease Control and Prevention (CDC) defines the intensity of use according to the number of days and the average number of cigarettes per day the subject smoked in the last 30 days (Centers for Disease Control and Prevention (CDC), 2019). Such detailed information is difficult for a person to remember, let alone going back over a long period such as 30 days. The survey further limits its age range to 18-year-olds and above, although the habit of using nicotine products may start at a younger age.

The research limitations caused by the 100 cigarettes benchmark were also noted by Wasim Maziak, Kenneth Ward, Rima Afifi, and Thomas Eissenberg (Maziak, Ward, Afifi Soweid, & Eissenberg, 2005) with regards to their field research on Hookah use in Syria (Maziak, Fouad, et al., 2004; Maziak, Rastam, et al., 2004; Maziak, Ward, & Eissenberg, 2004; Rastam, Ward, Eissenberg, & Maziak, 2004; Ward et al., 2005). The group resolved this obstacle by creating a classification of five categories: “Never,” “Smoked in the past”, “Monthly”, “Weekly” and “Daily” (Maziak et al., 2005).

In the early survey of March–April 2018 of this research, some of our respondents replied that they only tried smoking a few times and abandoned the habit. In the following surveys, we added the additional rubric of “tried few times.” The addition of this further option of “tried a few times” affected the categories of both “never users” and “former users.” The per cent. of “former users” decreased substantially, revealing the highly addictive influence of nicotine, and the low odds of cessation. Finally, we formulated the following scale (*illus.* Figure 7), which resembles the Maziak, Ward, Afifi, and Eissenberg classification system:

- Daily users: Respondents who use a nicotine product every day or almost every day. This category applies mainly to users of casual types, such as combustible cigarettes, RYO cigarettes, IQOS, and electronic cigarettes (Note 11).
- Weekly users: Respondents who use a nicotine product once or twice a week. This category is appropriate for users who prefer a leisure type of nicotine products, such as hookah, cigar, or pipe, and its intensity of use is more apt than a definition as daily users. This category is also suitable for cigarette users who smoke on social occasions, or during the weekend.
- Occasional users: Respondents who use a nicotine product once in a while, at an intensity lower than once a week.
- Former users: Respondents who smoked in the past (for at least two consecutive months) and quit smoking.
- Few times triers: Respondents who tried smoking a nicotine product a few times in their lives.
- Never users: Responders who never tried a nicotine product, even once.

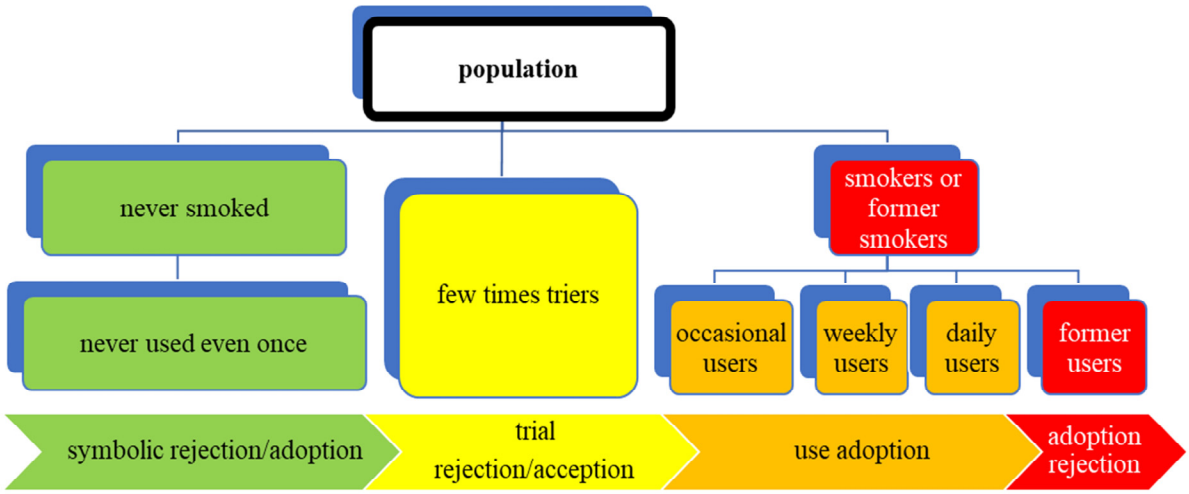


Figure 7. Comparison between a generic consumption flowchart and the intensity of nicotine products use

Note. Based on Klonglan and Coward, 1970.

It is accepted to classify the period of life between childhood and adulthood into four stages: early adolescence (ages 10–13); middle adolescence (ages 14–17); late adolescence (ages 18–21); and emerging adulthood (ages 18–25). Besides specific differences in physical, emotional, and cognitive development, these age groups are shaped by social factors such as legal status and participation in the institutions of society (Steinberg, 2017). For example, the military or civilian conscription of most Israeli youngsters at the ages of 18–21 (Note 12) influences the range of ages for each adolescence stage. To correlate the adolescence process in Israel with the conventional model, in this study, we defined the stages as follow:

- Early adolescence: the age-range of lower secondary (middle school) education, ages 12–14;
- Middle adolescence: the age-range of upper secondary (high school) education, ages 15–17;
- Late adolescence: the age-range of military or civilian service, ages 18–21;
- Emerging adulthood: the main age-range of undergraduate education, ages 22–24.

4. Results

Subgrouping the sample by the above age groups revealed that the Israeli population develops the habit of nicotine use gradually, beginning in early adolescence up until the age of 35. Beyond 35, the proportion of users remains stable.

4.1 The Importance of Triers as an Index

The primary increase in the use of nicotine products occurs from early youth to the age of 35. Beyond the age of 35, the rate of cessation increases as people get older (*illus.* Figure 8).

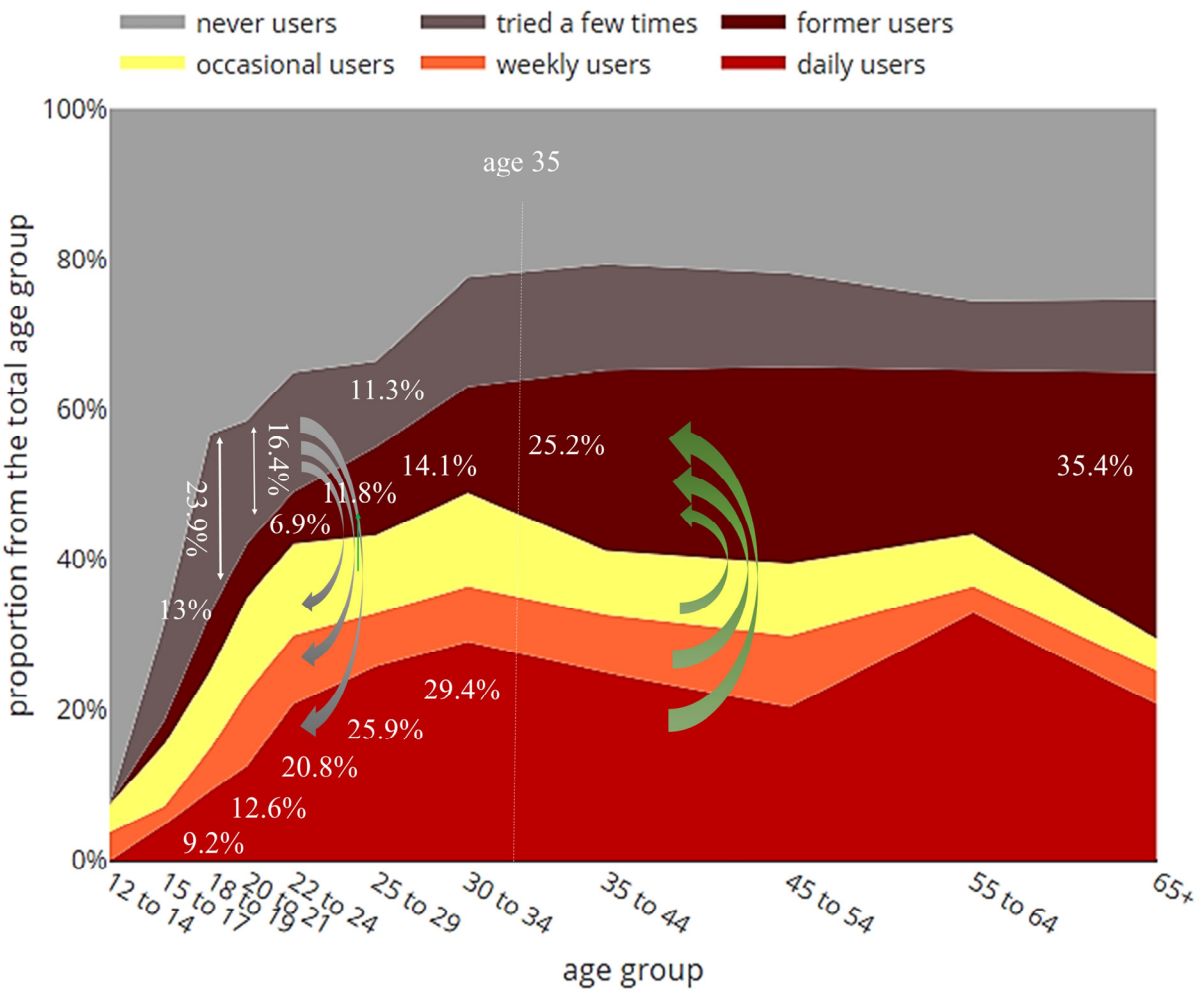


Figure 8. Nicotine use habits in the population, by age groups (Wave of April 2019)

Although the age range between 12 and 35 is only a quarter of a human's life expectancy, this group of people is the most interesting to study, since these are the years when users adopt the nicotine products habit.

Shortly after passing the minimum legal age for purchasing nicotine products (age 18), the rate of triers almost doubles in size: reaching the rate of 23.9% (95% CI [19.34, 28.46]) after the shift from the 15–17 age-group to the 18–19 age-group. Among the 20–21 age-group, some of these triers have become regular users, as revealed by a growth of 9.6% in active smokers, which is a lot more than the decrease in the rate of triers (Figure 9). Most of the movement at ages above 19 is towards becoming daily users, which negatively affects the number of non-smokers, triers, and even former smokers, especially among the age-group of 22–24 (Figure 9).

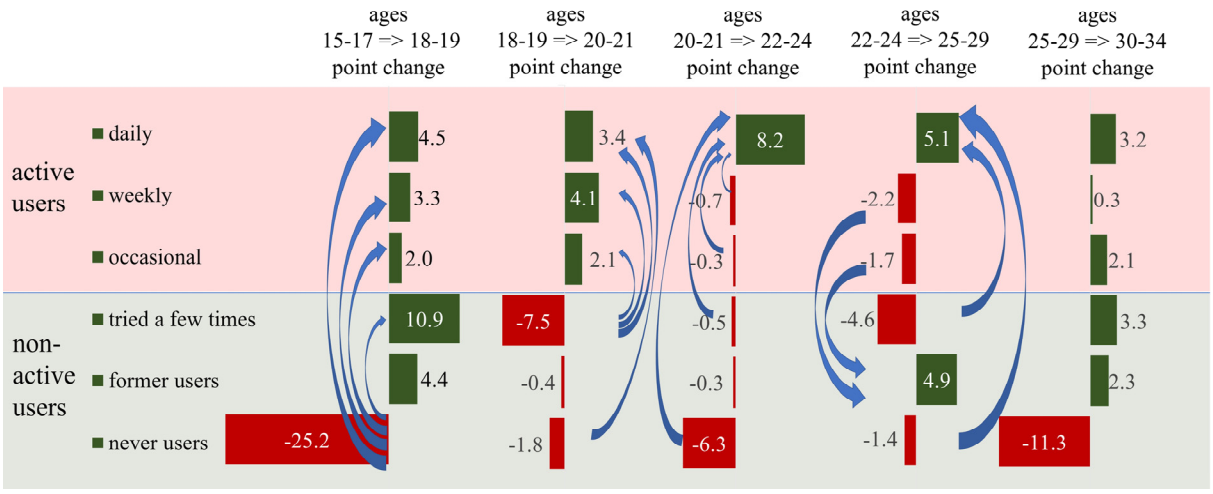


Figure 9. Point change between age groups by duration (Wave of April 2019)

Cessation starts to increase among the 25–29 age-group, while the weight of triers returns to the level it was among the middle adolescence group (age-group 15–17), before peaking among 18 years old young-adults and above. The effects of the termination of the sales ban at the age of 18 finally come to an end, along with other reasons (Note 13). Starting at the age of 25, the dynamics of the market transform from mostly adoption by new users to rejection by adopted users.

4.2 Smoking vs. Vaping: The Subjectivity of Users as Non-smokers

It was clear from the results of the last wave, conducted in April 2019, that respondents who mainly use electronic cigarettes differentiate between "smoking" and "vaping." This is expected, as previous research has shown that both legal interests (Willis, Haught, & Morris, 2017) (Note 14) and self-image encourage electronic cigarettes users to see themselves not as smokers, but as vapers (Agaku, Odani, Vardavas, & Neff, 2018; Young-Wolff et al., 2017). An estimated 12.6% of triers (95% CI [9.48, 15.7]) and 12.9% of active users (95% CI [9.08, 16.55]) of either THP (tobacco heating products) or ENDS products replied as if "vaping" is not "smoking" (Note 15).

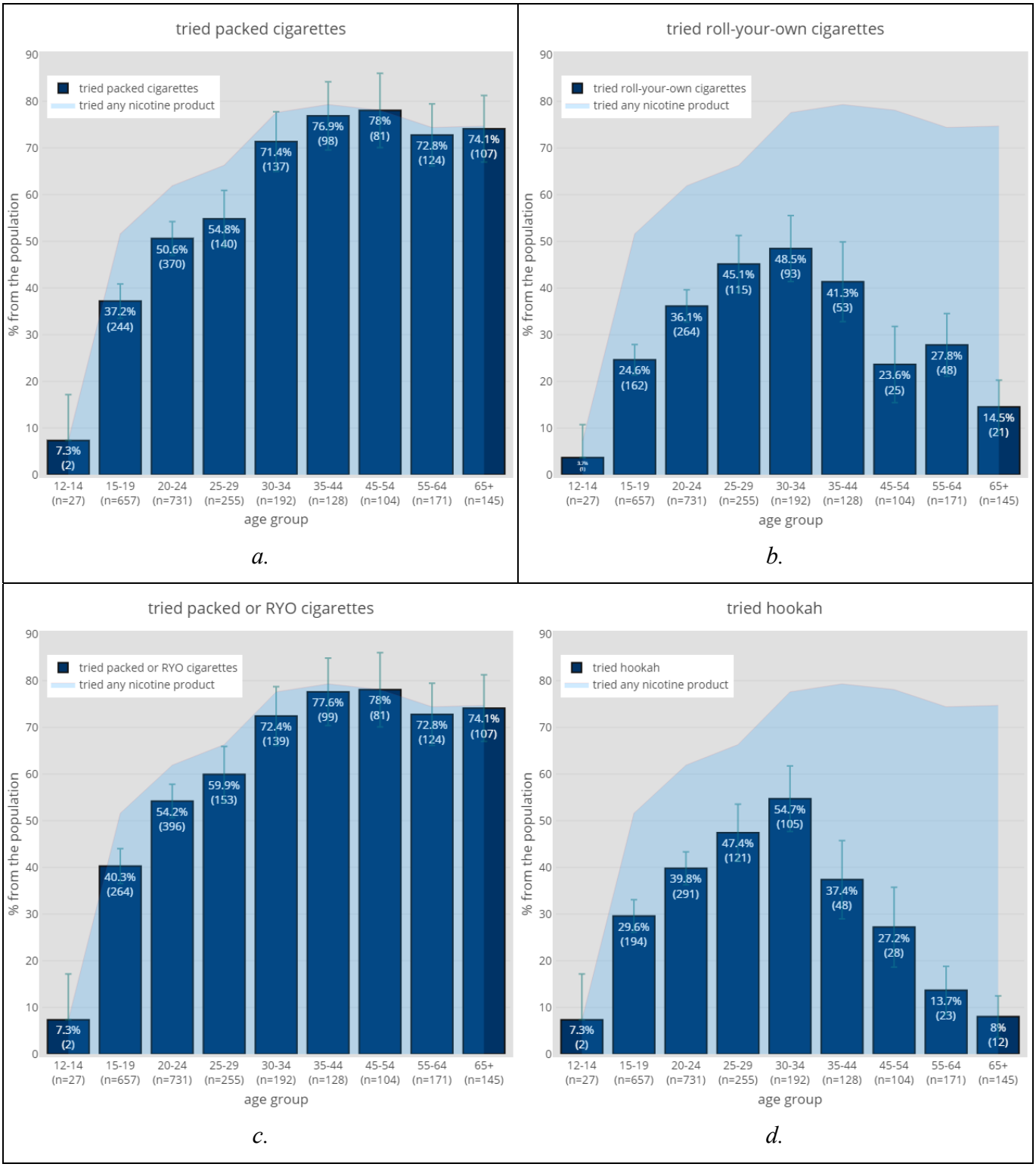
Table 3. An estimated portion of nicotine product users who define their vaping behaviour as different from "smoking"

	$\hat{P}(f)$	$P(f)$	MOE Adj.	95% CI Adj.
ever used THP and ENDS	66 (12.6%)	36 (12.6%)	3.11%	[9.48, 15.7]
active users of THS and ENDS	41 (12.9%)	25 (12.8%)	3.74%	[9.08, 16.55]

4.3 The Consumer Experience of Each Type of Nicotine Product

Geography and culture influence the orientation to certain types of nicotine products. The predominance of packed cigarettes is reflected in the findings of the current research. Figure 10(a) shows very clearly that almost all of the triers, users, and former users of nicotine products above the age of 35 have had some experience with packed cigarettes. Younger participants tried packed cigarettes widely, but some limit themselves to the inexpensive alternative of roll-your-own products (Note 16). The difference is evident mainly at ages below 30 (see the comparison between Figure 10(a) and Figure 10(c)).

The prevalence of triers, users, and former users of hookahs is second only to combustible cigarettes. This result is expected since previous research arrived at similar results in Israel (Baron-Epel, Shalata, & Hovell, 2015) and other eastern Mediterranean countries (Maziak et al., 2015; Tucktuck, Ghandour, & Abu-Rmeileh, 2017) (Note 17). The rate found in the young adult age-group (ages 25 to 35) in the current research indicates a strong attraction to this product type, reaching about half of the population (Figure 10(d)). Nonetheless, the popularity of the hookah as a product type among potential consumers seems to be limited to a certain age of about 35, beyond which potential consumers are less attracted (Figure 10(d)).


tried packed cigarettes
tried packed cigarettes
tried any nicotine product
% from the population
7.3% (2)
37.2% (244)
50.6% (370)
54.8% (140)
71.4% (137)
76.9% (98)
78% (81)
72.8% (124)
74.1% (107)
12-14 (n=27)
15-19 (n=657)
20-24 (n=731)
25-29 (n=255)
30-34 (n=192)
35-44 (n=128)
45-54 (n=104)
55-64 (n=171)
65+ (n=145)
age group
a.
tried roll-your-own cigarettes
tried roll-your-own cigarettes
tried any nicotine product
% from the population
24.6% (162)
36.1% (264)
45.1% (115)
48.5% (93)
41.3% (53)
23.6% (25)
27.8% (48)
14.5% (21)
age group
b.
tried packed or RYO cigarettes
tried packed or RYO cigarettes
tried any nicotine product
% from the population
7.3% (2)
40.3% (264)
54.2% (396)
59.9% (153)
72.4% (139)
77.6% (99)
78% (81)
72.8% (124)
74.1% (107)
age group
c.
tried hookah
tried hookah
tried any nicotine product
% from the population
7.3% (2)
29.6% (194)
39.8% (291)
47.4% (121)
54.7% (105)
37.4% (48)
27.2% (28)
13.7% (23)
8% (12)
age group
d.

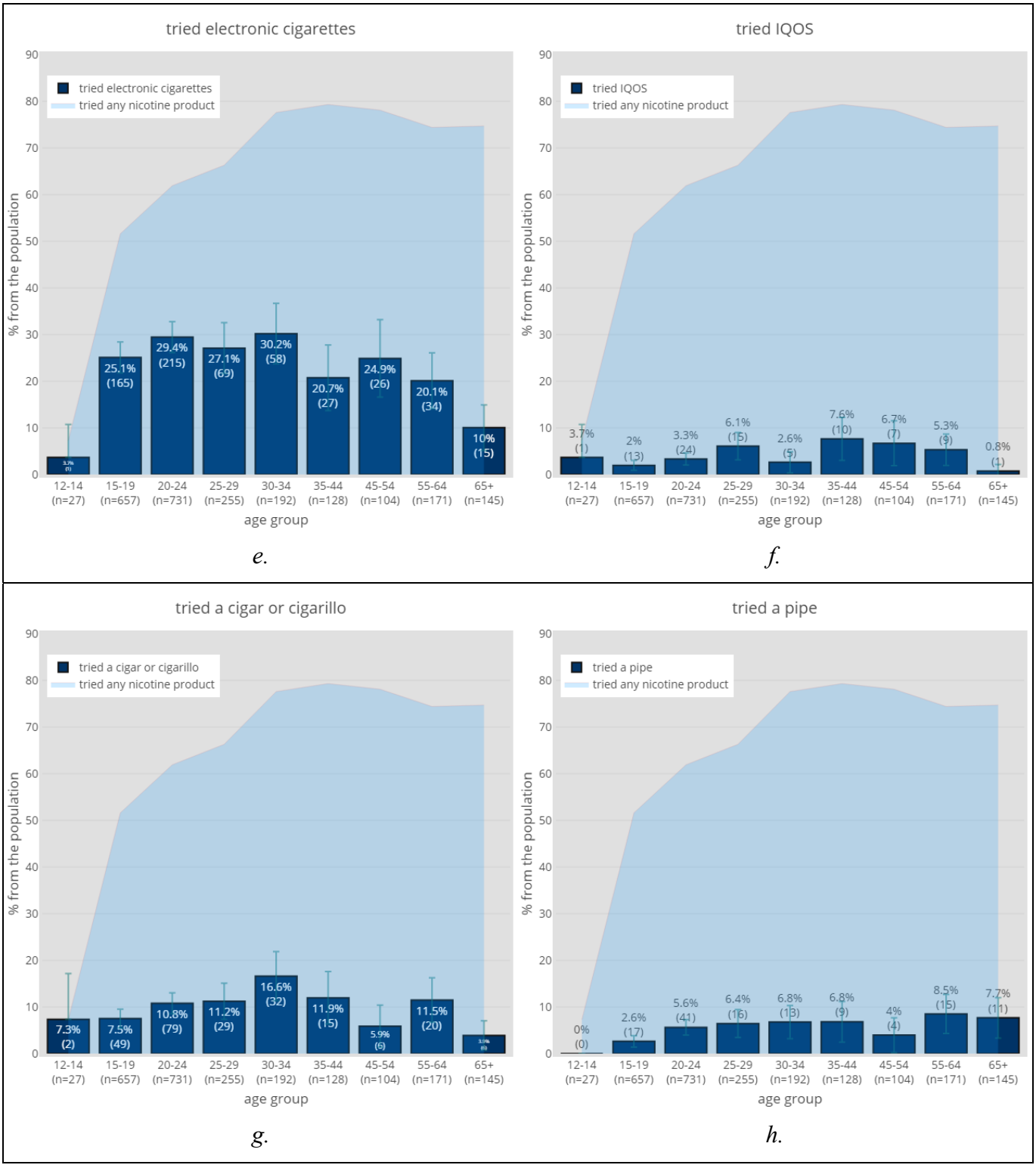


Figure 10. The proportion of triers of nicotine products, by product (n = 2296)

Unlike hookah, the age distribution among electronic cigarette triers, users, and former users is balanced between the age-groups (Figure 10(e)).

The pipe, cigar, and cigarillo are related by their consumption experience to the hookah (Hammal, Mock, Ward, Eissenberg, & Maziak, 2008), as a product for use as a leisure activity, while the smoking of cigarettes is done both at work and during leisure time (Brandt, 2007). Nonetheless, the different rates of popularity of the hookah

and other leisure product types (e.g., pipe, cigars, or cigarillos) is basically cultural.

4.4 Prevalence of Consumers of Each Type of Nicotine Product

As mentioned above, innovativeness is measured by the inclination to adopt a given product. Therefore, in addition to measuring the prevalence of each product through the experience of at least trying it, each subject was also asked about his/her usage in the last month, by the same categories of product types. Use over the previous month provides a good indication that the product type was adopted and not just tried, especially among respondents above the age of 22, when most of the population who wished to do so, have already tried a nicotine product (88.25%, 95% CI [85.09, 91.41]). We also preferred to limit the age to 24, to avoid the effects of the growing scale of former users from age 25 onward, as former users are subjects who rejected the category after its adoption.

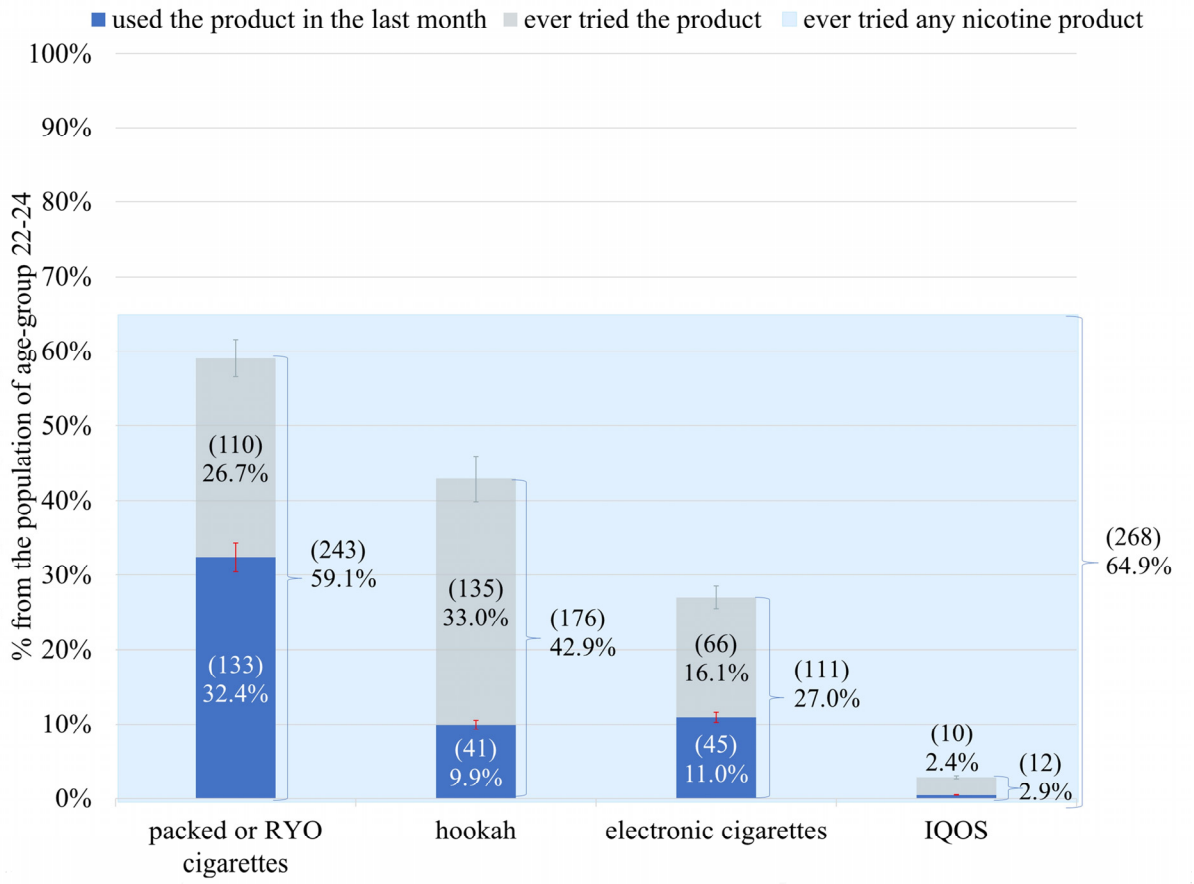


Figure 11. Rate of use in the last month among those who ever tried a certain nicotine product type, by product types (Ages 22–24, Wave March–April 2019)

About half of the combustible cigarette triers eventually adopt this type of product (55.84%, 95% CI [49.35, 62.33]), while the prevalence is lower for other types, reaching 40.5% (95% CI [31.41, 49.67]) for electronic cigarettes (*illus.* Figure 11) (Note 18).

4.5 The Reasons for Trying Electronic Cigarettes

In the March–April 2019 wave, the two leading reasons cited by subjects who either had tried, used, or were former users of electronic cigarettes were social influence and cessation. The role played by social influence was significantly different among responders younger than 35 in comparison to those aged 35 and above (*cf.* Table 4). While social influence serves as the predominant incentive among the group younger than 35, reaching a rate of 52.2% (95% CI [45.07, 59.39]), at the age of 35 and above, social influence reaches a rate of 29% (95% CI [22.19, 35.8]), which is slightly above the second most influential incentive for cessation in that same age group (26.04%, 95% CI [19.46, 32.62]).

Table 4. The main reason for trying electronic cigarettes among triers and adopters of electronic cigarettes (n = 466, Wave April 2019)

	Ages 15-34 (n = 382)				Ages 35-64 (n = 69)			
	$\hat{p}(f)$	$P(f)$	MOE Adj.	95% CI Adj.	$\hat{p}(f)$	$P(f)$	MOE Adj.	95% CI Adj.
friend or relative	210 (55%)	98 (52.2%)	7.16%	[45.07, 59.39]	20 (29%)	50 (29%)	6.81%	[22.19, 35.8]
to quit smoking	43 (11.3%)	26 (13.8%)	4.95%	[8.88, 18.78]	18 (26.1%)	44 (26%)	6.58%	[19.46, 32.62]
they are healthier	33 (8.6%)	14 (7.6%)	3.80%	[3.8, 11.4]	10 (14.5%)	24 (14.2%)	5.24%	[8.98, 19.46]
cost less	19 (5%)	12 (6.4%)	3.51%	[2.88, 9.9]	7 (10.1%)	20 (11.7%)	4.83%	[6.9, 16.55]
more places to use	18 (4.7%)	12 (6.2%)	3.45%	[2.71, 9.6]	6 (8.7%)	13 (7.8%)	4.01%	[3.74, 11.77]
Flavors	17 (4.5%)	7 (3.9%)	2.76%	[1.1, 6.62]	1 (1.4%)	2 (1.2%)	1.63%	[0, 2.83]
I see them everywhere	14 (3.7%)	7 (3.6%)	2.65%	[0.9, 6.21]	2 (2.9%)	5 (3%)	2.54%	[0.41, 5.49]
easier to get	9 (2.4%)	4 (2.2%)	2.12%	[0.12, 4.37]	3 (4.3%)	7 (4.2%)	2.99%	[1.16, 7.15]
for fun	3 (0.8%)	1 (0.4%)	0.93%	[0, 1.35]	0 (0%)	0 (0%)	0%	[0, 0]
famous people use them	3 (0.8%)	1 (0.4%)	0.93%	[0, 1.35]	0 (0%)	0 (0%)	0%	[0, 0]
less smelly	2 (0.5%)	1 (0.8%)	1.24%	[0, 1.99]	0 (0%)	0 (0%)	0%	[0, 0]
other	11 (2.9%)	5 (2.5%)	2.25%	[0.28, 4.78]	2 (2.9%)	5 (3%)	2.54%	[0.41, 5.49]

Health (7.6%, 95% CI [3.8, 11.4]) and marketing instruments such as cost (6.39%, 95% CI [2.88, 9.9]), flavors (3.86%, 95% CI [1.1, 6.62]), distribution (2.25%, 95% CI [0.12, 4.37]) or better smell (0.75%, 95% CI [0, 1.99]) were insignificant incentives for all ages.

5. Discussion

Following Johnson and Jones' model of classification of new products by product objectives (Johnson & Jones, 1957), it is apparent that the intention of the manufacturers and vendors of electronic cigarettes was to develop a new market alongside the current one for the same need, by framing the electronic cigarettes as a really-new product. Manufacturers and vendors of electronic cigarettes differentiate their products from other types of nicotine products by defining their motor-habit-system differently, as "vaping" and not "smoking" (Eversman, 2015; Laestadius, Wahl, & Cho, 2016; Shen, Banerjee, Greene, Carpenter, & Ostroff, 2017; Willis et al., 2017; Young-Wolff et al., 2017). This strategy is executed to enlarge the variety of product types on the market, while at the same time hoping to enlarge the number of consumers consuming nicotine products (cf. Crawford, 1972; Johnson & Jones, 1957; Wasson, 1974).

The rate of adoption found among triers of electronic cigarettes resembles the results of Ryan and Gross (Ryan & Gross, 1950), who also found a reverse correlation between prevalence and trial period. Although electronic cigarettes have a better comfort design than filter cigarettes, the rate of adoption by triers of electronic cigarettes is lower than the rate of adoption among triers of filter cigarettes. These findings support the assumption by Midgley and Dowling (1978), that prevalence affects the rate of adoption more than the product comfort design or other advantages. Consequently, it is expected that the rate of adoption among triers will rise, as the adoption rates of electronic cigarettes becomes more widespread in the population (cf. Ryan & Gross, 1950). Contrary to the assumption that most triers succeed in adopting the product (Wasson, 1974), the current research shows a high rate of rejection per product. Indeed, the failure rate is higher than the success rate for each nicotine product type, excluding combustible cigarettes (55.84%, 95% CI [49.35, 62.33]).

5.1 Diffusion of Innovation

The significant rate of rejection by triers of each product also emphasizes the need to distinguish between the stages of symbolic adoption, trial period, and use adoption of the product. The diffusion of an innovation seems to be an outcome of an increase in the triers and the adopters who switch from one product type to another in some correlated proportion. The increase in triers comes from the symbolic adopters, and the increase in use adopters comes from the triers who completed the learning process.

In accordance with the model offered by Rogers (2003), while the rate of triers of filter cigarettes among the 22–24 age-group reaches the late majority (59.07%, 95% CI [54.32, 63.82]), the rate of actual adopters among the same population is limited only to the early majority (32.39%, 95% CI [27.87, 36.91]). Although the rate of actual adopters is the rate of the early majority, the next individual who tries the product for the first time will come from the late majority population, since the rate of triers is at the level of the late majority.

As for the electronic cigarette product type, the rate of triers among the 22–24 age-group is at the level of the

early majority (27.03%, 95% CI [22.74, 31.32]). Therefore, the next individual who tries the product for the first time will belong to the early majority population, although the rate of actual adopters for the same population is limited only to the early adopters (10.98%, 95% CI [7.95, 14]).

The rate of adopters among triers of certain products correlates to the rate of triers in the general population (cf. Ryan & Gross, 1950). An exponential regression was calculated to predict the adoption probability, based on trial and use rates for the 20–21 and 22–24 age-groups, for combustible cigarettes, THP (IQOS), and ENDS (*illus.* Figure 12).

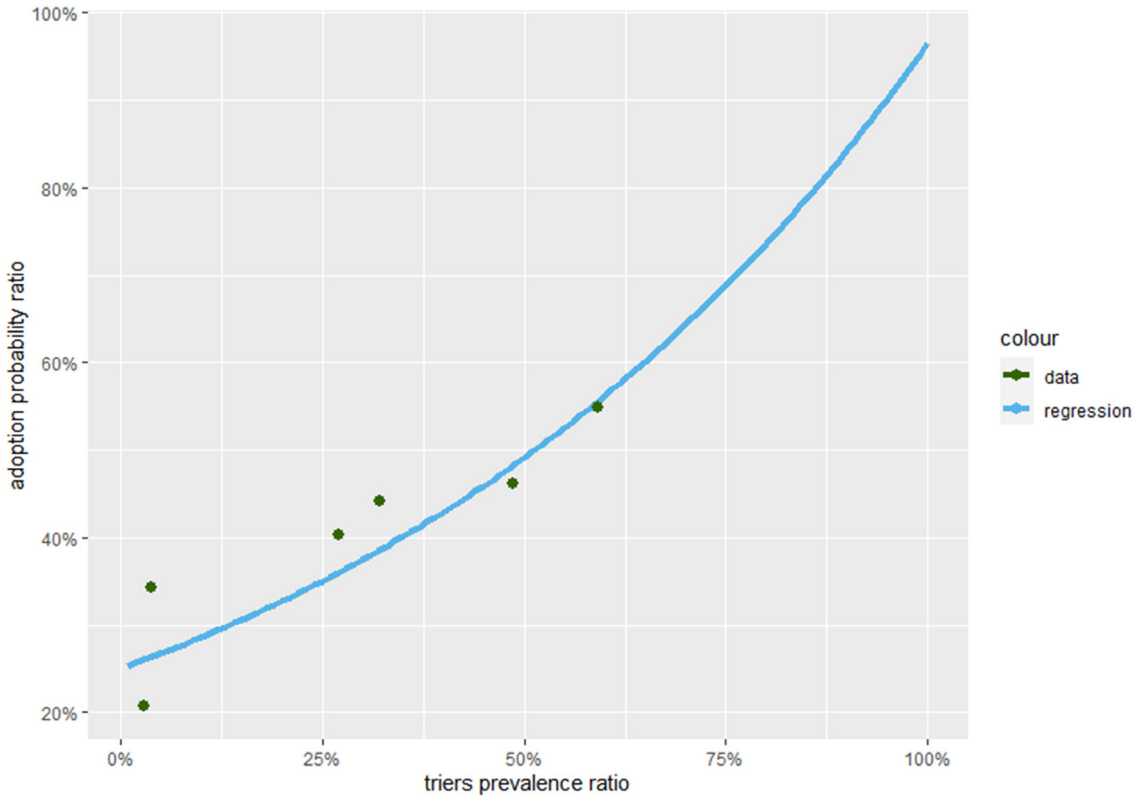


Figure 12. Correlation between adoption probability and the prevalence of triers

The prevalence of triers was a significant predictor of adoption probability (Note 19). From these variables, the following formula was derived to predict the prevalence of users:

$$\widehat{\mathrm{ADR}} = \frac{\overline{USE}}{\overline{TRY}} \quad \Leftrightarrow \quad \widehat{\mathrm{ADR}} = 0.25 \cdot EXP(1.35) = 0.25e^{1.35x} \quad \therefore \quad \overline{USE} = \overline{try} \cdot 0.25e^{1.35 \cdot \overline{try}} \tag{1}$$

ADR = Adoption probability

TRY = Triers

USE = Adopters

Figure 13 presents simply the correlation between triers, adopters, and the adoption probability, by rates of a certain milestone in the diffusion of radical innovation as a really-new product. The model, as illustrated in Figure 13, merges the market dynamics according to Levitt's "product life cycle" model (Levitt, 1965), and social adoption according to Rogers' "diffusion of innovation" model (Rogers, 2003). The exponential growth in the adoption probability out of the prevalence of triers illustrates the stronger impact of social influence over the rational evaluation by the individual. A trial acceptance by an individual depends significantly on the extent of symbolic adoption by other members of his/her society.

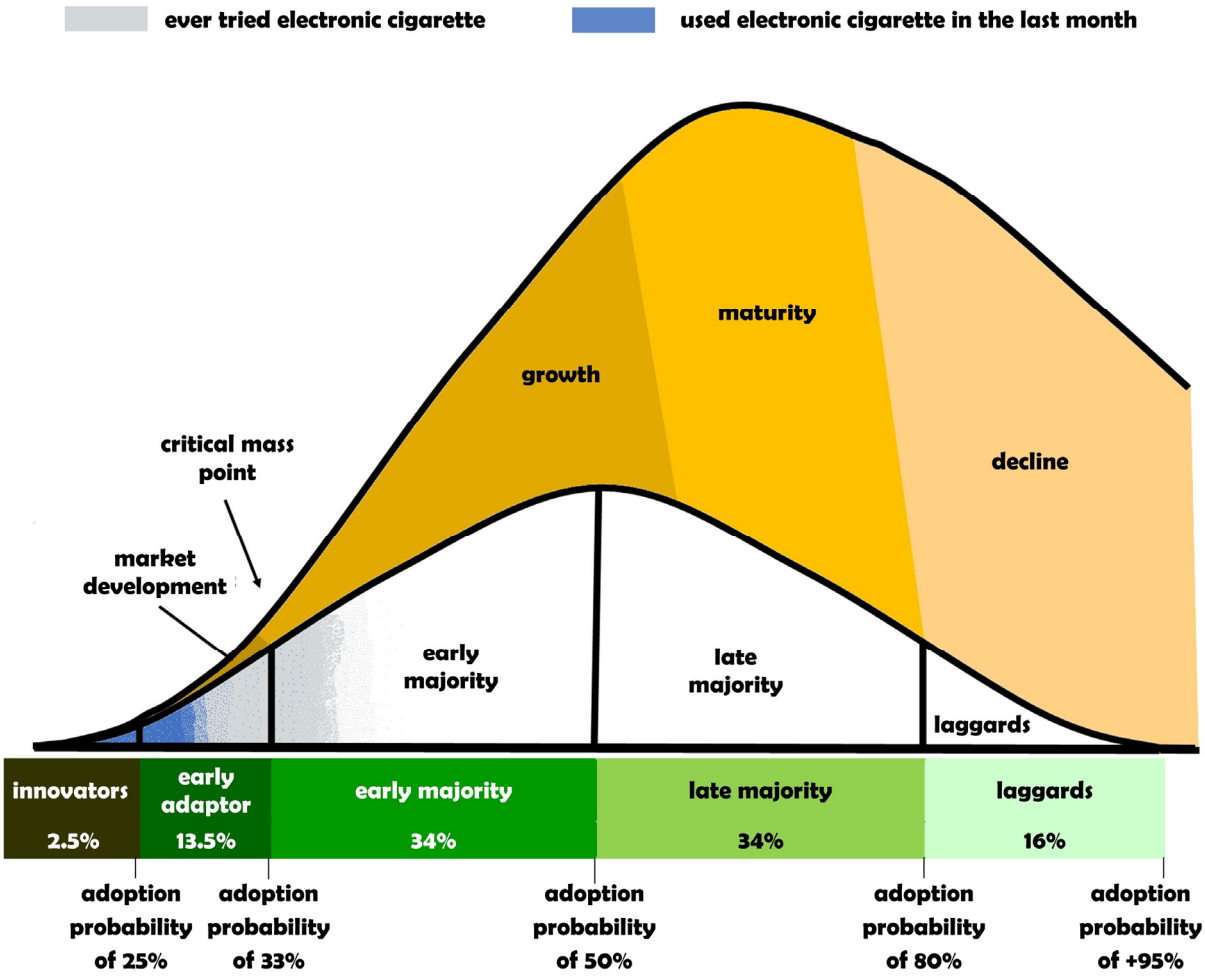


Figure 13. The innovation diffusion model by Rogers (2003) and the model of product life cycle by Levitt (1965), applied to the electronic cigarette product type, April 2019

The understanding that the rate of triers is more significant than the rate of use-adopters also contradicts Rogers' assumption that the early majority will start to try a new product only after the adoption of the product by the early adopters. The early majority also begin their trial experience after the early adopters, even if early adopters rejected the product to some extent during the trial period (*illus.* Figure 13).

The results of this research data illustrate a market dynamic where there is an entrance of the early majority following the trials of the early adopters, even though part of the early adopters rejects the product. It could be that the rate of success beyond the critical mass point and into the "take-off" period (def. Rogers, 2003, pp. 34, 370–371) depends on the proportion of trial acceptance among the early adopters, but this speculation could not be confirmed by the data of the current research. The strong social influence for trying electronic cigarettes ensures that electronic cigarettes penetrated the early majority population. Unlike the early adopters, who communicate by being advisors, the early majority prefer to garner and share their information from their peer groups of friends or neighbours, as they are more socially dependent than the early adopters (Lionberger, 1954; Lionberger & Coughenour, 1957; Rogers & Shoemaker, 1971; Wilkening, 1950). Their final act of purchasing an innovative product depends more on social engagement than for the early adopters (Note 20).

As for IQOS, it seems that the brand, as well as the product type itself, has not passed the market development stage. It has barely reached the early adopters and remains an innovators' product. Since IQOS is not an ENDS product, but a THP product, IQOS is defined as a brand, which represents a separate type of products. Several Supreme Court decisions in 2017 led to regulative differentiation between ENDS products and THP products (Rosen & Kislev, 2018).

5.2 Predicting Further Development of the Market

It seems that sales of electronic cigarettes affect the sales of filter cigarettes, just as filter cigarettes affected those of non-filter cigarettes (cf. Figure 2). Although filter cigarettes have been in a gradual decline for a long time, they are still the 'warhorses' (*def.* Barksdale & Harris, 1982) of Philip Morris International and British-American Tobacco. As sales continue to decline, the companies that have also developed strong electronic cigarette brands will reduce their expenditures on filter cigarettes in favour of more promising types of nicotine products (cf. Barksdale & Harris, 1982; Enis et al., 1977).

The electronic cigarette, developed to be the star nicotine product alternative to the filter cigarette, has yet to become a cash cow. But JUUL's success as a market leader demonstrated the existence of solid demand for an electronic cigarette of similar design. As can be expected, in the months following the successful introduction of JUUL in 2019, a boom of imitation brands was launched into the Israeli market, in a rush for the hidden gold of this new highly profitable market (cf. Levitt, 1965). "Logic" (Japan Tobacco International), KILO, and Vype ePen 3 (British-American Tobacco) (Linder, 2019) are just a few examples. The visual appearance of JUUL's device became the dominant design for electronic cigarettes, as JUUL's competitors realized that they had to copy its design to remain in the industry (Shapiro, 1986). The dominant design will ultimately define the use-system of this product type from now onward, and thus, the design of the JUUL device will shape the use of electronic cigarettes shortly, regardless of the actual product brand (*ibid.*).

As an outcome of the progress of the electronic cigarette as a product type beyond the critical mass point, passing the "market development" stage toward the "growth" stage, there is no longer a need to communicate the product's qualities to the public. The intensive debate in the Israeli media about the values and risks involved in consuming electronic cigarettes is expected to fade away from the public sphere. There is no need for this debate from the industry standpoint since the values and risks of using this product have already been determined in the public consciousness. At this point, the growth in sales beyond the critical mass point is expected to be self-sustaining with little promotional input (cf. Rogers, 2003; Wasson, 1974). Influence through social interaction encourages the continuation of the product's diffusion among new users (Rogers, 2003, p. 370). As the product's life cycle proceeds into the advanced phase of growth and onward to the maturity stage, advertisement and agenda-setting in the media lose their influence over the target audience, while the influence of homophilic interaction increases and becomes the predominant communication for persuading additional individuals to try the new product for the first time (Horsky & Simon, 1983; Rogers, 2003).

6. Conclusion

According to current scholarship, a critical mass point occurs when enough individuals have tried a radical innovation of a CPG product, but its rate of adoption is not the indicator for reaching that point. Therefore, for better monitoring of the diffusion of radical innovation, it is important to measure the prevalence of triers of this innovation alongside the prevalence of adopters.

Rational evaluation characterizes a consumer who tends to purchase a pre-critical-mass-point product, while social influence characterizes consumers who tend to purchase the product post-critical-mass-point. The effect of social influence grows as the prevalence of triers in society increases, reaching a predominant parameter for extending the trial experience of the consumer into the full adoption in an exponential impact.

By using the prevalence of triers as an indicator for measuring the entry of a radically new nicotine product into the market, we were able to identify the sustainability of the really-new product at a much earlier phase. Early understanding of the magnitude of the product's hold in the market increases the possibilities of action by policymakers, while the considerations of the consumers are still rational. Thus, policymakers could oppose the new product before social influence reinforces consumers' consideration, by which time it becomes almost impossible to prevent the diffusion of such a product.

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Notes

Note 1. i.e., Demerit goods are products that society views negatively and discourages the consumption of by imposing limitations, restrictions, and penalties as part of the policy aims of the government (cf. Mann & Gairing, 2012; Musgrave, 1959; Walsh, 1987). Other examples of such products are alcoholic beverages, gambling, and prostitution.

Note 2. Wasson categorizes the market recognition of a product as a new type of product group as a "just noticeable difference" phenomenon (Wasson, 1974, p. 36). Recent researchers use the term "radical innovation" (Assink, 2006; Brexendorf, Bayus, & Keller, 2015; Christensen & Rosenbloom, 1995; Dahlin & Behrens, 2005; Karande, Merchant, & Sivakumar, 2011).

Note 3. Observations can be made based on an analysis of quantitative data regarding the nicotine products trade over an extended period. Few countries have collected quantitative data on trade in nicotine products for more than a century, and Israel is not one of them. Historical records of nicotine products sales in the United States were used in many studies for such a purpose (Giovino, 2007; Hajdu & Vadmal, 2010; Zitzewitz, 2003). The comparison of the nicotine market in the United States to that in Europe and the Middle East is problematic, since the use of tobacco for chewing was historically the predominant category in the North American market (Cook, 2006; Hannah, 2006; Hart & Mather, 1961), while consumers in Europe and the Middle East had a preference for pipe (Hartnett, 2004; Klioutchkine, 2009; Nourrisson, 1988; Romaniello, 2007; Shechter, 2003; Walker & Henderson, 2010). Thus, the quantitative data from France is more suitable as a benchmark for the historical dynamic of the nicotine market in Israel. The data shown in this essay was originally published by Catherine Hill (2004, 2015).

Note 4. While the combustible non-filter cigarette and the combustible filter cigarette with all its extensions can be defined as second industrial revolution products, pipe tobacco should be defined as an outcome of the commercial revolution (1100–1776), which preceded the first industrial revolution.

Note 5. Wilhelm Ruprecht suggests a different approach, differentiating between "wants" and "needs." According to Ruprecht, consumer needs are set by the individual according to his/her genetic origin and are common to human and non-human mammals. The "wants" of the individual evolve out of the personal information processing of personal knowledge about the conditional link between the satisfaction of a need and certain behaviour. Since the personal knowledge of each individual is different from that of other consumers, his/her "wants" are also unique to him/her, unless social reinforcement influences individual preference toward a certain cultural convention (Ruprecht, 2002).

Note 6. Following Coughenour's observation, two years earlier, of the necessity to separate between the decision or choice-making phase and the acquisition phase (*qtd. in* Klonglan & Coward, 1970).

Note 7. The flowchart represents the process of adoption when experiencing for the first time any product from a certain product group (trying to use any nicotine product for the first time in their lives), or a certain type of products.

Note 8. Research has found that the first signs of nicotine dependence among users appear within two weeks after their first routine use of a nicotine product (DiFranza et al., 2000).

Note 9. Rogers' results regarding the proportion of each level of inclination to adopt innovativeness were also validated by Thomas Hurt, Katherine Joseph, and Chester Cock (Hurt, Joseph, & Cook, 1977). For a more detailed discussion of each class of innovators, see: Beal and Rogers, 1958b, 1958a; Chatterjee and Eliashberg, 1990; Goldenberg, Han, Lehmann, and Hong, 2009; King and Summers, 1970; Lionberger, 1954; Lionberger and Coughenour, 1957; Rogers, 1959; Rogers and Shoemaker, 1971; Ryan and Gross, 1950; Wilkening, 1950, 1951, 1952.

Note 10. This distinction was found among JUUL users in the United States (Willett et al., 2019). Fortunately, in Hebrew, the use of an equivalent verb to "Juuling" did not evolve and it is likewise described as "vaping."

Note 11. Casual type of products aim to satisfy the user's need for nicotine without hindering other routine

activities, such as work or street walking. Such products include combustible cigarettes, IQOS, and electronic cigarettes. Other types of nicotine products are more suited to a leisure activity, such as pipes, cigars or cigarillos, and hookahs (cf. Brandt, 2007; Hammal et al., 2008).

Note 12. In certain communities, such as ultra-orthodox youth, the alternative to conscription is the commitment is to apply to one of the institutes for advanced study of religion (a Kollel), and to remain in this full-time learning institution at least till the age of 24 (Deferral of Service for Yeshiva Students Law, first amendment 5763-2003, article 2(2)).

Note 13. It is clear, based on existing data, that the end of the sales ban at the age of 18 is not the only reason, but further research is necessary to determine these additional causes.

Note 14. Until March 8, 2019, electronic cigarette users were free from the legal limitations set on combustible cigarettes.

Note 15. In the current research, we defined as "vapers" those responders who either reported a higher duration of vaping than smoking or reported non-smoking despite using a vaporizing device (electronic cigarette or heat-not-burn tobacco product) in the last month.

Note 16. Over the years, the Israeli government kept raising taxes on tobacco manufacturing and import, and by 2015 the tax on packed cigarettes reached 80.4% of the pack cost, and 38.3% of the cost for RYO tobacco (calculated based on Israel Ministry of Health, 2018). The tax on RYO tobacco was finally raised to the tax level of packed cigarettes only on February 21, 2019 (Customs Tax and Exemptions and Purchase Tax Ordinance (fourth amendment), 5779-2019), but this tax correction occurred after six years, during which the tax for RYO tobacco was much lower than the tax on packed cigarettes. The imbalanced tax between packed cigarettes and RYO tobacco affected the average price of these two types such that the cost of RYO tobacco was much lower than the equivalent amount of packed cigarettes. The lower tax and average price of the RYO tobacco between 2012 and 2016 led to an increase in sales of 1,236%; while packed cigarettes experienced only a mild increase in sales of 11.5% (Fatal, 2017). This shift from packed cigarettes to RYO tobacco due to cost was also noted in other countries, such as the United State (Agaku & Alpert, 2016), Spain (Fu et al., 2014), the United Kingdom, France, the Netherland, and Germany (Brown et al., 2015).

Note 17. The hookah even exceeds combustible cigarettes in its prevalence in Egypt and the Palestinian Authority, which share common borders (Maziak et al., 2015).

Note 18. The rate of hookah use in the last month among the Jewish population was extremely low, reaching only 23.1% (95% CI [16.89, 29.34]), probably because this product type is used for leisure in special social gatherings. The use-system of the hookah is not suitable for casual use. Therefore, this measuring tool is unsuitable for estimating the adoption rate at least for the past month.

Note 19. We define this relationship using the term "Adoption Probability," based on an equivalent term "Trial Probability" for the symbolic adoption phase (cf. Du & Kamakura, 2011; Sinapuelas, Wang, & Bohlmann, 2015; Steenkamp & Gielens, 2003). Since "Trial Probability" is generally used in the context of CPG, it seems that the term "Adoption Probability" would be also more relevant for CPG than for durable goods.

Note 20. i.e., The early majority views commercial sources as unreliable (Beal & Rogers, 1958a, 1958b), while early adopters rely on commercial information and are more commercial-oriented (Goldsmith, Flynn, & Goldsmith, 2003; Rogers, 1959).

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